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Functional Abilities of Adults with Intellectual Disability

Mini Mathew
P.S. Sukumaran[1]

There are different types of disabilities and each of these come with their own set of issues and limitations. While most students in special education need to learn functional skills, teaching functional skills to students with intellectual disabilities represents different challenge then teaching those with disabilities that may be emotional or behavioral. Those with intellectual disabilities will need to have help comprehending various functional skills before they ever get to actually utilize them. The present study aims to examine the extent of functional ability skills among adults with intellectual disability in relation to the presence or absence of mother, degree of disability, duration of special school and regular school education and present status. The investigator randomly selected 200 subjects of 18-45 years of age from Ernakulam and Kottayam district of Kerala. A standardized tool was administered to examine the functional academic skills among the subjects. The result indicated that most of the adults with mild intellectual disability have moderate level functional skills while adults with moderate, severe and profound intellectual disability are in nonfunctional level.

Key words: Intellectual disability, Functional skills

Functional skills are all those skills a student needs in order to live independently. The final goal of special education should be for students to gain as much independence and autonomy as possible, whether their disability is emotional, intellectual, physical, or a combination of two or more (multiple) disabilities. "Self Determination" is the highest goal of special education for the students.

Skills are defined as functional as long as the outcome supports the student's independence. For some students, those skills may be learning to feed themselves. For others , it may be

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ATTITUDE OF PARENTS OF PERSONS WITH INTELLECTUAL DISABILITY TOWARDS REHABILITATION PROGRAMMES

P. S. Sukumaran and Shimmy Rosy P. A.

Abstract

Present study examines the attitude of parents of persons with intellectual disability towards rehabilitation programmes. A sample consisting of 154 parents of persons with intellectual disability was randomly selected for the study. Attitude scale for parents towards rehabilitation was used for the collection of data. Data were analysed using 't' test and ANOVA. The results indicate that the attitude of the parents of persons with intellectual disability towards the rehabilitation programme is neutral. The findings of the study suggest the need for various programmes for creating awareness on rehabilitation and to create more positive attitude towards rehabilitation.

Introduction

Intellectual disability is just not a medical condition. It is a disability characterized by significant limitations both in intellectual functioning and in adaptive behaviour as expressed in conceptual, social and practical adaptive skills. The disability originates before the age of 18 (American Association on Mental Retardation, 2002). The lives of persons with disabilities are made difficult not so much by their own impairments, but by the way the society interprets and reacts to disability. Disability segregates and habitually isolates the persons from their own community. They are not considered as a part of main stream life. It is not generally recognized or accepted that disabled people have equal rights as other citizens of the country and should have access to equal opportunities like others. As compared to children of same age, the child with intellectual disability has significant developmental hindrance and lags behind in cognitive, language, social, vocational and motor functions.

Persons with disability means persons with long term physical, mental, intellectual, or sensory impairment which, in interaction with barriers, hinders his full and effective participation in society equally with others (RPWD Act, 2016). During 2012–2013, Government of Kerala appointed a commission to study the problems and needs of persons with intellectual disability. After a comprehensive study regarding the problems faced by the intellectually disabled a report was submitted. Along with this, 169 recommendations in relation to the roles and

Personality Profile of Alcohol Dependence Syndrome Using Rorschach Exner's Comprehensive System

Suresh Kumar, M., Rajeev Kumar, N and Sarath S.S.

ABSTRACT

Personality of addictions received much attention with in conclusive results. Present study is an attempt to fill this gap using a projective test. A 50 ADS patients and demographic characteristics matched control subjects recruited. Administered Demographic proforma, MAST, GHQ-12 and Rorschach Ink-blot tests (RCS). On analysis it is found more than the half of the Rorschach variables differ between groups. A poor control over stress with poor affect and self-perception pointing towards addiction.Analysis also gave much information regarding alcohol personality dynamics such as their poor coping ability, self-perception, affective regulation etc.

Keywords: Dependence, Alcoholism, Rorschach, Exner's Comprehensive System, Personality.

INTRODUCTION

Understanding the personality of alcohol dependents has a long history with contradicting results (Hansenna, Delhez & Cloninger, 2005). A satisfactory explanation for the existence of specific personality traits has been questioned by the scientific community even now. Findings regarding personality and Alcohol Syndrome Dependence (ADS) can be classified into - Studies between (1) neuroticism and negative emotionality (2) impulsiveness and lack of inhibition and (3) extraversion and sociability (Leonard, 1999). The first category deals with emotional traits including anxiety-related personality. The second category incorporates traits such as aggressiveness, impulsivity and psychoticism. The type I and type II classification of addicts shows-types II shows low harm avoidance and high novelty seeking along with somatic anxiety, verbal aggression, impulsiveness, monotony avoidance, low socialization and inhibition of

Current scenario of organ donation and transplantation in Kerala, India

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Organ transplantation has been an accepted mean of treating patients with severe organ failure in India for nearly five decades. However, the organ donation rate of people who have died in India is very low (0.26 per million population), and this low rate partly contributes to the deaths of 500,000 people every year due to lack of available organs [1]. Kerala, one of the southern states in India with 35 million inhabitants, claims some of the best health statistics in the country, in fact some are similar to those in the high-income countries, has a deceased organ donation rate of 1.03 per million population [2]. Although this rate is four times higher than the national rate, it remains lower than that of the neighboring state of Tamil Nadu which has the highest deceased organ donation rate in the country (1.9 per million population) [2]. Alarmingly, the deceased donor transplant data by Kerala Network for Organ Sharing (KNOS) revealed a significant decline in number of donations in recent years. In 2015, there were 218 major organ donations by 72 deceased donors whereas only 29 major organs were donated by 8 deceased donors in 2018, which suggests major limitations of the existing deceased organ donation programme at governmental level [3].

Lack of or negligible brain death declaration in many hospitals across the state was identified as one of the major reasons for delays or lack of organ donations. Working closely with Donation and Transplantation Institute of Spain, the Government of Kerala recently provided a training programme on Transplant Procurement Management for professionals (mainly neurologists and anesthetists) from all over the state [4]. The training programme included establishing brain death and best ways of obtaining consent from relatives for organ harvesting and transplantation [4]. Moreover, the government is currently planning to introduce a new position of Transplant Coordinator in every hospital in the state to facilitate deceased organ donations. Brain death declaration in Kerala is being performed by a board of medical experts which include two doctors from outside the hospital where the brain death patient was treated, and one should be a doctor employed in the government facility. In addition, now there is a regulation to videotape the apnea tests conducted for the assessment and diagnosis of brain death. These medical governance measures will ensure transparency in the process which will ultimately address the misconceptions about organ donation in the healthcare system that may exist among the population.

LETTER TO THE EDITOR

Cervical cancer screening and HPV vaccination challenges in Qatar

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Public Health has several important tools in its arsenal, including screening for diseases and offering the public various vaccinations. Qatar introduced an important programme this year, offering Human Papilloma Virus (HPV) vaccination.

Cervical cancer is among the top ten cancers in the world with an estimate of 527,624 new cases and 265,672 deaths in 2012. [1] Cervical cancer constitutes an age-standardized incidence rate (ASIR) of 5.1 per 100,000 and age-standardized death rate (ASDR) of 2.4 per 100,000 in Qatar. [1] In addition, it is the fifth most common cancer among women, in the State of Qatar. Cervical cancer screening services are free in the primary health care corporation (PHCC), but it is difficult to make an appointment. It can take more than one month to get an appointment with a general physician and subsequently there is a further delay of several weeks in getting a referral consultation to a well women clinic for cervical cancer screening. Similar problems have been found in England, where Waller and colleagues showed that 'difficulty to make an appointment' was a barrier to cervical cancer screening. [2]

In January 2018, the Qatar Cancer Society (QCS) launched 'Darbek Khadar', its one-month campaign. The aim of this campaign is to raise awareness about cervical cancer and the importance of early screening. In addition, it also aimed to increase the willingness among the population to get a Pap smear test. This campaign will return in the month of January every year. This year, as part of the 2018 campaign women have come forward for a free Pap smear test at Al Emadi and Al Ahli hospitals. [3] The Qatari campaign recognized the development of primary health care development in the introduction and management of cervical cancer screening services [4]. In Qatar screening is offered to women aged 21 and over every three years until age 49, and every five years for women aged between 50 and 64.

QCS also organized a lucky draw among women who underwent the Pap smear test at Ritz Carlton Hotel on 28 January 2018. This was mainly to increase willingness among women to come forward. This event included an interactive session with the health educators about cervical cancer. It was a great initiative by QCS, but there were some pitfalls. Even though it was for the whole population including foreign workers (or expatriates), some people were not aware of this programme. Areas that could have been improved were the ways to draw public attention to the programme. Mass media advertising could have been

Original Research Article

A study on the quality of life and adjustment of adolescents with acne vulgaris

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ABSTRACT

Background: Acne vulgaris is a seemingly harmless disease affecting majority of adolescents. It is actually a psycho-dermatological disorder associated with psychological trauma. The impact of acne on the quality of life of Indian patients remains undocumented. A study is undertaken to assess the impact of acne on health, family, emotional and social wellbeing of acne patients.

Methods: 100 patients between age group of 13 to 19 years with acne vulgaris, attending St. Antony's Skin Clinic, Pala, Kerala, between April 2010 and March 2012 were selected for study. The control group consisted of 100 adolescents without acne. Both groups had no other dermatological or systemic disease. Acne cases were graded using global acne grading system. Quality of life was assessed using WHO QOL BREF. Four domains were derived from this, physical and psychological health, social relationship and environment. Adjustment levels were assessed using adapted version of bell adjustment inventory.

Results: The parameters assessed were quality of life, family, social, emotional, health related and overall adjustments in those with and without acne and severity of acne in relation to quality of life and all values were significantly in favour of those without acne.

Conclusions: Acne affects personality, self-esteem and self-image of patients. It affects social interaction. Adolescents with acne report low quality of life and resultant poor psychosocial adjustment. There is an inverse relation between severity of acne and quality of life. The severity levels and adjustment also has an inverse relationship.

Keywords: Quality of life, Adjustment, Acne vulgaris

INTRODUCTION

Acne vulgaris is a seemingly harmless disease affecting a vast majority of adolescents all over the world. It is considered as a mere nuisance by most of the people including physicians. It is actually a psycho-dermatological disorder which is associated with very severe psychological problems. Medicines alone usually fail to cure the disease.

Psychosomatic medicine is a branch of psychiatry which deals with the interaction and relationship between psychological factors and physiological phenomena. Psychosomatic diseases involve all the systems of the human body. Psychodermatology deals with the psychological causes of cutaneous disorders and the patients' psychological predisposition to suffer from skin diseases. A large number of dermatological conditions are classified as psychocutaneous disorders using

RESEARCH ARTICLE

LIFE STYLE AND HEALTH RISK BEHAVIOR OF YOUTH IN BANGALORE

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ABSTRACT

Introduction: The leading causes of mortality and morbidity among young people can be traced to several preventable health risk behaviours that are often initiated during youth and may extend into adulthood. Intermittent monitoring of health risk behaviours at the youth level is important for the planning and evaluation of national health promotion intervention programs. Half of the premature death from the 10 leading causes in developed countries is caused by preventable factors such as tobacco use, alcohol abuse, physical inactivity, unhealthy dietary habits etc. **Aim:** The aim of the study was to understand the life style and extend of health risk behavior among youth in Bangalore. **Methods:** A cross-sectional study was conducted in selected six Business school students of Electronic city of Bangalore using multistage sampling technique for selecting 165 students who pursuing Master of Business Administration during September -November 2015. Data analysis was done by SPSS version 17. **Result:** The study reveals that, more than one third (36.4%) of the students had smoked at least once. Only negligible proportion of the students had experienced or chewing tobacco or pan. Less than half of the students (46.7%) were consumed alcohol. It was quite alarming that 7.5% had taken drugs at least one time in their life. High prevalence of health risk behaviours and increases in some of them should call for intensified college health promotion programmes to reduce such risk behaviours. Health-promotion activities should be established to decrease the occurrence of these behaviours and prevent their future adverse health outcomes.

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INTRODUCTION

Lifestyle diseases and their associated risk factors are now the major causes of premature morbidity, mortality, and economic loss in developed and developing countries, including the younger age groups. Non-communicable diseases have emerged rapidly killing 38 million people (68%) each year globally, of which 16 million deaths (>40%) occur before 70 years. This rapidly growing epidemic of non-communicable diseases is responsible for 50% of India's deaths. The rise of non-communicable diseases has been driven by primarily four major preventable behavioral risk factors, namely tobacco use, unhealthy diet, physical inactivity and harmful use of alcohol. This is mainly due to changing lifestyles of populations due to westernization of our country, demographic transitions and modification of our own culture. Lifestyle is the way humans chose to live their day to day lives which may be related to social, occupational or environmental factors. A healthy lifestyle is about striving to obtain a reasonable balance between enhancing one's personal health, the health and well-being of others, and the health of the community and according to the World Health Organization (WHO), health is a state of complete physical, mental, and social well-being not merely absence of disease or infirmity.

Promoting healthy lifestyles is a challenge for many primary care practices. Although most individual understand the importance of physical activity and healthy eating, many seem unable to change their unhealthy behaviors to reduce weight and improve chronic conditions, and lifestyle changes have been shown to significantly reduce morbidity and mortality rates for most chronic diseases. An unhealthy lifestyle can contribute to the development of risk factors of non-communicable diseases (NCDs) such overweight and obesity can lead NCDs such as diabetes, hyperlipidemia, cardiovascular diseases (CVDs), and hypertension. Thus, obesity is an important risk factor of NCDs. Many studies have implicated weight gain in the patho physiology of hypertension, diabetes, CVD, and cancers. Moreover, obesity can lead to increased mortality and disability and rising costs of treatment in most communities. Annually, 300,000–587,000 deaths worldwide are attributed to obesity. Obesity is considered as the second important preventable cause of death worldwide. Adequate dietary habits and regular practice of physical activities and exercises are important components of a healthy lifestyle that are associated with decreased risk of chronic non transmissible diseases such as Type 2 diabetes, hypertension, obesity, some cancers, and the metabolic syndrome.

Teacher and Parent Perceptions of Comprehensive Sexuality Education for Individuals with Intellectual Disability in India.

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Introduction: Global research indicates sexual abuse is prevalent for individuals with intellectual disability and that they generally have a limited knowledge of matters related to sexuality and relationships. Parents and teachers play a leading role in providing comprehensive sexuality education (CSE), however, to date there is limited information on their perceptions toward the matter.

Methods: The purpose of this study was to make a unique attempt to analyze the perception of parents and teachers of individuals with intellectual disability in Kerala, India on the need for CSE by using Sexual Education Needs Survey (SENS) consisting of seven constructs developed by the researchers. A total of 264 teachers and 418 parents of individuals with intellectual disability completed the survey with a response rate of 82% and 69.7% respectively.

Results: The majority of teachers (70.45%) and parents (65.31%) perceived an overall high need for CSE for individuals with intellectual disability. Teachers had an across the board higher perception of the need for CSE across each of the seven constructs than parents.

Implications: There are limited tools or curricula available for CSE globally, and especially in Kerala. While efforts on the part of individual teachers or parents are important, they need support from schools and governmental agencies to provide adequate and appropriate CSE that meets the varying needs of individuals with intellectual disability.

Keywords Intellectual Disability, Sexual Abuse, Sexuality Education, Perception

TEACHERS' PERSPECTIVES ON DIFFERENTIATED INSTRUCTIONS FOR STUDENTS WITH INTELLECTUAL DISABILITY IN INCLUSIVE CLASSROOM.

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Introduction: The fundamental characteristic of inclusive education is the teachers'willingness to accept students with special needs; their attitudes and knowledge about inclusive education are important as these are indicators of such willingness. In order to achieve this undertaking, teachers in inclusive classrooms play a major part through their attitudes. The practice of inclusive education requires the involvement of and collaboration between educational professionals.

Methods: The present study aimed to find the level of awareness and nature of attitude and its relation of middle school teachers on differentiating instructions for students with intellectual disability in inclusive education classroom. Descriptive survey method of research was employed for the study. The study sample consists of 107 middle school teachers who are working in different schools in Kerala, India where individuals with intellectual disability are provided education.

Results: The study reveals that the majority of middle school teachers show average awareness and neutral attitude on differentiating instructions for students with intellectual disability. The study also shows a positive relationship between awareness and attitude on differentiating instructions for students with intellectual disability.

Implications: The involvement of teachers is possible only through creating high awareness and by having high positive favorable attitude towards differentiating instructions for students with intellectual disability. So there should be opportunity in teacher training programs to know about differentiated instructions.

Keywords: Differentiated Instructions. Inclusive Education. Awareness. Attitude

A Study on the Importance of Parent Child Relationship in Early Developmental Stages of Children with and Without Specific Learning Disabilities

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Dr. P. S. Sukumaran, Professor, M.G. University

The present study is conducted to find out the importance of parent child relationship in early developmental stages of children with and without specific learning disabilities. The objectives are to identify the nature and extent of Demanding, Indifferent Behaviours, Loving, Neglecting, Protecting, Rejecting, Symbolic Punishment, Object Punishment, Symbolic Reward and Object Reward in PCRS during early developmental stages of children with and without specific learning disabilities. Using purposive sampling technique, 35 children with specific learning disabilities consisted of boys and girls ranging age from 5-12 attending normal schools and children without specific learning disabilities consisted of boys and girls ranging age from 5-12 attending normal schools were selected individually from Kottayam, Ernakulam and Allepey Districts. The tools used are (a). General Data Sheet (GDS) are used as the tools for collecting data and (b) Parent Child Relationship Scale (PCRS), Dr. Nalini Rao, Assistant Professor, Department of Education, Bangalore University, Benagluru (1989). Statistical techniques used are Descriptive Statistics of Domain wise PCRS Scores of Students with and without Specific Learning Disabilities and Mann Whitney U Test for the comparison of the scores obtained for the domains of PCRS of students with and without specific learning disabilities. The study reveals that Quality Time spent by Parents, Parenting Styles, Social Relationships, Parental Punishments, Demanding Nature of Parents, Play Methods, , etc have major role in the early development of children in achieving learning skills.

OBJECTIVES:

1.   To identify the nature and extent of the 'Demanding' in PCRS during early developmental stages of children with and without specific learning disabilities.

2.   To identify the nature and extent of the 'Indifferent' behaviours of parents in PCRS during early developmental stages of children with and without specific learning disabilities.

DEVELOPMENT AND STANDARDIZATION OF COGNITIVE FUNCTION ASSESSMENT TEST (CFAT) FOR CHILDREN WITH MILD AND MODERATE INTELLECTUAL DISABILITY

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Abstract: Cognitive Function assessment is necessary to maintain/ improve the Cognitive Function of children with Intellectual Disability. Widely accepted tools/ tests are not available for the term/interim assessments of children with mild or moderate Intellectual Disability. Special teachers and non- medical health professionals have an urge for such culturally developed tests. Hence, the Investigator decided to develop a test. The draft copy of test included 35 items and which was evaluated by experts. After the try out in 20 subjects, the test was administered among 202 children with mild and moderate Intellectual Disability. Items were finally reduced to 29 from 32 after the analysis by using t- test (>2.5) and corrected item correlation (>0.2). The items were sorted under 7 components after the principal component analysis and varimax rotation. The reliability of the test is 0.856.

Keywords: CFAT, Cognitive function, Intellectual Disability (ID).

I.   Introduction

Intellectual disability is a disability characterized by significant limitations both in intellectual functioning and in adaptive behaviour which covers many everyday social and practical skills. This disability originates before the age of 18 (AAID, 2013). Intellectual functioning include learning, problem solving and judgement. In Intellectual disability, deficits occur in language development, reasoning, problem solving, planning, abstract thinking, judgement, academic learning and learning experience (APA, 2016). Pre-natal, natal or post natal factors or errors can make Intellectual Disability. Children's with Intellectual Disability needs support to maximize their individual's ability

A 2011 meta-analysis of international studies shows prevalence of ID among adults and children across the life span to be 10.36/1000 and 18.3 respectively. Male to female ratio of ID among children is 1:1. Usually, intellectual function (cognitive function) can be assessed with the help of standardized IQ test. IQ test is the test describes the level of intellectual ability of a child but, this test can be administered by a qualified medical practitioner or psychologist.

Based on the need assessment study conducted by the investigator, in Kerala many schools lack the regular review from a medical person or psychologist. The IQ tests are very expensive in nature and regular special schools are not able to purchase that. Even though they are purchasing, the teachers cannot administer the test. During the time of school admission, one IQ test will conduct and thereafter no follow up. IQ test is best for diagnosis and categorization. But it is felt that, a simple cognitive function test (which is culturally and economically affordable) is needed to measure their cognitive function in between the school terms. The test

DEVELOPMENT AND STANDARDIZATION OF A SCALE FOR THE ASSESSMENT OF TEACHER'S PERCEPTION ON COGNITIVE FUNCTIONING OF CHILDREN (PASCFID) WITH MILD AND MODERATE INTELLECTUAL DISABILITY

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ABSTRACT

Research is always guided by quality instruments. This will decide the reliability of results. The investigator developed a Perception Assessment Scale for teachers to give their response regarding the cognitive functioning of children with mild and moderate Inucllectual Disability. The scale is implemented among 115 special teachers and the instrument is likert scale with 25 items initially. After the t-test and exploratory factor analysis (principal component analysis with varimax rotation) 24 items were remind in the scale under 5 components. The reliability of the scale was 0.859.

INTRODUCTION

Intellectual Disability is a label used to describe a constellation of symptom that includes severe deficit or limitation in an individual's developmental skills in several areas or domains of function: cognitive, language, motor, auditory, psychological, moral, judgemental and specific integrative adaptive (activities of daily living).

As per the Census 2011, 2.68 Cr persons were disabled in which 6% was intellectually disabled in India. NSSO Report NO: 393, 1991 shows that enrolment of those children in rural and urban schools were 0.01%.

Intellectual functioning is usually assessed with a standardized intelligence test by a doctor or clinical psychologist. Parekh, 2017 suggest that IQ Score of 70-75 indicate a significant limitation in IQ Function. However, IQ score must be interpreted in the context of person's difficulties in general mental abilities. Moreover, scores on IQ can vary.so that the full scale of IQ score may not accurately reflects overall Intellectual Functioning.

In 1998, Director General of Health Services, Government of India gave guideline for converting the IQ in to degree of disability as borderline (IQ= 70-79) has 25% of disability, mild (IQ– 50-69) has 59% of disability, moderate (IQ– 35-49) has 75% of disability and profound (IQ<20) has 100% disability.

Developmental Assessments are important because fine motor skills can predict improvements in Pre-schooler's cognitive and social skills. The USA study conducted among 2027 pre-kinder garden students shows some evidences. There are association between motor, cognitive and social skills but, they may vary by disability type. Fine motor skills can predict improvements in ID.

Education for children with ID has evolved from no education to special education and Integrated education to present day inclusive education respectively. According to PWD Act 1995 and UNCRPD 2007, inclusive Education offers education to each child irrespective of disability and social class.

RTE Act, 2009 under Article 21A guarantee that every child between 6 and 14 has a right to full time elementary education. Experts working with CWSN feel that children with mild to moderate category will definitely benefit from inclusive education. However, children with severe form of disability will require to be taught in special schools or through home based programme.

Teachers and parents are real persons those who are observing and assessing the children. They can provide real evidences regarding their functional aspects. Regarding the cognitive function, teachers are the first assessment persons and they can easily categorize the child. These assessment findings will act as the basis for their further teaching and moulding plan. So I think teachers can contribute much for this scale.

OBJECTIVE OF THE STUDY

The objective of this study is to develop and standardize a culturally appropriate scale for the teacher's perception on cognitive functioning of children with mild and moderate intellectual disability.

PLANNING ABOUT THE TEST

As a part of cognitive function assessment test preparation for ID children, the investigator searched for reviews but the related studies are a few. Especially there are few studies from the perspective of special school teachers. So, the researcher decided to do a survey on that. For that purpose investigator developed a perception assessment scale and made an attempt to standardize the scale.
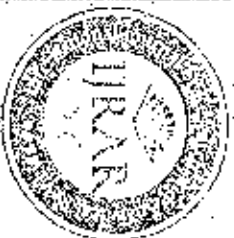
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A STUDY ON THE ANXIETY AND ACADEMIC ACHIEVEMENT OF CHILDREN WITH LEARNING DISABILITIES

EDITOR IN CHIEF

Heliyon

Chemotaxonomic profiling of *Penicillium setosum* using high-resolution mass spectrometry (LC-Q-ToF-MS)

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A B S T R A C T

In the present study, secondary metabolites produced by an endophytic fungus *Penicillium setosum* were extracted using colony agar plug and culture broth extraction methods. High resolution LC-MS was used to explore the chemical nature of the secondary metabolites, as well, to compare the reliability of the methods. *P. setosum* was chemotaxonomically distinguished from other members of section *Lanata-Divaricata*, by its ability to produce mycotoxin, patulin and also by the presence of certain phenol-derived compounds like quercetin, dihydroflavonols (dihydroquercetin and dihydromyricetin), kaempferol, luteolin, while some *Penicillium* specific compounds such as chrysomycin and andrastin D reveal its similarity/convergence to *Lanata-Divaricata* members. For the first time, the presence of dihydroquercetin (taxifolin) and quercetin metabolite is reported from a microbial source. In addition, a few polyketides, anthraquinone compounds, hydrocarbons, and fatty acids were also detected in the culture extract. Being the first report on the production of polyphenolic compounds by an endophytic fungus of *Penicillium* species, the current research is crucial and moreover the strain itself is a novel species.

1. Introduction

Endophytic fungi are diverse polyphyletic groups of microorganisms, and are thrive asymptomatically in different healthy tissues of living plants above and/or under the ground, including stem, leaves, and/or roots (Jia et al., 2016). They establish an irreplaceable plant-microbe interaction entirely inside the plant tissues without affecting them initially. The close interaction offers metabolic interchanges and support the synthesis of some valuable compounds of the plant and the endophyte. Studies have reported that some isolated endophytes are able to synthesize certain secondary metabolites in culture media, which are typically produced by the plant. The central examples are production of taxol by *Taxomyces andreanae* (Stierle et al., 1993), podophyllotoxin by *Phialocephala fortinii* (Eyberger et al., 2006), deoxypodophyllotoxin by *Aspergillus fumigatus* (Kusari et al., 2009a), camptothecin by *Fusarium solani* (Kusari et al., 2009b), piperine by *Colletotrichum gloeosporioides* (Chithra et al., 2014).

Withania somnifera (common name: Ashwagandha, Family: Solanaceae) is a widely-known medicinal plant having various therapeutic qualities. It is an inevitable component in the Ayurvedic medicinal preparations like Rasayana. This plant has not been explored enough for

its endophytic occurrences. So, endophytes present in this less-explored medicinal plant may be of great importance, in terms of investigating the biosynthesis of natural products and/or bio-active metabolites. In a previous work, we had isolated a novel *Penicillium* species from the surface sterilized root of *W. somnifera*. The identification of its secondary metabolites is being dealt here.

Penicillium is one of the most promising biologically active metabolite producers of the fungal genera among the group of micro-fungi. Under different environmental conditions, almost 429 species have been already reported in this genus (Visagie et al., 2014). Since the discovery of penicillin from *P. notatum* by Alexander Fleming, *Penicillium* species have gained much attention for discovering novel bio-active secondary metabolites/extrolites. *Penicillium* isolated from little studied habitats have shown the ability to synthesize both previously-known and new physiologically-active compounds with diverse structures (Frisvad et al., 2013). Novel species have been reported continuously from these genus together with their prospective biological action.

Filamentous fungi like *Penicillium* are difficult to discriminate using a conventional morphological approach, so extrolite profiling analysis was considered as an additional assistance in this regard. A profile of secondary metabolites is comprised of all the different compounds

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RESEARCH ARTICLE

Aerobic Biodegradation of the Anionic Surfactant Sodium Dodecyl Sulphate (SDS) at Sub and Supra Critical Micelle Concentrations

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Abstract

The anionic surfactant Sodium dodecyl Sulphate (SDS), the core components of detergent and cosmetic product formulations, contributes significantly to the pollution profile of sewage and wastewater by its long usage, to its high foaming capabilities which can cause numerous problems in sewage treatment facilities as well as the direct toxic effects on many different organisms in the ecosystem, it is generally considered to be a serious pollutant. In this study, 44 SDS degrading strains were isolated by soil enrichment methods and its utilization efficiency was assessed by methylene Blue Active Substances (MBAS) assay and HPLC method. The most efficient SDS degrading isolate was identified as *Pseudomonas aeruginosa* MTCC 10311 based on phenotypic features and 16S rDNA typing. The reduction of SDS in the synthetic wastewater contained subcritical micelle concentrations (CMCs) and supra CMCs of SDS by free cells and immobilized cells of the isolate *Pseudomonas aeruginosa* (MTCC10311) were investigated. Free cells could degrade upto SDS 71% and 80 ± 2% of SDS in the synthetic waste water contained sub CMCs and supra CMCs of SDS at a residence time of 48 hours, whereas with immobilized cells same result was obtained at a less residence time of 32 hours. In conclusion, the isolate *Pseudomonas aeruginosa* can be exploited for the SDS removal from industrial sewage contained high concentration of SDS.

Keywords

Biodegradation, Critical micelle concentrations, HPLC, Sodium dodecyl sulphate, *Pseudomonas aeruginosa*

Introduction

Surfactant based processes are becoming increasingly important in pollution control. The use of surfactant can significantly enhance conventional groundwater pump-and-treat processes for the clean-up of contaminated soil and aquifers. Surfactants, in the form of conventional foams, micro-gas suspensions and micelles have also shown promise in wastewater treatment [1]. These surfactant-based technologies are at an expense of leaving residual surfactants in the produced water or the subsurface environment. Surfactant removal becomes a necessity for the successful application of these technologies.

Surfactants contain both strong hydrophobic and hydrophilic moieties. According to the charge of their hydrophilic moiety, surfactants can be classified into four categories: Anionic, non-ionic, cationic and amphoteric [2]. Anionic surfactants are one of the most frequently employed surfactants used in detergent formulations. The predominant classes of anionic surfactant are linear alkylbenzene sulfonate and linear alkyl sulfate [3].

There is an urgent need to search for new possibilities of enhanced degradation of surfactants. Bacterial degradation of pollutions has proved to be very efficient especially in combination with immobilization methods. Immobilization of bacterial cells offers several advantages such as prevention of cell losses in continual processes and allows working with high cell densities [4]. Furthermore, immobilized organisms are more resistant to adverse effects occurring during the degradation processes like changes of physico-chemical parameters such as pH, temperature, fluctuations of substrate concentration, presence of toxic substances etc.
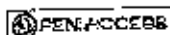
Probiotic Spore Formers Enhances Host Health

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Abstract

Wild species of sporeformers from various sources has remarkable probiotic potential. Many of the isolates possess antihemolytic, antilecithinase activity, acid and bile tolerance, resistance to artificial gastric and intestinal fluids and antagonistic action towards pathogens. Most of the spores and vegetative cells of isolates showed excellent resistance to acid and bile. Many of the wild species of sporeformers are able to produce siderophores, and antimicrobial substances. Adhesive rate of sporeformers were found to be more than vegetative cells on intestinal mucous. Both spores and vegetative cells were auto aggregating but auto aggregation of vegetative cells was found to be more than that of spores. Vegetative cells of isolates coaggregated pathogens while spores remained to be not aggregating. In vivo immunomodulatory studies also proved that the sporeformers has a significant role in improving both humoral and cell mediated immunity. Ingestion of probiotic spores is very significant because they can survive in the harsh gastrointestinal conditions which further germinate to vegetative cells during favorable situations.

Keywords: Probiotics; Sporeformers; Antagonism; Cell surface property; Gut immunity

Introduction

The concept of probiotics has a long history of health claims. For example, in a Persian version of the Old Testament (Genesis 18:8), it states "Abraham owed his longevity to the consumption of sour milk. Replacing mixed antibiotics with non-antibiotic alternatives is, therefore, an ever-increasing necessity. However, the withdrawal of all growth promoting factors is not a simple matter since this will not only affect feed efficiency but will also increase the mortality and morbidity of animals [1]. Sporeformers are capable of growth and metabolic activity only when in the vegetative state, and resort to sporulation when conditions of inadequate nutrition or other challenge to survival is experienced [2]. Currently, there is no universal class of probiotic bacterium although the most common types available are lactic acid bacteria (e.g., Lactobacillus spp.). These bacteria are found normally in the gastrointestinal tract (GIT) of humans and animals and above is the vague notion that the use of indigenous or commensal microorganisms is somehow restoring the natural microflora to the gut. A second class comprises those that are not normally found in the GIT. For example, Saccharomyces boulardii has been shown to be effective in preventing the recurrence of Clostridium difficile-induced pseudo membranous colitis [3] as well as the antagonistic action of Escherichia coli [4]. S. boulardii products are currently being marketed for human use. Within this group of allochthonous probiotic microbes are the spore-forming bacteria, normally members of the genus Bacillus. Here, the product is used in the spore form and thus can be stored indefinitely on the shelf. The use of spore-based products raises a number of questions though. Since the bacterial species being ingested are not considered resident members of the gastrointestinal microflora, how do they exert a beneficial effect? Because the natural life cycle of initial efforts to document a physiological impact of probiotic bacteria often focus on the following three criteria:

a) inherent characteristics of strains that would enable intestinal tract survival

b) the fate of the fed bacterium, and

c) the impact of consumption of the live bacterium on intestinal flora.

It should be noted, however, that effects beyond an impact on intestinal flora, and at extra intestinal sites, have been documented for many probiotic strains [4]. A few such studies have been done with sporeformers. Hydrophobicity, auto aggregation and mucin adhesion are important attributes which help in the attachment to various substrate that explain the probiotic nature of the microorganism [5].

The Gut as A Habitat for Sporeformers

Since spores of Bacillus species can readily be found in the soil, one might assume that the live (vegetative) bacteria that produced these spores are also soil inhabitants. This, however, is proving an unfounded assumption and, of course, the ability of spores to be dispersed in dust and water means that spores

In Search of Energy Efficient WBAN for Patient Monitoring

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Abstract – Currently, interests in Healthcare Monitoring System (HMS) based on Wireless Body Area Network (WBAN) have grown substantially. HMS reduces the healthcare cost and a great deal of work of the medical staff that involves the collection and analyzation of the information through the continuous monitoring of patient health. In a WBAN based health monitoring systems, low-energy consumption is one of the most challenging requirements. Many techniques have been proposed to reduce the energy consumption of the sensor nodes out of which the novel data segregation and classification technique is considered to be the most important one. This method plays an important role in reducing the energy consumption of the sensor node but does not maintain a full medical history of the patient. This paper solves this issue by introducing a data reduction and compression algorithm that separates the sensor's readings into critical and normal packets and transmits only the necessary packets from both thereby maintaining the full medical history of the patient with a reduced energy consumption. Moreover the size of the critical packets to be transmitted is reduced using delta encoding technique which further reduces the energy consumption. The performance evaluation of this work using OMNET+– shows promising results in terms of energy consumption.

Keywords – Delta encoding technique, Energy efficiency, Health Monitoring System, IEEE 802.15.4,Wireless Body Area Network, Wireless transmission

I. INTRODUCTION

With the increasing population and urbanization, humankind tends to move towards an unhealthy lifestyle resulting in diseases. The rate at which the diseases are occurring is greater than the number of medical centres ready to provide support. It is important that a patient gets enough medical care even if doctors and hospitals are inaccessible [1]. The current developments in the field of wireless networking technologies and the advent of integrated electronic circuits offering very small and intelligent sensor nodes able to be used on or implanted in the human body has led to the development of WBANs. Presently, WBAN constitute an active field of research and development as it offers the potential of great improvement in the monitoring of healthcare [2]. WBAN technology can be deployed within a hospital, care home environment or in the patient's own home.

WBANs consist of a number of heterogeneous biomedical sensor nodes which are placed in different parts of the body. They can be wearable or implanted under the user skin. The fast growth of wireless technologies and personal area networks enables the continuous healthcare monitoring of patients using these heterogeneous biological sensor nodes that collect and evaluate body parameters [3]. Equipped with WBAN, the physiological attributes, such as pulse rate, body temperature, blood pressure and SPO_2 could be continuously monitored by sensor nodes. Honestly, taken good care of by WBAN, elderly people and patients who are always at home or hospitals could get mobility support, freely roaming in the coverage of a telemedicine system. In a WBAN based health monitoring system, the medical information of the patient is collected automatically by various heterogeneous biological sensor nodes. These data are then transmitted to a local medical server directly or to a remote medical server through Internet via a coordinator. The medical personnel can then

A Review on Various Nearest Neighbor Searching Algorithms Using Graphical Processing Units

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Abstract—The demand for Graphical Processing Units or GPUs, gained a tremendous hike during the past few years as a result of its migration from processing and representation of mere high dimensional graphical patterns to a heterogeneous high performance computing capability. The future generation data science requirements like Big Data Analysis and Deep Learning increased the popularity of GPUs to a wide extend. Graphical Processing Units or GPUs are well suited for parallel processing which enables visualization of vast amount of real time processed data in a more significant manner than CPU. From processing mere graphical algorithms, GPU has gone through numerous advancements in the past few decades. They can be used to improve the performance and efficiency of any algorithm nowadays. The expenditure of installation and use of GPUs have come down to a great extent from the initial huge amount. Data classification tasks like kNN classification can be done more efficiently and cost effectively by applying parallelism using GPU. kNN algorithms are the most popular data classification algorithm, because of its simplicity, high accuracy and versatility. This paper studies four major kNN algorithms developed for GPU processing and compares the techniques and methodologies used in them.

Keywords— GPU, BF CUDA, CUBLAS, CUKNN

I. INTRODUCTION

Classification is the process of categorizing a newly arrived data to its original class label, by studying the characteristics of previously trained data. The classification models are categorized into two- Eager Learning methods and Lazy Learning methods. The different eager learning classification methods include Classification by Decision Tree Induction, Bayesian Classification, Rule Based Classification, Classification by Back propagation, Support Vector Machines (SVM), Associative Classification etc. K Nearest Neighbor classifier and Case-based reasoning classifiers are examples of Lazy Learners. Even though Lazy Learners are more expensive and require high storage space, they are well suited for parallel implementation. kNN (k Nearest Neighbour) classification [1] is the simplest and the most popular technique in the Lazy Learner classification methods. They are well suited to model high dimensional data.

Over the past years, many authors have proposed a number of optimal algorithms for kNN classification. For example dW-ABC-kNN(distance Weighted kNN using Artificial Bee Colony) algorithm [2], kTree method [3], coefficient Weighted kNN classifier, Residual Weighted kNN classifier[4] etc.

The main objective of this paper is a thorough study of the different algorithms for implementing kNN classification, in Graphical Processing Units. The four different Nearest Neighbour Searching algorithms taken for this study are BF CUDA (Brute Force Compute Unified Device Architecture), GPU kNN, CUBLAS (CUDA Basic Linear Algebra Subprograms) and CUKNN (CUDA kNN). These algorithms are compared with regard to their speed, accuracy and the sorting techniques used.

This paper is organized into 5 different sections. Section I gives an introduction about the importance of classification algorithms in Graphical Processing Units. Section II illustrates a brief description about GPUs and CUDA programming. Section III presents related works in this area. Section IV depicts a simplified GPU memory architecture and Section V illustrates the observations of the study. Conclusion and future research directions are specified in section VI.

II. GRAPHICAL PROCESSING UNITS AND CUDA PROGRAMMING

When the same set of code is to be applied on a large amount of data elements, Graphical Processing Units (GPU) provide an efficient platform for the same through parallelism. Hence the distance calculation and sorting steps which are independent, in kNN classification, can be done parallel using GPUs. GPUs achieve high degree of parallelism by dedicating most of their transistors for data processing rather than control and data flow management. Graphical

A Review on EDM Techniques with Special Focus on Student Performance Enhancement

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Abstract - Today many of the institutions use data mining techniques, especially in the field of education. The main purpose of Educational Data Mining (EDM) is to increase the quality of education. Use of data mining methods in educational scenarios will help us to learn student behaviour, their performance, enhance the present student models and efficiently design the course curriculum. Teachers will get an overview into the academic performance and administrators can make policies, execute programmes, and adapt the policies and programmes to enhance the teaching–learning process. Using EDM we can improve student's achievements and success more efficiently and effectively. Machine Learning methods are very efficient for predicting student performance. The student data depends on the various educational environments. Selection of the correct dataset plays a vital role in these predictions. EDM uses computational approaches to analyze educational problems and data. By applying data mining techniques we can extract valuable information from huge amounts of data. For extracting knowledge from huge volume of data we require sophisticated set of algorithms and data pre-processing techniques. This paper surveys the most relevant studies carried out in the field of student performance enhancement. It also discusses EDM, areas of student performance enhancements and enhancement methods based on classification.

Keywords— Educational Data Mining, Classification, Knowledge Discovery, Machine Learning, Prediction

I. INTRODUCTION

Educational Data Mining includes various applications of data mining techniques on educational data. Student performance enhancement has been an important research area in EDM which uses both data mining and machine learning methods to explore data from educational environment [1]. EDM is defined by the journal of educational data mining and Baker [2] as an emerging discipline, concerned with developing methods for exploring the unique types of data that come from educational settings, and using those methods to better understand students, and the settings which they learn in. The major objective of EDM is the proper understanding of educational phenomena and enhancement of higher education quality. Quality education plays a vital role in the development of a nation. EDM is an interdisciplinary subject which includes features and applications from various fields such as statistics, machine learning, psychometrics, scientific computing, information retrieval, and artificial Intelligence [3]. The educational researchers mainly depend on data mining techniques for analysis and evaluation of their data set. The major goal of EDM is to increase the higher education quality in the field of improvement in decision making, organizational productivity and academic performance of students [4]. The

EDM is a wide area because the data produced from data mining can come from various sources. The application of EDM is different according to the different educational environment. Educational data can come from different areas like administrative data, actual classroom data, intelligent tutoring system (ITS), computer-supported collaborative learning activities, learning management systems (LMS) [5], e-learning, discussion forum, social networks etc [6]. Evaluation of student - teacher performance plays a vital role in higher education quality. Different factors that affect student performance include their prior achievements, academic performance, family background, learning capability, and social factors.

This paper is organized into 5 different sections. Section 1 gives an introduction about the importance of student performance enhancement. Section II illustrates a brief description about different areas of performance enhancement. Section III presents some classification methods related to this study. Section IV illustrates related researches and conclusion is included in section V.

II. AREAS OF STUDENT PERFORMANCE ENHANCEMENTS

Lexicon based Document Level Sentiment Analysis on the Multilingual Dataset

Deepa Mary Mathews[1] and Dr. Sajimon Abraham[2]

Abstract—Sentiment Analysis is a potential and high-speed emergent research topic as it deals with the mining of social users' opinions which generates incredibly in fraction of seconds. The hasty growth of online medium such as blogs and various social networking sites are nowadays used by many users to express their perspectives on various topics. Most of us are more comfortable in expressing our views and opinions in native language. Commonly using positive and negative English words might also be used along with the native language. Here the authors propose a method to perform polarity calculation on the multilingual dataset considered for sentiment. The multilingual dataset under consideration consists of a mix of reviews in English and Malayalam. Various language detectors are considered for experimentation and the langid algorithm gives more accurate results. The English and Malayalam lexicons need to be treated differently. Since English is a Universal language, the positive and negative lexicons and the list of stopwords are readily available. But the positive and negative Malayalam lexicons need to be created in house. The proposed methodology treats both types of lexicons differently for sentiment analysis.

Keywords: Sentiment Analysis, Malayalam, Rule based Classification, Opinion Mining, Lexicon based

I. INTRODUCTION

Since English is a universal language, much research works in Sentiment Analysis, also called as Opinion Mining, is mostly done in English dialect. However it is likewise imperative to do the sentiment analysis in regional languages. Viewpoints of the social clients on assorted subjects conveyed in their very own primary language prompts the need of mining the feelings in different dialects. The perspectives set apart by the clients are in unstructured organization and examining these writings picked up consideration of many researchers. The aforementioned work is lagging in these local dialects. This kind of investigation picked up a great deal of prevalence as it contains proposals and recommendations at a regional level. It is also imperative to think about the informal and mixed linguistic nature of online social media languages, which are habitually coupled with localised slang as a way to express exact emotions. Our goal was to test whether we could naturally foresee clients' perspectives on a specific subject from their free-text reactions communicated mainly in Malayalam dialect mixed up with English words.[1]

A. Sentiment Analysis

Sentiment Analysis is the way toward distinguishing the polarity of the rudimentary opinion. This procedure can be utilized to decide if a bit of writing in the blog about the news alluding to an issue is certain, negative or impartial. It determines the conclusion or frame of mind of the client. Sentiment Analysis can be performed either in Supervised and Unsupervised methodology. In the Supervised, the past experiences are utilized to characterize the test set. In the Unsupervised, no labeled dataset is given with; rather the Sentiment Orientation (SO) of opinion words is resolved. Sentiment Analysis can be done in various levels of granularity like Document level, Sentence level and Aspect level. In document level, the polarities of the surveys are determined based on the general feeling communicated in the entire archive. Lexicon based methodology or Machine Learning algorithms can be used for classification. To know the polarity of individual reviews, sentence level analysis is required. To obtain fine-grained opinions, aspect level analysis is required.

B. Significance of Sentiment Analysis in Malayalam

Natural language processing techniques typically pre-suppose that all comments are written in a given language usually English, but as focus shifts onto processing comments from internet sources such as microblogging services, this becomes increasingly difficult to guarantee. In India, almost 30 official dialects are there and more than 35 million individuals spreading along the districts of Kerala, Pondicherry and Lakshadweep are having Malayalam as their local language. Lots of people used to pass on suitably in their nearby tongue thus making colossal measure of data.

The reviews while extracted, the authors noticed that while writing the reviews in Malayalam, the users mostly use some English words too for the common sayings. For eg: 'beautiful' instead of സുന്ദരമായത, 'good' instead of

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A Hybrid Approach to Classify the Learning Style of Learners in an E-Learning Environment

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ABSTRACT

Learning style identification has a significant role in the process of setting a personalized learning environment and for providing adaptive courses. It helps the students to understand their strengths and weaknesses when it comes to learning and subsequently helping them by improving their learning outcome, increasing satisfaction, and reducing the time needed to learn. Hence, the objective of the study is to develop a method to identify the learning style of learners based on Felder-Silverman Learning Style Model for achieving an adaptive learning environment. In this study a hybrid learning style classification mechanism is proposed by incorporating K-NN classification approach with a computational intelligence algorithm to identify the learning style of learners in an online learning environment. A Moodle log data will be used to evaluate the performance of the proposed algorithm.

Keywords: Computational Intelligence algorithm, Felder-Silverman learning style model, K-NN classification, Hybrid learning style classification, Moodle log data

1. Introduction

Nowadays, Information and Communication Technology (ICT) has pervaded the fields of education and term "e-learning" has emerged as a new alternative to the traditional learning system. Since learners in an e-learning environment have individual differences and prefer different ways of learning, there is a big challenge for 21st teachers to provide suitable learning materials according to the interest of these learners. With the growing demand in e-learning, numerous research works have been done to enhance teaching quality in e-learning environments. Among these studies, researchers have indicated that adaptive learning is a critical requirement for promoting the learning performance of students. Learning styles can be considered as one such factor for providing a suitable learning content or organizing these contents in LMS. Identifying students' learning styles has several benefits such as making students aware of their strengths and weaknesses when it comes to learning

Personalized trajectory anonymization through sensitive location points hiding

N. Rajesh[1] · Sajimon Abraham[2] · Shyni S. Das[3]

Abstract The omnipresent use of GPS enabled smart devices left numerous mobility traces in an unprecedented scale. The analysis and publication of these ordered spatio-temporal points is essential for the inventions and discovery of new mobility management applications. But the publication of trajectory details is certainly a privacy threat to the object/or individuals. So a privacy preserved anonymization approach for the publication is needed. It is observed that, instead of anonymizing the whole trajectory, the sensitive location samples are to be protected. This work proposes a new model, which extracts the delicate halting points using *Haversine* distance measure and protects these points from adversary attack by a personalized generalization technique. This model also mitigates the exposure of whole trajectory by safeguarding the sensitive location points in a diversified area zone. From the evaluation point of view, this model uses the real-world data set and the results show that the model is more effective against malevolent attacks and is having less information loss than the existing well-known anonymity approaches.

1 Introduction

The abundance of embedded location aware systems has equipped the users to share their location details and enjoy the seamless location based services like social networking, navigation systems, Location Based System (LBS) based information systems and traffic planning, etc. The researchers and government authorities like traffic monitoring authorities, urban planners make use of these mobility traces to develop new effective applications or to modify the existing ones. But sharing of users sensitive mobility data like location data may expose their daily preferences, religious habits and even health details.

The term "Trajectory privacy preserving" mainly aims to protect the whole trajectory from the re-identification so as to avoid the exposure of sensitive or frequent location points. For the protection of trajectory, we need to extract stay points [6] from trajectory and find which among them are of sensitive in nature and anonymization of these points is enough to resist the privacy attacks from the adversaries.

In this work, we study the task of personalized trajectory anonymization during the data publication phase. The main task with this work is to extract the sensitive and non-sensitive points from the user trajectories and anonymize them in a Minimum Bounding Rectangular (MBR) zone of user defined size with diversified points.

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Trajectory Anonymization Through Generalization of Significant Location Points

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Abstract— The widespread use of Location Based Systems results in the accumulation of movement trajectory details in a massive scale. These mobility traces are very much useful for the researchers and the developers who needs to develop or invent new mobility management applications or modify the existing ones. But without proper privacy preserving mechanism for the published trajectory details may definitely raises the issue of privacy breach for the user. So before publishing the trajectory details suitable anonymization approach has to be applied. It is also found that the protection of significant points is better than the unnecessary anonymiztion whole trajectory points. This paper proposes a new model, which depicts a model that safeguards the significant points from the malevolent attacks by the help of generalization approach. With this model, the significant location points are hided in a specified size diversified area zone. The analysis shows that this approach is well ahead of the similar approaches used by the researches and provides better privacy and less information loss.

Keywords—Anonymization, Trajectory Publication, Privacy Preservation

I. INTRODUCTION

With the ubiquity of location based systems(LBS) allows users to exchange their mobility traces and they can use variety of location based services like social media, GPS(Global Positioning System) based navigation systems etc. The researchers also used these trajectory details to make or modify new or existing applications and the government authorities used it for the applications like traffic management etc. But sharing trajectory details, especially location details may reveal their social customs, habits, health details, religious customs etc. This is going to be the major privacy threat to the user.

The Privacy preservation of trajectory means to safeguard the entire trajectory from re-identification so that to overcome the disclosure of significant or important location points. In order to keep away from adversaries, we have to find the stay points[6] from the mobility traces and differentiate them as significant and non-significant points and anonymize these points is well enough for the protection of entire trajectory from malevolent attacks.

In this work, we mainly focused to anonymize the trajectory before the publication of trajectory details to stakeholders. For this purpose, it is necessary to extract halting points and identify the significant and non-significant location points from the user trajectories. At last during the anonimization of these points is to be done with the help of generalized area zone, which contains a user specified number of significant and non-significant points.

The organization of the paper is organized as follows, Section I contains the introduction about the privacy preserved data publishing and the brief summary of the work done. Section II contains the related work of trajectory anonymization and the developments in the said area, Section III contains the basic terminologies used in the paper as problem definitions, Section IV contains the proposed work and which is categorized as block diagram of the work, methodologies and algorithm which we used for the proposed work, Section V explains the results and discussion through sample screens and analysis graphs and finally Section VI concludes research work with future directions.

II. RELATED WORK

For the development and modification of new or existing trajectory management application must need published trajectory details and it is too good to have this in a privacy preserved mode. In the privacy preserved data publishing scenario, a plenty of approaches and models were there. Some of them are discussed below.

The concept of *k*-anonymity was introduced in [2] to protect health details from malevolent attack so that it is indistinguishable from *k-1* other records. Few years later, the authors in [4] introduced another model called *t*-closeness,

Statistical Predictabilty in Big Data Analytics with Data Partitioning

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Abstract— The huge volumes of data which cannot be manipulated easily by commonly available tools are termed as Big Data. Big Data analytics gives competitive opportunities in designing business plans for Business Analytics. The results are used for taking intelligent business decisions; hence it must be accurate and well-timed. For analytical purpose we use Multiple Linear Regression (MLR) model in the statistical method, a type of Supervised Machine Learning Algorithm. Performance of the particular MLR model with one quantitative dependent attribute and four independent attributes are evaluated using splitting up of the whole data set with Cross-Validation technique. This technique is used to validate the accuracy of model developed from training data with test data to control the problem like over fitting. Here we use Hold-Out Cross Validation method with serial and random partitioning. The data set from UCI machine learning repository are evaluated through simulation methods to check the performance. The model generated in training data are validated with test data, the evaluation shows that the result obtained is a generalized one. The proposed MLR model can be used in the new data set for an accurate result. Here we obtained that the accuracy, measuring with random partitioning is a better method.

Keywords— Big Data Analytics, Multiple Linear Regression, Predictive Analytics, Validation Methods

I. INTRODUCTION

The widespread use of digital technologies has led to the exponential growth of data from every imaginable source such as sensors, purchase transactions and social media networks. The large volume of complex and growing data generated from many distinct sources led to the era of Big Data. Companies depend on this massive data to take intelligence decisions as well as to gain a powerful competitive advantage. Modern society is also impacted by big data involving business, management, medical healthcare and government. Big data is extremely valuable to produce productivity in business and evolutionary breakthroughs in scientific disciplines, which give us a lot of opportunities to make great progress in many fields. In large volumes of data so much useful values are hidden and that can be generated only through the careful analysis. For this a new scientific paradigm has been born as Data Intensive Scientific Discovery (DISD) also known as Big Data Analysis.

Big Data can be characterized by the following aspects: (1) volume of data is huge, (2) the data cannot be stored in the regular relational databases, (3) data generation, capturing and processing must be performed very quickly [9]. Big Data analytics technologies and techniques should analyze the huge volume of data and generating conclusion from them to enhance the business and customer relationship [2]. So BI is a technology based analytical process for analyzing huge amount of data and presenting the information to help the end

users to increase the decision making capacity. The data used in BI is historical data as well as newly generated data from distinct sources. BI programs are the combination of following advanced analytic techniques: data mining, predictive analytics, statistical analysis, text mining, and Big Data Analytics.

Now a day's the analytical techniques uses data mining, statistics and machine learning for analyzing the huge data set for BI. Indeed the researchers are trying to develop new techniques and technologies or improving the existing one for enhances the BI tools. The aim of the business forecasting tools is to automatically discover the hidden useful information from the large data set.

Rest of the paper is arranged as follows: section II covers related works, section III gives a detailed study on prediction with multiple linear regression, section IV describes the partitioning techniques with linear regression for finding the accuracy of the model, section V contains the implementation methods and the results and its discussion are detailed in section VI. We conclude with a brief discussion in the last section.

II. RELATED WORK

Hai Wang et al. [10] presents in their work the challenges and new trends faced by Big Data while taking decision making. C L Philip Chen and Chu-yang Zhang [9] in their paper has discussed about various methods to manage the

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A Survey of Security Violations and Prevention in Cloud Platform

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Abstract:-- The term "cloud computing" is everywhere. In the simplest terms, cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive. The cloud is just a metaphor for the Internet. Cloud computing is shared pools of configurable computer system resources and higher-level services that can be rapidly provisioned with minimal management effort, often over the Internet. Cloud computing relies on sharing of resources to achieve coherence and economics of scale, similar to a public utility. The main thing that grabs the organizations to adapt the cloud computing technology is cost reduction through optimized and efficient computing, but there are various vulnerabilities and threads in cloud computing that affect its security. Providing security in such a system is a major concern as it uses public network to transmit data to a remote server. Therefore the biggest problem of cloud computing system is its security. In this paper we discussed different type of security issue related to cloud computing and some possible solution for them.

Keywords:-- Cloud Framework, Types, Service Providers & Models, Threats & Remedies.

I. INTRODUCTION

Cloud computing is basically a collection of different services provided by different companies. It mainly depends on resource sharing using internet enabled devices that allow the function of application software. The Cloud can serve a wide range of functions over the Internet, such as storage from virtual servers, virtual applications, authorization of desktop applications etc. By implementing resource sharing, cloud computing is able to achieve reliability and economies of scale.

Image 1 – Infrastructure of a Cloud Network

Characteristics: essential characteristics of cloud computing:

i.   On-demand self-service: A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.

ii. Broad network access: Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops and workstations).

iii. Resource pooling: The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state or datacentre). Examples of resources include storage, processing, memory and network bandwidth.

iv. Rapid elasticity: Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.

v.   Measured service: Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth and active user accounts). Resource usage can be monitored, controlled and reported, providing transparency for the provider and consumer.
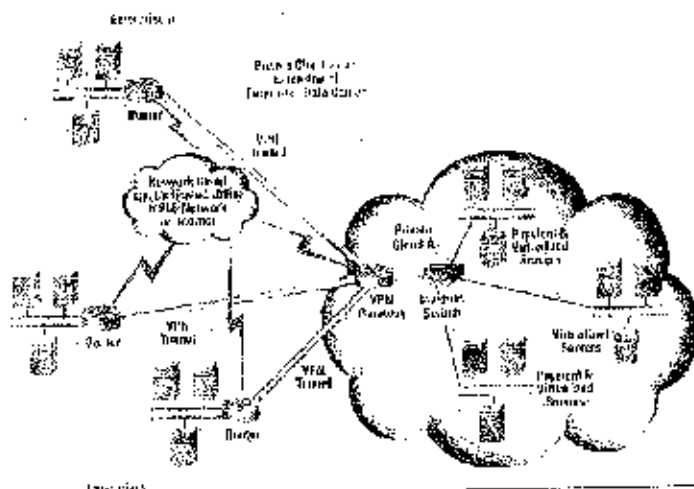
Types: four Types of Cloud Computing Models are Based on a deployment model, we can classify cloud as:

- public
- private
- hybrid
- community cloud

CERTIFICATE OF PUBLICATION

This is to certify that the paper entitled

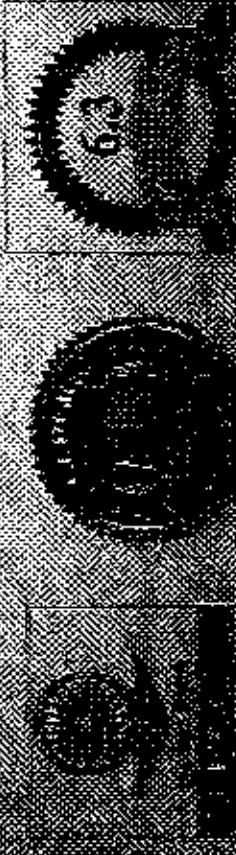## "Unstructured Data Mining for Customer Relationship Management: A Survey"

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Sentiment Analysis on Malayalam Reviews: A Survey

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ABSTRACT:

The exponential boom of social data in social media and the challenge to take the decisions in business using computers formulate Sentiment Analysis a demanding and attention-grabbing research problem. Sentiment Analysis is a scientific approach that is inseparably vault to the field of Affective Sciences which concerns the individual suppositions, feelings or notions and thereby discovers the cognitive deeds of humans. Communicating the slants in their own native language can be considered as the most comfortable way of expressing the viewpoints. This leads to the necessity of Sentiment Analysis in various local dialects. This paper summarizes the major contributions in the field of Sentiment Analysis that can be utilized for looking into Malayalam audits.

***Keywords:** Lexicon based, Malayalam, POS Tagging, Sentiment Analysis, Stemming*

1. Introduction

Social Data is being generated at an unprecedented rate every second. People utilize online networking to express their sentiments and standpoints about a specific event. Retrieving and evaluating real time social data is gaining popularity because the dynamic trends and outlooks are updated right away on such platforms. The viewpoints marked by the users are in unstructured format and analyzing these texts gained attention of many researchers as it has a significant role in decision making. In the last decade, the viewpoint analysis gained lots of significance and many researchers came out with different strategies for performing sentiment analysis. Standpoints of the social users on diverse topics communicated in their own mother tongue leads to the necessity of mining the sentiments in various dialects. Though the percentage of these dialects compared to English dialect is low, the analysis of these kind of information need to be done to identify many valuable frequent patterns at a regional level. This type of analysis gained a lot of popularity as it contains recommendations and suggestions. Compared to the high-resource languages such as English, sentiment analysis task in low-resource language suffers mainly due to the absence of annotated corpus and the tools to extract features. The present paper brings out the works being carried out in Malayalam language in the field of Sentiment Analysis.

The rest of the article is structured as follows. A brief description about Sentiment Analysis and the significance of Sentiment Analysis in Malayalam language is depicted in Section 2 and 3. Major Contributions in POS Tagging,

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A Hybrid Approach to Classify the Learning Style of Learners in an E-Learning Environment

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ABSTRACT

Learning style identification has a significant role in the process of setting a personalized learning environment and for providing adaptive courses. It helps the students to understand their strengths and weaknesses when it comes to learning and subsequently helping them by improving their learning outcome, increasing satisfaction, and reducing the time needed to learn. Hence, the objective of the study is to develop a method to identify the learning style of learners based on Felder-Silverman Learning Style Model for achieving an adaptive learning environment. In this study a hybrid learning style classification mechanism is proposed by incorporating K-NN classification approach with a computational intelligence algorithm to identify the learning style of learners in an online learning environment. A Moodle log data will be used to evaluate the performance of the proposed algorithm.

Keywords:Computational Intelligence algorithm, Felder-Silverman learning style model, K-NN classification, Hybrid learning style classification, Moodle log data

1. Introduction

Nowadays, Information and Communication Technology (ICT) has pervaded the fields of education and term "e-learning" has emerged as a new alternative to the traditional learning system. Since learners in an e-learning environment have individual differences and prefer different ways of learning, there is a big challenge for 21st teachers to provide suitable learning materials according to the interest of these learners. With the growing demand in e-learning, numerous research works have been done to enhance teaching quality in e-learning environments. Among these studies, researchers have indicated that adaptive learning is a critical requirement for promoting the learning performance of students. Learning styles can be considered as one such factor for providing a suitable learning content or organizing these contents in LMS. Identifying students' learning styles has several benefits such as making students aware of their strengths and weaknesses when it comes to learning and the possibility to personalize their learning environment according to their learning styles. Hence this study proposes a method to identify the learning style of learners using an efficient classification algorithm. In this method a novel approach is introduced, which combines the advantages of computational intelligence and KNN-classification approach. A Moodle log data will be used to evaluate the performance of the proposed algorithm.

AN IMPROVED RELEVANCE VECTOR MACHINE WITH SPATIAL FUZZY CLUSTERING BASED DEFENSE MECHANISM TO DEFEND AGAINST CO-RESIDENT DOS ATTACKS IN CLOUD COMPUTING

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Abstract : Cloud computing is taking the technology world by storm because of the varieties of services offered by the cloud service providers (CSPs). Despite numerous benefits offered by CSPs, there are some security issues that may dissuade users from using it. In this service, different virtual machines (VMs) share the same physical resources, these VMs are known as co-resident VMs. The shared physical resources pose a significant threat to the users. As resources may belong to competing organizations as well as unknown attackers. From the perspective of a cloud user, there is no guarantee whether the co-resident VMs are trustworthy. The shared resources make privacy and perfect isolation implausible, which paves the way for co-resident attacks, where a VM attacks another co-resident VM. There is a risk that a covert side channel can be used to extract another user's secret information or launch Denial of Service (DoS) attacks. In this paper, an Improved Relevance Vector Machine with Spatial Fuzzy Clustering (IRVM-SFC) based defense mechanism is proposed for minimizing the co-resistance DOS attacks by making it difficult for attackers to initiate attacks. In this process, first, the attacker behavior is analyzed by using Previously Selected Server First (PSSF) VM allocation strategy. Then, the partial labeling is done by using SFC scheme to partially distinguish the users as legal or malicious. After that, an IRVM scheme is proposed for classifying all users into three categories like high risk (i.e. malicious), medium risk (i.e. uncertain), and low risk. In IRVM, the Mosquito Flying behaviour based swarm intelligence Optimization (MFO) approach used to optimize the kernel functions of parameters to improve the training process. Finally, aStackelberg Game Approachis presented to increase the cost of launching new VMs thus minimizing the probability of initiating co-resident DOS attack. The experimental results show that the proposed IRVM-SFC attained high performance results compared than existing VM allocation schemes.

IndexTerms- Cloud security, Defence mechanism, Improved Relevance Vector Machine, Spatial Fuzzy Clustering, PSSF..

I. INTRODUCTION

Virtual machines (VM) are one of the most crucial and fundamental components to cloud computing systems. For cloud providers, VMs facilitate the efficient utilisation of the hardware platforms. For cloud customers, VMs reduce the maintenance overhead of computing resources.

However, similar to traditional web servers, VMs can also be exposed to various types of security threats. Some forms of attacks, such as brute force SSH attacks, are relatively easy to block, because of the evidence left from failed attempts, which can be found in authorisation logs. In contrast, other forms of attacks are much harder todetect due to their stealthy nature, which leaves little trace in the system logs. In this paper, we focus on one such stealthy security threat: the co-resident attack (also known as co-residence, co-residency, or co-location attack).

Virtualisation techniques [1] provide logical isolation between VMs that locate on the same server (i.e., coresident VMs). This means that programs running on one VM should not interfere with other programs that run on co-resident VMs. Nevertheless, this can happen in real cloud systems. For example, the execution time of cache read operations is to a large extent influenced by the cache utilisation rate [2]. As a result, malicious users can build various types of side channels [2-7] between their VM and the target VM on the same server, and then extract sensitive information from the victim. This is what we call a co-resident attack. Although it is not easy to perform this type of attack in real cloud environments [8], the potential security risk is still very high, as it has been demonstrated in a number of papers [2-7] that various types of private information including cryptographic keys can be leaked to malicious users. For clever attackers, even seemingly innocuous information like workload statistics [3] can be useful. For example, they can identify when the system is most vulnerable based on the workload data, and launch further attacks, such as Denial-of-Service attacks.

In order to defend against co-resident attacks, most previous work [9-17] has concentrated on preventing the construction of side channels. However, the main problem with these methods is that they often require substantial changes to be made to existing systems which can be costly for current cloud providers. For example, Vattikonda et al. [13] and Wu et al. [14] propose to remove or modify the high resolution clocks that many side channels rely on, while Jin et al. [10] and Szefer et al. [12] redesign the

Feature selection using Ant Colony Optimization- A review on Heuristic Information Measurement

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Abstract— Performance of Machine learning problems are greatly affected by the high dimensionality of the data set. To reduce the dimension, feature selection is used. Feature selection simplifies and enhances the quality of a data set by selecting salient features and reduces the complexity of the overall learning process. Ant Colony Optimization (ACO) is a modern algorithm for feature selection. It is an evolutionary algorithm inspired by the foraging behavior of real ants. To coordinate the activities ants produce a volatile substance called pheromone. The pheromone laying and pheromone following behavior of real ants helps to find the shortest path from nest to food source is the basic working principle behind ACO. This shortest path tracing is mainly based on a local heuristic information and the intensity of pheromone existing in the path. This paper mainly focusses on the review of techniques used for evaluating the heuristic information measurement which guide the ants towards the most prominent solution constructions.

Keywords— Feature Selection, Ant colony optimization, Heuristic information, Pheromone, Construction graph, Correlation Coefficient

I. INTRODUCTION

The rapid growth of computer and database technologies over the past decades caused an explosion of data with huge information. The high dimensionality of the dataset cause severe problems to the performance of numerous machine learning techniques when they are used for generating knowledge. High dimensional dataset contains very large feature sets which not only cause learning to be more difficult but also degrade the generalization performance of the learned models [1]. To reduce the dimension of the data set, feature selection is used as a data pre-processing technique. The purpose of feature selection is to simplify and enhance the quality of a dataset by removing irrelevant and noisy features.

As a result a number of outcomes can be expected such as speeding up mining algorithms, improving mining performance and comprehensibility [1].

Various strategies for feature selection method includes exhaustive [5], heuristic [6] and random [7, 8].The heuristic and random search methods start with an initial subset of features heuristically selected beforehand. The features are then added or removed iteratively until an optimal feature subset is obtained. The heuristic or random search methods are further classified into wrapper [3], filter [4] and hybrid methods [2]. In wrapper method, to evaluate the quality of features a predefined training algorithm is used and the corresponding classification accuracy is determined. The selected feature subset is considered as optimal if it satisfies the desired accuracy; otherwise the process is repeated for a better one. In filter approach statistical analysis of feature set is required without using any learning models [4]. The hybrid approach utilizes the properties of wrapper and filter methods [9].

ACO is an effective iterative approach for solving discrete optimization problems in which a new solution is constructed at each iteration by applying the knowledge obtained from previous iterations. ACO is used in feature selection [10, 11] and is considered as a modern algorithm for selecting significant features. The design of ACO algorithm involves the appropriate representation of problem domain and it can be implemented by a weighted completely connected graph known as the construction graph. ACO is important in feature selection because there is no need of searching the principle of optimality each time when a subset is generated. This is because features are selected and added to the feature subset as a result of a graph traversal. To take the decision regarding which feature is to be added next to the current partial solution, ACO follows a probabilistic decision strategy based

A Survey on Improving Cloud Security using Data Integrity

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Abstract– Cloud computing is an internet oriented memory space that data can be fetched through internet. In recent years cloud computing is getting more attention because of the innovation in hardware and software resources, the ability to manage them remotely with benefits like high computing power, competitiveness, cost efficiency, scalability, flexibility, accessibility and availability, just adding more to the interest. There are many pros to cloud computing but on the other hand the security and integrity of data that gets stored in untrustworthy server is a determinant factor. Remote data integrity is playing a vital role in modern cloud storage and existing protocols are not secure enough under the quantum computer attacks. That is, attackers can hack the information sometimes from cloud even if data integrity protocols were installed. In this paper, a survey on cloud security by data integrity and auditing technique is done.

Key words: Cloud Security, Data Integrity, Cloud Auditing

I. INTRODUCTION

Cloud computing is an Internet-based technology where the users can attain quality of services from data and software that resides solely in the remote servers. Basically it provides many advantages for the users to create and store data in the remote servers thereby utilizing fewer resources in client side. Cloud computing allows customers and businesses to use applications without installation and access their personal files at any computer with internet access anywhere in the world. As it is publicly available the security mechanisms are of highly concern. Nowadays, many institutions or organizations are moving to cloud storage. The data can be easy store or upload the data in the cloud platform. Furthermore, we can retrieve the required file or data effortlessly. This process will be done only with the help of internet access. The main purpose of the cloud is to keep our huge data very secure. Virtual machines allow simultaneous operation for more than an operating system furthermore, it provides the same processing to the numerous interconnected computers, as well it has an ability to reside the entire computing environments into one physical environment.

According to the large-scale organization, this was one of the first public networks, which allowed computers to access data from anywhere in the world.

In cloud storage, remote data integrity checking is considered as a crucial technique about data owners who upload enormous data to cloud server provider. A majority of the existing remote data integrity checking protocols rely on the expensive public key infrastructure. In addition, the verification of certificates needs heavy computation and communication cost. The idea is to secure against cloud service provider attacks, and leaks no any blocks of the stored file to the third party auditor during verification stage, namely the data privacy against the curiosity third party auditor attacks. Data integrity is nothing but verifying the data once we successfully upload the data into the cloud. No need to

download the whole content of data to verify, without downloading also we can check the integrity.

II. LITERATURE SURVEY

Literature survey is mainly focused and explained with the update of problems and data security measures.

Yves Deswarte and Jacques[2] introduced the first RDPC to analyze Data Integrity and represents how data is to be stored. Also he introduced two new ideas to store the data secure on cloud. Convensional challenge response being the first one and Diffie-Helman being the second one. Both of them can be considered as major achievements for that project. But the necessity to access the files for every solution, is the downside of this technique.

Giuseppe Atteniese, Randal Burn[3] introduced two updated ideas to overcome problems on the previous idea. That is provable data possession. Verification of unknown server is being done here. Guarantee and security are to be processed on both two techniques respectively. The RSA algorithm was the idea behind two of these factor. A constant amount of metadata is being also maintained on client side. There is no need to access file blocks here that has been stored on cloud database. But it doesn't support the dynamic operation.

Wang et al[4] introduces Merkle hash tree and this is for acquire the operations that are executed dynamically. The basic problem on cloud is said to be Security. Proposal of this Merkle hash tree is because of this security reasons. Because it supports the remote data integrity and authentication process to the server. These feature makes it highly effective and secured one.

A privacy preserving protocol also has been developed as a continuation for this. Basically auditor doesn't knows anything about data while it check together in cloud. For this homomorphism and masking are to be used. Both are combined together for the effective result. But there is a con here as existing PPAP will not supports the auditing on public side. Finally Wang finds an auditing protocol having batch verification for multi user.

R. PatilRashmi[5] introduced updated data possession protocol that can resist the attack of the active adversary. It is purely based upon the homomorphic hash function. Continues checking of data integrity is the major process here so that the integrity of data is to be calculated continues. Merkle hash tree is being used on this protocol also so that data location can be calculated. Dynamic operations like insert, modify, delete and update supports at this condition. Also the base aspect is that, auditing also works together to find the correctness and accuracy. But it have no confidentiality.

III. CONCLUSIONS

In this Survey paper describes many methods of cloud security. RDPC was the first idea to find data integrity on a data base. Many algorithms like RSA are also implemented

Principal Component Analysis with SVM for Disease Diagnosis

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Abstract: Big data is the collection and analysis of a large set of data which holds many intelligence and raw information based on user data, Sensor data, Medical and Enterprise data. Since the volume of the medical data is increasing due to the presence of a vast number of features; the conventional rule mining technique is not competent to handle the data and to perform precise diagnosis. For instance, this paper intends to implement the improved rule mining technique to overcome the above-mentioned limitations. The model comes out with two main contribution stages (i) Using Map Reducing Framework (ii) Classification. Initially, the input medical data is given to map reduce framework. Here, Multi-linear Principle Component Analysis (MPCA) is used for reducing the given bulk data. Then, the reduced data is given to the classification process, where it classifies the disease with high accuracy. For this, this paper uses Support Vector Machine (SVM) classifier. After the completion of implementation, the proposed model compares its performance over other conventional methods like Principle Component Analysis- NN (PCA-NN), Independent Component Analysis- NN (ICA-NN) and MPCA-NN respectively in terms of performance measures like accuracy, specificity and, sensitivity, and the superiority of the proposed model is proven over other methods.

Index Terms: Medical Data, Disease Diagnosis, Feature Extraction, NN Classification, MPCA

I. INTRODUCTION

Nowadays, big data is the most admirable research topic. However, the mining of needed data from a huge volume of data is considered as the major issue. Numbers of researches are in progress to find the solution for this problem [7]. The solutions often vary from some conventional data mining approaches, by which the process of mining should be more effective and improvable. Handling of big data offers an issue to conventional computation daises and hardware as well. A well-modelled algorithm is quite critical in resolving the problems related to big data. Further, bigdata is not only the fact of criterions like volume, velocity as well as a variety of data (stored data), but it also deals with the potential value of the corresponding data, which has been already present with poor coordination and kept in extensively dissimilar formats through industries that not share their data openly. Usually,

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the 'data stream model' is determined as the model where the data moves incessantly at large-speed. Almost all big data is concerned as data streams, by which the respective novel data are produced unceasingly. Data streams have a huge volume of data that could not be saved in internal or external memory [6].

The learning of medical diseases, as well as wounds or injuries, often produce large amounts of data. The developing area of bioinformatics associates the interesting research parts of biology[5]. As well as informatics for the development of diverse approaches and tools for examining biological data. Three challenges are convoluted in this procedure that is i) gathering clinical and genomic information ii) regaining applicable information from huge data iii) mining novel knowledge from large volume data. As it is known that last decade has reviewed numerous life science research troops that have also produced a large amount of clinical as well as genomic information from 'Human Genome Project (HGP)' and most of the data are openly accessible via online sources. Normally, the formulation intelligence researchers have resourced with machine learning (ML) approach and also with Data Mining (DM) algorithms for exploiting the biological information. However, the challenges like over-fitting and less efficacy to classification often happen since the biological data are noisier, great dimensional space, the minimum size of samples and certain gene series have a great alteration.

This paper intends to propose a diagnosing model of disease to overcome the issues that present in the field of medical science. The novel diagnosis model initially gives the input data to map-reduce framework, where it reduces the data using MPCA concept. The reduced data is given to the SVM classifier. Moreover, the developed model compares with other methods like PCA, ICA, and proves the efficiency of the proposed model. The rest of the paper is arranged as follows: Section II reviews the literature work; Section III gives the explanation of the proposed diagnosis model. Section IV details the phase of diagnosis model (SVM). Section V gives the results obtained, and Section VI concludes the paper.

II. LITERATURE REVIEW

A. Related Works

In 2016, Dewan et al. [1] have developed a novel classifier for multi-class classification of biological data. The major issue reflected in this investigation were overfitting, noisy instances as well as class-imbalance data. The developed rule-based classifier has utilized two classification

KEYWORD EXTRACTION USING CENTROID GRAPH AND WITH A STUDY OF TEXTRANK AND HITS ALGORITHM

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Abstract — Automatic keyword extraction identifies the terms that best describe the subject of the document or else it describe salient features of the article. This paper introduce a keyword extraction algorithm using centroid graph from single document. Algorithm proposed a graph based approach to the centroid values. In addition to extraction algorithm, the paper make a comparative study of HITS and TextRank algorithm. The keywords are recursively evaluated according to the cohesion to the document context. Evaluation of algorithms based on the precision and recall of extracted keywords.

Keywords — *Automatic keyword extraction, MEAD, HITS, TextRank*

I. INTRODUCTION

Keywords are useful for the people to know about the document context before it is read. Automatic keyword extraction is the process of selecting the salience features of words from document. It is used to identify a small set of keywords from the given document context which define the meaning of the document. It should be done systematically and with either minimal or no human intervention, depending on the model. The goal of automatic extraction is to apply the power and speed of computation to the problems of access and discoverability, adding value to information organization and retrieval without the significant costs. Keywords give a clue about the context of article so that users can decide their interest. They will give an outline about the document context to the readers.

Extraction of a sequence of one or more words provide a compact representation of article's context is a vital role in Text Mining, Information Retrieval, Natural Language Processing. Human made keyword extraction is very time consuming and costly. Also digital information in day to day life is increases exponentially. The existing approaches of keyword extraction are divided into four categories, simple statistics, linguistic, machine learning, and hybrid approaches. Simple statistics methods are simple have limited requirements and don't need the training data. They tend to focus on non-linguistic features of the text such as term frequency, inverse document frequency, and position of a keyword. The statistics information of the words can be used to identify the keywords in the document. Other statistics methods include word frequency, TF*IDF, word co-occurrences. Linguistics Approaches use the linguistic features of the words, sentences and document. Methods which pay attention to linguistic features such as part-of-speech, syntactic structure and semantic qualities tend to add value, functioning sometimes as filters for bad keywords.

Machine Learning Approaches consist of a set of training documents, each of which has a range of human-chosen keywords as well. Then the gained knowledge is applied to find keywords from new documents. The Keyphrase Extraction Algorithm use machine learning method. Hybrid approaches is the combination of all learning approaches and use some heuristic knowledge in the task of keyword extraction such as the position, length, layout feature of the words, html tags around of the words. In this paper proposes MEAD extraction of keywords using its centroid value in graph based model. Also make a comparative study of mostly widely used rank based algorithms such as HITS and TextRank algorithm for the extraction.

This paper organized as follows. Section II describe the MEAD extraction of keywords using its centroid value in graph based model. Section III describe the TextRank algorithm. Section III define the HITS algorithm and its working. Section V make comparison of HITS and TextRank algorithm. Section VI deals with the result and discussion pretend with tabulation and graph. Section VII presents the conclusion.

II. KEYWORD EXTRACTION USING CENTROID GRAPH (KEUCG)

MEAD based on sentence extraction. For each sentence in a cluster of related words, MEAD computes three features and uses a linear combination of the three to determine what sentences are most salient. By using this method we extract words that describe salience of document context. KEUCG is a graph based approach to the centroid value in order to increase its efficiency. MEAD extraction algorithm used three features to compute the sentence score of the each sentence. The three features are centroid score, positional value, first sentence overlap. Sentence score are computed based on the linear combination of all three features. Hierarchal selection of sentence based on its sentence score. The keyword extraction, we only adopt the centroid value of each word. MEAD decide which word is to be extracted based on its value. The input to the MEAD is a document and output is set of keyword extracted from the document. Following are the steps of keyword extraction.

A. Pre-Processing

Pre-Processing is the primary step of Natural Language Processing. It is cleaning of data and convert into list of words. The list of words are converted into lower case tokens. The token is a string of characters collected together in a document. In simple words, tokens are the words in the sentences that are used in lexical analysis. Tokenization is the process of splitting the sentence into words, phrases, symbols or other components. Stop words are the commonly used

A Novel Scheme for Multimedia Content Protection by Biometric Encryption Watermarking Method

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Abstract: Multimedia content protection has become one of the most important and interesting research area. We present a multimedia content protection by utilizing both biometric and digital watermarking. The finger print, face and signature biometric feature of the owner is used to generate the watermark. We include these three different water mark on the host image by partitioning row wise or column wise and then embedding the watermark on it. Our scheme includes 2-D Single Level Discrete Hear Wavelet transform for image compression and Single value decomposition for embedding and extraction of the watermarks. Sometime any ownership dispute on the host image, the watermark i.e., the fingerprint, face and signature is extracted from the watermarked image and related to the biometrics of person claiming the ownership. If they match, the claiming person is the real owner of the host image.

Keywords: Digital Water marking, Biometrics, Digital Right Management[DRM], Single Level Discrete Haar Wavelet Transform[DWT], Singular value decomposition[SVD].

1. INTRODUCTION

The digital copy right problem has been gaining important in the recent years due to proliferation digital technology. Piracy other copy right violation regarding digital multimedia content represent a significant problem for legal content owners and content distributors. (F. Hartunget al., 1999). Hence the protection of intellectual property right for multimedia content, often referred to as the digital right management [DRM] for multimedia, (Fred Von Lohmann, 2005) recently started receiving a considerable amount of interest.

Recently several DRM solutions has been proposed which makes use of and digital watermarking techniques (Scott Carver et al., 2001). The most vital function of DRM system is the copyright protection. The copy restriction such as permitting no or one or several unlimited copies of the multimedia data, and without right to produce copies of these can be enforced by DRM system (E.T. Lin et al., 2005). DRM consists of certain techniques which include encryption, digital water marking, finger printing, traitor tracing, authentication, key management and revocation (Ian Kerr, 2007). The objective of digital watermarking is to embed small amount of secret information, ie. the watermark into the host digital production like the image and audio, thus facilitating the extraction at the later stage for the purposes of copyright assertion, authentication and content integrity verification. (IhuainSiChan-TsunLi, 2005). Digital watermarking techniques can have utilized to protect theintellectual property right of the data by embedding the proprietary information, such as company logo and password in the host data (G.Voyatsiz et al., 1999). Face recognition is important for to recognize an individual, find the best match by matching the input face image with the face image in the training data set. It is used to verify a persons claimed identity or identify a person. (M.Vikas.K et al., 2012,Y. T Xiao et al., 2006). Facerecognition plays an important role in our daily life for theidentification and authentication purpose [Finey Francis et al., Mohammed Hasan et al., 2013). Handwritten signature is behavioral trait and can be used for person identification purpose. There are two types of identification modes available, online and offline mode. In the proposed scheme, we use watermarking and biometrics to protect the digital contents. In this paper, we have focused on the prevention of disputes that arise out of ownership claim on multimedia digital images and novel and efficient scheme to deal with it has been developed. In future biometric will play a vital role in security (John Chirillo, Scott Blaul). Finally, if any ownership dispute arises, biometric help to solves the situation because of the insertion of biometric feature as the watermark in the proposed scheme, Extracted watermark image are compared with test image using correlation analysis.2D Single Level Discrete Haar Wavelet Transform used for image compression transformation and Singular Value Decomposition embed the watermark to host image.

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Textural changes In Fluvial Sediments As An Impact of Anthropogenic Interventions: Case Study Of A Small Mountainous River In Western Ghats, South West India

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ABSTRACT

A small mountainous river system in the Thiruvananthapuram District of Kerala State, South Western India has been subjected to textural analysis of fluvial sediments. The study area is Karamana river basin, impounded by two reservoirs, namely Aruvikkara and Peppara. Granulometric as well as statistical parameters of the sediments of the Upper Karamana catchment generally depend on the flow pattern controlled by the gradient of the terrain. The high flow energy of the upstream reaches is capable of transporting sand and other finer particles downstream leaving gravel and other coarser particles as lag concentrates. In addition to the natural processes, manmade structures like dams, check dams, bridges etc., also impart marked effect on grain size distribution along and across the river profile. The reservoirs retard the flow velocity and force water to deposit the particles in suspension upstream of the impoundment based on size and specific gravity. Pebbles and granules show comparatively higher proportions in the river stretch, where the gradients and local turbulence are higher. Sand dominates in the confluence zones of river channels with the reservoirs. Standard deviation varies between 0.58 Φ 5.84 Φ for the study area and the best sorted sediments are observed in the river reservoir confluence zones. Observed high positive skewness in the upstream reaches and negative skewness in the impounded areas. SEM studies revealed that the grains are subjected to very limited wear and tear. CM model reveals that particles in the river environment are transported mainly by rolling and partly by rolling and suspension. In reservoirs the transportation processes are graded suspension and uniform suspension. Sediment collected from the areas close to the impoundment behaves like those deposited from pelagic suspension, indicating turbulent free depositional environment prevailing in the area.

KEYWORDS: Karamana River, Grain size, Sediment transport, Texture, River Channel.

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RESEARCH ARTICLE

PISCICIDAL PLANTS USED BY *MALAI PANDARAM* TRIBES IN ACHANKOVIL RIVER BASIN, KERALA: AN ETHNOBIOLOGICAL APPROACH.

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Manuscript Info	*Abstract*
	Malai Pandaram tribes are well known for their nomadic way of life style and inherited wisdom of ethnobiology. An ethnobiological survey for Piscicidal plants used by Malai Pandarams has been conducted during 2013 March to 2015 March in the Achankovil River basin. Information on piscicidal plants and their usage were collected through observation, personal conversation and structured questionnaires among them. 41 plant species belonging to 33 genera and 18 families were found of piscicidal value. The plant species are enumerated in alphabetical order along with families and local names, followed by their ethnobiological uses.

Introduction:-

Ethnobiology, the scientific study of biological knowledge of particular tribal communities about plants, animals, their interrelationships and uses, shares various methodologies and theoretical frame works has been associated with ethnobotany and ethnozoology[1,2]. Ethnobotany of Kerala is augmented with significant contribution from primogenitors[3-9]. Kerala is remarkable with high biodiversity and cultural diversity possesses 35 tribal communities accounting for about 1.45 per cent of the total population[10]. Most of them are inhabited in the Western Ghats forests and rely on forest resources for their livelihood. Fish has been an integral part of their diet since time immemorial. Traditionally they have been used plants and plant parts for poisoning or stupefying fishes. The uses of poisonous plants for catching fishes make a distinctive attention in the field of ethnobotany in all over the world[11-15].

Malai Pandarams, a typical regional nomadic forest dwelling community distinguished into three categories, viz., the forest nomads, the colonized and the semi-colonized or semi-nomads[6]. They are settled in the highland and midland region of Achankovil River basin between 9° 09'N-9°37'N latitude and 77°11'-76° 96' E longitudes. The altitude varies from 50-1000m above msl. The Malai Pandarams contribute 0.49% of the total tribal population of Kerala and most of them are lived in rural regions.

Ethnoichthyology and ethnobotany are the areas of ethnobiology that examines the indigenous knowledge of fishes and plants for their day-today life of indigenous communities have attracted the attention of both ethnobotanists and ethnozoologists. Documentation of piscicidal plants in the state has an extensive history from imperial period. The usage of fish poisonous plants by the *Malayadiyars* tribes of Pamba river basin reported by Bourdillon in 1892 was considered as the first report[16]. In 1914 Rama Rao reported that there have been 21 plant species as fish poison in the Travancore region of Kerala[17]. Prasad et al described 28 plants which belong to 23 genera and 16 families were used for fish poisoning in Kasargod district, Kerala[9]. A review of the available literature revealed that a few

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HIERARCHICAL ANOMALY AND DENUDATION INDEX OF KARUVANNUR RIVER BASIN, THRISSUR DISTRICT, KERALA, INDIA

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ABSTRACT

Process geomorphologic aspects of drainage basin can be interpreted from the analysis of morphometric parameters with the aid of geospatial technology. In the present study, the hierarchical anomaly of Karuvannur river basin (KRB); a sixth order tropical river flowing through Southern Granulite Terrain (SGT) of peninsular India, is attempted to infer the denudational status deduced from drainage density (D_d) and hierarchical anomaly index (Δa). Vectorized Survey of India (SOI) topo-maps and Shuttle Radar Topographic Mission (SRTM) data were processed with ArcGIS 10.4 software to derive the morphometric indices. The anomalies in the hierarchical organization of drainage network of KRB is revealed from Hierarchical anomaly number (H_a), hierarchical anomaly index (Δa) and hierarchical anomaly density (ga). The denudation index showed that sediment yield of KRB is 0.34 tons/km²/year.

Keywords: Hierarchical anomaly. Denudation Index. Process geomorphology.

INTRODUCTION

Drainage networks are gravity driven subcrustal water transmitting veins of the earth system. It readily responds to terrain changes and serves as an important tool for deciphering geomorphologic signatures of topographic evolution. The progressions of the stages of fluvial landform development are the end product of the action of the trinity of structure, processes and time (Davis, 1909). Similarly, the development and temporal changes of a drainage configuration to a great extent is the reflectance of various geological activities, tectonics, and climatic set up of the terrain. The short term and long term geologic history of a river system dictate the trend, and stability of the basin, and also gives an understanding about the natural characteristics and human-induced imbalances (Armaş et al., 2013).

The water flow within a basin is in proportion to its stream length if the geological and atmospheric factors remain constant (Langbein, 1947). The area – distance/ length distribution of drainage system, called the drainage density act as a measure of the effectiveness of stream incision and development of the drainage basin. As the drainage basin develops through geomorphic evolutionary stages, the number of tributaries and stream order increases to acquire a progressive drainage configuration. The development of drainage segments will be poor in the old stage of geomorphic evolution. Tectonic/diffusive/mass wasting process and /or anthropogenic interferences in the drainage basin can alter the drainage network progression (Avena et al., 1967).

Estimation of hierarchical anomaly in a drainage network offers hint to the processes responsible for creating the drainage network anomaly, such as tectonics/diffusion and/or erosional status. For instance, the hierarchical anomaly index will be higher for an elongated drainage basin developed under strict tectonic controls (Bahrami, 2013).

Hierarchical anomalies in drainage network: a case study from Western Ghats, South India

A. U. Anish, K. R. Baiju & Sreenath Sekhar

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Evidences of polyphase deformation and retrogression in high-grade metamorphic rocks – a case study from the Western Madurai Block, Southern India

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Abstract: The deformation history of the Southern Granulite Terrain is as complicated one as its metamorphic evolution is polyphased with multiple thermal events. In this present study detailed lithological mapping and analysis of structural fabric of the Precambrian metamorphic rocks in and around Erattupetta area, Western Madurai Block, Southern Granulite Terrain. The different tectonic impulses varying in magnitude and direction have left their imprints in the tectonites in the form of the mesoscopic and macroscopic structures. Systematic analysis of structures reveals that the area has been affected by polyphase deformation. The textural and mineralogical evidences suggest that rocks undergone high grade metamorphism and influenced by different tectono-metamorphic events. It is suggested that, these multiple and complex structural and metamorphic events could be chronologically constrained for better perception and evaluation of the tectonic history of this terrain.

Keywords: Deformation, retrogression, Western Madurai Block, southern India

1. Introduction

The South Indian shield represents one of the shield areas of the world that has preserved an early formed crust (prior to 2500Ma). Following the pioneering classification by Fermor [1936], the south Indian shield has been traditionally divided into the Dharvar craton and the Southern Granulite Terrain (SGT). The SGT forms the southernmost part of the peninsular India is one among the prominent granulite terrains of the world which constitutes deformed and metamorphosed assemblages with complex lithological inter relationship (Ramakrishnan et al., 1993, 2003). The SGT is characterized by the association of upper amphibolite's and granulite facies lithologies along with rocks of syn-post events of plutonism, volcanism, sedimentation and several periods of deformation and metamorphism. In the SGT, the granulite rocks are well exposed except along the linear stretches of the coasts where they overlain by Mesozoic and Tertiary sediments. The most characteristic feature of the SGT is that the entire terrain is dissected by various crustal scale shear zones (Chetty et al 1995). Major shear zones, the prominent crustal discontinuities in SGT include, Mercara Suture Zone, Moyar–Bhavani shear zone, Palghat Cauvery Shear System and Achankovil Suture Zone (Amaldev et al., 2016; Santosh et al., 2015) (Fig. 1). Systematic studies of the rocks in these Proterozoic crustal units had provided a valuable insight to the tectonic history of the south Indian shield (Hariss et al., 1994; Jayananda and Peucat, 1996; Braun and Kriegman, 2003).

2. Regional geology

The Southern Granulite Terrain (SGT) forms the southern part of the South Indian Precambrian shield and is comprised of high-grade metamorphic rocks such as charnockites and gneisses. The prominent crustal blocks in the SGT from the north to south are the Mesoarchean Coorg Block (Santosh et al., 2015) dominantly Neoarchean Nilgiri Block (Samuel et al., 2014), the NW and SW segments of Madurai Block dominated by Neoarchean-Paleoproterozoic and Meso-Neoproterozoic rocks respectively (Plavsa et al., 2012 and Collins et al., 2014), Late Neoproterozoic-Cambrian Trivandrum Block (Santosh et al., 2005, 2006). The Madurai block is the largest granulite block in Southern granulite terrain bounded by Palghat-Cauvery shear zone in the north and Achankovil shear zone to the south. The major rock types in the area include charnockites, mafic granulites, hornblende-biotite gneiss, biotite gneiss, garnet-biotite gneiss, other quartzo-feldspathic gneisses and granitoid intrusives. Some of the petrological features like sapphirine bearing granulites; occurrence of graphite in charnockites and the extensive areas of massive charnockite occurrences etc, make this block petrologicaly significant.

Tree biomass and carbon density estimation in the tropical dry forest of Southern Western Ghats, India

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United Nations Framework Convention on Climate Change highlights the significance of carbon storage and emission in forests towards climate change mitigation. The aim of this study was to quantify the tree biomass and carbon density (carbon storage) in the tropical dry forest of the Chinnar Wildlife Sanctuary of Kerala located in the Southern Western Ghats, India. We investigated the species-wise contribution of carbon (C) storage, as well as the species-wise and plot-wise correlation between carbon and other dendrometric variables. We also analysed the girth (diameter) wise distribution of carbon and tree density in the study region. The study was conducted in eight selected sample plots of the region, each with an area of 0.1 hectare. Species-specific volume and specific gravity relationship coupled with suitable regression equation were used to estimate biomass. Tree carbon was assumed to be 47% of the biomass. The results showed that the average biomass and carbon density of the vegetation were 64.13 t ha^{-1} and 30.46 t-C ha^{-1}, respectively. Among the 32 species identified, *Tamarindus indica* L. (17%), *Hardwickia binata* Roxb. (14%), *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn (10%) and *Pleiospermium alatum* (Wight & Arn.) Swingle (10%) were dominant as for carbon storage. The correlation analysis showed that basal area is a good predictor of tree biomass and carbon, while the role of tree density and tree diversity remain uncertain in determining carbon storage. With respect to diametric class distribution, tree density showed a reverse J-shaped pattern indicating the sustainable regeneration of the analysed forest, where the small- (diameter at breast height 3-9 cm) to medium-sized trees (diameter at breast height 10-69 cm) were found to contribute to more than 50% of biomass and carbon in the forest. The study provides useful information for carbon mitigation strategies in a tropical dry forest in the Southern Western Ghats.

Keywords: Above Ground Tree Biomass, Carbon, Tropical Dry Forest, Kerala, Southern Western Ghats

Introduction

Forests represent a significant part of the global carbon cycle and play an important role in carbon sequestration. Forests cover 40% of the terrestrial surface though they contribute by 90% and 70% to terrestrial biomass and productivity, respectively (Korner et al. 2005). The significant role of forests in containing global carbon dioxide levels (CO$_2$) was acknowledged in Kyoto in December 1997. In the present climate change scenario, the international community is increasingly made aware of the fact that the alleviation of global warming cannot be achieved without the inclusion of forests in the mitigation plan. Reducing Emissions from Deforestation and Forest Degradation and enhancing forest carbon (REDD+) is a new initiative of the United Nations Framework Convention on Climate Change (UNFCCC). It is led by developing countries with rich forest cover and calls for economic incentives to reduce the emissions of greenhouse gases from deforestation and forest degradation in developing countries (Gibbs et al. 2007). Beyond carbon sequestration, REDD+ is also expected to play a major role in other ecosystem services and has the potential to generate benefits for indigenous and local communities. To achieve and optimize these "co-benefits", the developing countries need to have well-established estimates of forest carbon densities or stocks for a successful implementation of mitigating policies and to take advantage of the REDD+ programme (Saatchi et al. 2011). According to Canadell & Raupach (2008), increasing the carbon density or stock of existing forests is also an important option in this regard. It is therefore vital to understand the potential role of forests, especially tropical forest, in curtailing the impact of global warming. As the climate change debate progresses, policy makers also require more scientific and reliable information on the current status of carbon storage that would benefit in effective resource management, in developing policies

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Environmental protection under Tort Law

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Introduction

Earth is the only known planet where life exists. Scientists achieve that in the whole life of earth, on many occasions life has totally vanished from earth and revived later. There may be various scientific theories and reasons for this phenomenon. But in simpler, words this is because of the unique environment which prevails in earth. When all other organisms in the earth adapt themselves to the environment, man is the only animal which changes the environment for his convenience. Changing the environment, we conveniently call development, may be the real threat to environment. Environmental pollution in the present sense of the term has been seriously noticed only after 1960. It is true that our present environmental protection strategies are the contributions of 1960s and 1970s. Surprisingly the environmental strategies and policies have created an impression that environmental protection laws are sui generis and independent. But this may not be the realistic way of approach. As a matter of fact, environmental law is not a sui generis branch of law and it is

mankind is the ecosystem. Proper and efficient use of water, land and air, fisheries, and biodiversity. Every individual, family, organization, and community have a vital role to play. Advocating the openness of nature and its resources in the name of advancing the greatness and business of the present number of people can lead to ruthless destruction on economy and gradual elimination of human from earth. Nation states and governments have been following a strictly utilitarian view of nature and were guided by the principle of greatest happiness of greatest number of people in the decision making process. The origin of entire discourse is an alternative framework that should be taken up to protect our planet from further destruction. The educational institutions, media, businesses, nongovernmental organizations, and governments should offer creative leadership in saving our mother earth from such destruction. The legal academia can play a lead role to forestall the dominance of anthropocentrism and re-evaluate the place of human interests in relation to nature. The partnership of government, civil society and business is essential for effective governance and judicious management of natural resources.

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Environmental Risk and Vulnerability Leads to Natural Hazards–Lessons Learned from the Natural Disaster Affected Communities in India

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Abstract

Disaster risks in India further compounded by increasing vulnerabilities related to changing demographics and socio-economic conditions, unplanned urbanization, development within high-risk zones, environmental degradation, climate change, geological hazards, epidemics, and pandemics. All these contribute to, a situation where disasters seriously threaten India's economy, its population and sustainable development (NDMA, 2014). The lessons learned from the previous disasters, the Indian Ocean Tsunami in 2004, Uttarakhand floods in 2013 and the landslides in Kerala (2012 & 2013) has questioned the timely, appropriate and effective disaster operations in India. The study also gives a short review about the recent Kerala floods in 2018. One serious issue was that the disaster operations seldom valued the crucial linkages between environmental risk, vulnerabilities, and disasters. It is in this context, the author collected information on the different kinds of environmental hazards that communities face, and accordingly developed community-based alternatives to environmental and livelihood uncertainties. The paper assesses (a) the vulnerability of the critical disaster-affected places of India (b) describes the dynamics and challenges faced by the author in generating public opinion towards environmental risks and in sustaining such processes and (c) explains the strategies and approaches adopted in strengthening community-based initiatives towards coastal and environmental management. This paper is, in fact, a case study, which is qualitative. The villages are described here are the Alappad village in Kollam district of Kerala; Landslide affected communities in Kerala, Tsunami affected areas of Tamilnadu & Andaman Islands. The arguments presented in the paper show that local culture, social capital, local self-government and other contextual factors such as technology used for livelihood, state policies and community participation are crucial components that shape and sustain in sustainably addressing the risk and vulnerabilities.

Keywords: *Public opinion, environmental risk, Andaman Islands, community participation*

Introduction

Natural disasters such as drought, flood, fire, earthquake, tornado, and wind storm affect thousands of people every year. It is inevitable to understand and respond to disaster vulnerability and risks and to prepare and protect everyone is the sole responsibility of the government as well as the other stakeholders. Disasters strike the hardest at the most vulnerable groups, the poor, especially women, children, and the elderly, and the most vulnerable, disproportionately experience the adverse effects (Thomson & Twynam, 2006). The risk of natural disasters in India is extremely high. Because of its

RIGHTS BASED SUSTAINABLE LIVELIHOOD ASSESSMENT: A STRATEGY FOR HUMANITARIAN AGENCIES DURING DISASTER

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Abstract

Existing models that assess the impact of disasters are narrow in scope as they tend to overlook the effect of disasters on people's livelihood. They mainly use the conventional method, latter participatory methods were used but still it was not comprehensive enough to address the issue. Recently from 1990's onwards the Sustainable Livelihood Approach (SLA) and Livelihood Assessment Tool-kit (LAT) for relief agencies (FAO and ILO, 2009) and has been experimented in many countries, the efficacy and long-term effect of LAT still need to be empirically evaluated. Immediately after the 2010 Haiti earthquake investigator used the SLA with right's perspective to carry out the livelihood assessment of the affected people. The investigator used the participatory approach and qualitative tools to collect the information. Using the SL approach from right's perspective developed a livelihood model for the survivors. The investigator conducted three in-depth interviews and FGD with survivors of Jacmel and another focus group with 14 volunteers from a local NGO in Port au Prince in order to examine the livelihood needs and capacities of the Haitian community. In the next phase, 35 local NGO workers were recruited and trained in an in vitro livelihood analysis session that mirrored Haitian livelihood conditions. It is expected that the proposed livelihood assessment model and intervention strategy can be adopted by NGOs, government, and other aid agencies in designing their livelihood interventions in Haiti and similar other nations affected by disasters.

Keywords: Disaster, Livelihood, Right based approach, Sustainable livelihood assessment, Earthquake

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The Impact of Mahatma Gandhi National Rural Employment Guarantee Programme on Livelihood Security of the Rural Poor in Kerala

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Abstract

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) was developed by the Indian government to reduce rural poverty through 100 days of guaranteed employment per year. The objectives of the study are (1) to find out the economic impact of MGNREGS among rural beneficiaries (2) to find out the livelihood security of the beneficiaries accomplished through MGNREGA programme (3) to understand the influences of MGNREGA programme on rural poverty in Kerala. The present study is intended to identify the socio-economic impact of MGNREGA and its effect on poverty reduction. The study based on descriptive, the method used w.as qualitative. The study is covered three districts of Kerala namely, Kannur, Kottayam, and Kollam districts. From each area, five panchayats will be included. Samples from15Grama Panchayats in the three districts will be selected equally for the study. Selection of the panchayats will be made using purposive sampling method. Here the researcher presenting the salient features of the Focus Group Discussions carried out in these districts among the respondents. The findings imply that the scheme provided timely support to the rural poor people and tit given immense change in their life in terms of social and economic improvement and boost up their confidence to meet the realities in the life.

Keywords: MGNREGA, rural poverty, purposive sampling method, focus group discussions.

Introduction

The National Rural Employment Guarantee Act, 2005 (NREGA) has come into force with effect from February 2006 initially in 200 districts and later on extended to all the rural districts of India from 2008-09. The scheme is to enhance livelihood security in rural areas by providing at least 100 days of guaranteed wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work. The Act is an essential step towards the realization of the right to work and aims at arresting out-migration of rural households in search of employment simultaneously enhancing people's livelihood on a sustained basis, by developing the economic and social infrastructure in rural areas. Economic security enables women to make choices and live independently; it enriches all aspects of their lives and those of their families including their education, health, employment, personal safety, and financial security.

Origin of Conservation Refugees
The Downside of Environment Protection in India

ANJU L S KURIAN, C VINODAN

The conservation of biodiversity and natural resources can help offer a sustainable supply of goods and services to fulfil the right of people to development and livelihood. However, the conservation record is not inspiring in India and across the world, when its social, economic, and cultural impacts on local people are considered. Conservation projects that exclude local people may conserve natural resources to an extent but not people's access to livelihoods. By being a densely populated country, India cannot encourage the strategy of "pristine nature" in its conservation initiatives.

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The global North's vision of untouched wilderness regarding the protection of natural ecosystems and the conservation of protected areas has permeated global policies and politics. The central strategy of conservationist and institutions with transnational conservation agendas is largely based on the preservation of undisturbed natural areas. They look upon national governments as the guardians of biodiversity, though the international conservation agencies have very nominal control over the areas set aside for conservation. In developing countries, conservation policies and the creation of protected areas with a wilderness approach have led to conflicts between governments, institutions, and the local population. This approach has also catalysed the expulsion and marginalisation of people living in these regions, ignited the issue of the dependence of inhabitants on natural resources, and has disregarded the knowledge and traditions of local populations in the conservation of ecosystems and biodiversity (Dowie 2011).

Over the last few years, the significance of protected areas with expanding institutional structures has been constantly highlighted by committees and scholars in discussions about climate change. Protected areas have been made, stood or given notified by the national governments for wildlife conservation, as a means of reducing pressure on wildlife and biodiversity. But, they are now being viewed as avenues for afforestation and reforestation, along with curbing deforestation, as a cost-effective approach to reduce greenhouse gas emissions (Dudley and Stolton 2010; Leguminosa and Kothari 2010).

National and international conservation efforts in the form of "protected areas" emerged in the context of 19th century colonialism. The first "modern" protected areas with an understanding of "pristine nature" devoid of human intervention and occupation began in the United States with the establishment of Yellowstone National Park in 1872. The creation of protected areas, accompanied by the expropriation of people's land, evictions of local populations and restrictions on their access to and the use of vital resources, as well as restrictions on access to cultural and sacred sites, have led to the impoverishment of inhabitants, and the loss of traditional culture (Springer and Almeida 2015). On the one hand, the conservation of biodiversity and natural resources can facilitate the creation of environments that offer a sustainable supply of goods and services to fulfil people's right to development, to life and livelihood. However, on the other hand, conservation may negatively affect people's rights in the protected area through various ways (Thomas 2011).

ENERGISING THE NEW SILK ROAD: CHALLENGES AND OPPORTUNITIES

Anju Lis Kurian

C. Vinodan

The term 'One Belt, One Road' (OBOR) applies to the establishment of the 'Silk Road Economic Belt' and 'Maritime Silk Road' by the Chinese Leadership in 2013. This initiative encompasses areas that generate 55 percent of the world's GNP, 70 percent of the global population and 75 percent of known energy reserves. The main objective of the paper is to analyse the OBOR from the perspective of energy security and the utilization of the initiative for ensuring energy security for the country. Just like any other net importer of energy resources, China's energy policies are also mainly driven to achieve the supply security, to satisfy the energy thirst of the masses, and to ensure energy at reasonable prices. The energy dimension of OBOR is well suited to address the issues related to energy supply, demand as well as price and thereby becomes one of the key drivers of its foreign policy.

Introduction

By the first decade of the 21st century China became the world's second largest economy by passing United Kingdom in 2005, Germany in 2006 and Japan in 2010 and still moving on to a high growth path. The sky-scraping economic growth caused the country to be the world's largest energy consumer in the year 2009. Growth in domestic consumption along with deficient domestic output of fossil fuels posed energy security as an urgent challenge for China. The intense efforts of China to enhance domestic production of fossil fuels especially oil and natural gas has failed to catch up with consumption growth due to resource shortages. So the Chinese government initiated the policy of exploring overseas resources and markets in various locations of the world to guarantee its energy security to cope-up with its development needs[1]. In this scenario the initiation of New Silk Route gave great impetus to the energy security aspirations of the country.

The original Silk Road came into existence more than two thousand years back as part of the westward expansion of China's Han Dynasty (206 BC-220 AD). It was a sprawling network of exchange which connected South and Central Asia with the Middle East and in due course extended over four thousand miles to Europe. From the 16th Century onwards Asian commerce with Europe had largely shifted to maritime trade routes owing to the cheapness and fastness[2]. The Silk Road was a major factor in the advancement of the civilizations of China, India, Persia, Rome, Central Asia, Africa, Europe, and Arabia by means of political, economic and cultural interactions among the civilizations and cultures of these countries and regions. The Silk Road symbolizes a historical example of political, economic and cultural assimilation due to inter-regional trades and cultural communications. The revivification of the Great Silk Road was first call forth by the former European Commission (EC) when the Central Asian countries – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan – became independent nations in the year 1991. The intension of EC's Silk Road was to connect Europe with Central Asia through the International Transport Corridor Europe-Caucasus-Asia (TRACECA). Later the United States initiated the 'Silk Road Strategy Act' in 1999 that was updated with the 'Silk Road Strategy Act of 2006', to ensure long-term US interests in Central Asia, South Caucasus, Afghanistan and to advance regional security as well as cooperation. The UN planned to revitalize the Silk Road as a trans-Asian highway and conceived as a transcontinental railway linking Russia and China with Europe passing through Kazakhstan, the Eurasian Land Bridge is sometimes referred as the 'New Silk Road'[3].

In 2012, Professor Wang Jisi, a prominent Chinese scholar was the first to speak about the need for China to invigorate three Silk Roads: to Southeast Asia, to South Asia and to Central Asia. One year later, China's President Xi Jinping, in a September

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Women Empowerment and Livelihood Promotion: A Transformation made by Self- Help Groups in Andaman & Nicobar Islands, India

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Abstract

The concept of SHG's and development oriented, NGOs are moving towards empowering women by a provision of credit and making them participate in the process of development. There are several success stories recorded in India like (LIJJAT), signifying the greater importance of women-centered self-help groups that make changes in the life of the women/families and the communities. Microfinance in India started evolving in the early 1980s with the formation of informal Self Help Group (SHG) for providing access to financial services to the needy people who deprived of credit facilities. Here the study intends to bring a comprehensive analysis of an intervention study carried out in the Andaman and Nicobar Islands in India. The study is an intervention based; it produces a clear picture on how women can bring positive change in their life after facing series of massive disasters, which made their presence more vulnerable in various spheres of their life. The study was carried out in association with leading voluntary organizations like Mata Amritanandamayi Math projects,   CARE India; a national organization working in the development sector has initiated microfinance and livelihood restoration programs in Andaman & Nicobar Islands since December 2005. Several hundred SHGs have been formed by CARE in the Islands with the close support with NABARD, Andaman & Nicobar State Cooperative Bank, SBI, Syndicate bank and other stakeholders in the island. The overall focus of the intervention project was ensuring the empowerment of the women in the islands through promoting Self Help Groups (SHGs). NABARD supports Amrita SREE in giving capacity building training for SHGs on leadership, micro-enterprises, and promotion of livelihood activities in the islands. Care India monitored the project on a bimonthly basis, and technical inputs are given from time to time. The aim of the study is to narrate the process of changes made through this intervention among the life of the women SHG member in the island. The objectives of the study are (1) to understand the economic impact of SHGs through this microfinance and livelihood programmes in the study areas (2) to find out the nature and scope of credit linkages and the transformation process (3) to document the success stories of women SHG members through the intervention (4) to understand the microfinance and livelihood programmes and policies influences the women SHGs in the promotion of their livelihood. The study is based on the qualitative method and also used case studies of women SHG's and members. The sampling size is 30 for qualitative interviews, and five in-depth case studies completed for collecting the information. The received data analyzed by content analysis and thematic presentations. The major themes derived from the survey are credit linkages, initiation of microenterprises, capacity development, livelihood promotion, revolving fund management, networking /advocacy with various stakeholders, community ownership, and management system. The success case studies are documented and presented in the

A New 'Washington Consensus'
'Indo–Pacific' and India's Emerging Role

K M SEETHI

The United States administration is fervently promoting the "Indo–Pacific" as an alternative geopolitical construct to mobilise a large number of countries in the Asia–Pacific region to contain Chinese and Russian influence. However, India under the Narendra Modi administration has become a strategic contraption by yielding to the pressures of the Donald Trump regime for a programmed "Indo–Pacific" ploy. In the emerging scenario, New Delhi's rhetoric on "strategic autonomy" has become a political liability.

The geopolitical construct of "Indo–Pacific" has gained considerable significance in international relations recently. Scholars, policymakers and think tanks across the world argue that the locale of Asia–Pacific has been substituted more realistically by an appropriate category encompassing two oceanic political and strategic heritages of both the Indian Ocean and the Pacific Ocean. Leaders and policymakers from Japan, Australia, the United States (US), to India and Indonesia have frequently deployed "Indo–Pacific" in their speeches, statements and writings. However, the construct of the Indo–Pacific has a much wider meaning and implication today against the background of the changing US strategy in the region with a view to containing China as a rising power, both economically and militarily.

The US President Donald Trump and Indian Prime Minister Narendra Modi enunciated this construct within the framework of their countries' strategic and economic interests. While Trump has been more explicit in his position on the potentials and challenges of the region, Modi talked about "strategic autonomy" and "free, open, prosperous and inclusive Indo–Pacific Region" at the Shangri-La Dialogue in Singapore (MEA 2018a). However, just before the commencement of the Shangri-La Dialogue, it may be noted, Washington had rechristened its military command in charge of the Asia–Pacific region from the "Pacific Command" to the "Indo–Pacific Command."

The renaming was done in a function where America's South Korean ambassador, Admiral Harris, charged that China was seeking "hegemony in Asia." He also warned that Russia should be watched, calling it a "spoiler." The US Secretary of Defense James Mattis was even more categorical, saying that the US would continue its naval activities in the South China Sea aimed at challenging China's territorial ambitions (Sputnik 2018). Plausibly, the American strategy in the Indo–Pacific is to contain China and co-opt India, both economically and militarily. This strategy obviously stemmed from Washington's long-term fear about the "rise" of Asia and the decline of American power.

Revisiting Washington Consensus

The "Washington Consensus," as it has been known for more than a quarter century, unfolded an array of free market economic policies enunciated and reinforced by Washington-based institutions and agencies, as popularised by John Williamson. In a paper "What Washington Means by Policy Reform," Williamson said that the Washington, as he referred to in his paper,

is both the political Washington of Congress and senior members of the administration and the technocratic Washington of the

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Indo-Pacific and India's Emerging Role

K. M. Seethi

Is India sliding itself into the world capitalist centre as a 'sub-imperialist' country fulfilling the 'responsibilities' of the imperialist core? Going beyond the conventional Leninist conceptualisation, India, an emerging economy with a credo of neoliberal aspirations and militarism, appears to be exercising a particular form of imperialism over its partners in the Global South, by fulfilling the role of a sub-imperialist power in the increased coordination/collaboration between imperial forces. The latest in the series of such engagements could be seen in India's incorporation into the 'grand strategy' of the United States in the Indo-Pacific region. Here the conventional economic theory of imperialism could be effectively supplemented by concepts which take into account 'imperialism by delegation.'

The Indo-Pacific Business Forum held in Washington in 2018 witnessed this coronation ceremony—of elevating India's status to "Tier-1 of the 'Strategic Trade Authorization' (STA) regime. The Trump Administration already acknowledged that the American investment in the Indo-Pacific region "is good for America, good for business, and good for the world." The Administration announced "$113.5 million in immediate funding to seed new strategic initiatives in the Indo-Pacific region." Announcing "a range of new economic cooperation efforts with Japan, Australia, India, and Mongolia," the Department of Commerce "granted Strategic Trade Authorization Tier 1 status to India, enabling American companies to export more high-technology items under a streamlined license exception" (US, White House 2018).

It was the Secretary State Michael R. Pompeo—while addressing the Business Forum to launch the "economic and commercial pillars" of the Trump Administration's Indo-Pacific strategy—who emphasized "the critical role of the U.S. private sector in ensuring a sustainable, financially responsible economic future for the Indo-Pacific." Pompeo also announced strengthened support for important regional institutions in the Indo-Pacific, including the Association

Trail-blazers in International Relations
Tributes to Samir Amin and Robert Cox

K. M. Seethi

With the demise of Samir Amin (1931-2018) and Robert Cox (1926-2018), the discipline of International Relations (IR) has lost the trail-blazers of two intellectual traditions. While Amin was literally an indispensable component of a new genre of the Radical Political Economy School of Marxism, Cox represented a Critical Theory tradition of Marxism that set off an alternative discourse in the realm of IR Studies.

Samir Amin was born in Cairo in 1931, to an Egyptian father and a French mother. Amin had his formal education in Egypt and then moved to Paris for the PhD in political economy. During the student days, he was attracted to socialism and took membership in the Communist Party of Egypt. During 1957-60 Amin spent his early career days at the Institute for Economic Management in Cairo. Even as Nasser started his rule, he had to move out of Egypt. Then he decided to settle down in Dakar, Senegal. It was here that he took charge as the Director of the UN African Institute of Economic Development and Planning and, subsequently, as the Director of the African Office of the Third World Forum. One of the distinct contributions of Samir Amin was his abiding interest and commitment to the cause of socialism. As Prabhat Patnaik observed, he "was not a mere arm-chair theorist who used Marxist tools to analyze the contemporary reality as a form of detached intellectual activity." He could be called "a passionately-committed activist, for whom intellectual activity was quintessentially an aid to praxis." Amin also accorded a prime importance to imperialism, in his analysis. He saw "imperialism as central to capitalism, but placed it firmly within the framework of the Labour Theory of Value through his theory of unequal exchange for which he is justly celebrated, as noted by Patnaik. A critique of the capitalist world-system/imperialism, the ultra-right regimes and reactionary forces across the world, Amin had talked and written about strategies of transforming the world through political

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The Effect of MGNREGA on Social, Economic and Political Empowerment of Women in Rural Rajasthan, India

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Abstract

An analysis of women's social, economic and political empowerment programmes in Rajasthan through MGNREGS will contribute to the recommendations about how a national level programme can benefit to the targeted group and policy-making process of any development programmes. The significance of women participation in all spheres of MGNREGS needs to be studied and documented. Here the research the article in focus on understanding the various factors supported to the socio-economic and civic empowerment of women through this field-based programme in the State of Rajasthan. The recent report of MGNREGS claims 69% participation rate of women in Rajasthan (MGNREGA, 2016). The state claims to have given reservation to women in local Panchayati Raj institutions. But still, various exploitative practices are prevalent in the state. In terms of various indicators, the state ranks among the poorest performing state. Women health in the state remains a serious concern. Due to the entrenched patriarchal system, to date women emancipation remains a daunting task. Understanding the ground realities and impact of MGNREGS on women in socio-economic and political space, the paper will bring a new perspective which will help to understand the importance of such policies and regional differences in terms of achieving desired outcomes.

Keywords: MGNREGS, women empowerment, Panchayati Raj Institutions

Introduction

MGNREGA is undoubtedly one of the revolutionary steps taken by the Government of India in the post-independence period, towards legal enforcement of the Right to Work to enhance 'livelihood security.' The year 2015 marks the 10th anniversary of the Act. Though seemingly limited in its scope (100 days per household per year), the Act emerged as a powerful tool of empowerment for the rural population of India. It provided vast opportunities for the rural poor not only to escape from the decades-old poverty and miseries of social stratification but also to organize and fight for similar rights like the "right to social security." It also helped to empower woman by guaranteeing them relatively autonomous income-generating employment schemes.

The implementation of the Mahatma Gandhi NREGS has raised a formidable challenge to the existing institutional framework as well as to the elected representatives, officials and workers to effectively plan, organize and execute a large number of works across the State in order to work towards the creation of assets that contribute to livelihood security and regeneration of the natural resource base (TISS, 2011). The response from the State of Kerala, in terms of procedural clarity for programme implementation, has been remarkable, as it capitalized on its achievements in implementing democratic decentralization over the past decade. MGNREGA entitles 100 days

CLIMATE CHANGE AND ENVIRONMENTAL STEWARDSHIP: KERALA PERSPECTIVE

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Introduction

Climate change and associated maladies are at the periphery and centre of global and national policy formulation process, as the issues are emerging and imminent in nature (Chuntina et al., 2012; Dubash and Joseph, 2016). Climate change is the significant change or shift in the long term weather patterns due to an array of natural or anthropogenic factors. No doubt, climate change is affecting every nook and corner, irrespective of continent or country thereby crippling economies and affecting lives, costing communities and countries (IPCC, 2011; Ahmed and Suphachalasai, 2014;). The world is witnessing significant impacts of climate change, which include shifting weather patterns, sea level rise, extreme weather events etc and generally the poorest and most vulnerable people are lion part of the victims (Jogesh, 2011).India is a developing country with nearly 700 million rural population directly depending on climate-sensitive sectors (agriculture, forests and fisheries) and natural resources (water, biodiversity, mangroves, coastal zones, grasslands) for their existence and livelihoods. The state level climate change trends over India during the last 60 years was well illustrated in respect of temperatures (Maximum, Minimum and Average), Daily temperature range and rainfall for each state of the country (Rathore et al., 2013) with commendable impacts on livelihood.

Kerala scenario

The State of Kerala is heralded for its unique development leading to high human (social) development disproportional to its economic growth. Kerala ranks first in the UNDP's ranking of Indian states in Human Development Index (Planning Commission, 2002; Council for Social Development, 2008). Kerala stands at the top though it ranks only fifth in per capita Net State Domestic Product (NSDP). However, the state of Kerala is vulnerable to the changing climate articulation owing to its location along the sea coast and steep gradient along the western slopes of the Western Ghats which can be summarized as,

1. Sea level rise - will result in widespread salinity affecting the availability and quality of groundwater for drinking and agriculture purposes in Kerala and also will also result in coastal erosion.
2. Erratic monsoon - Climate change has affected the monsoon patterns and increase in raindrop size has resulted in increased erosion and infrastructure inducing wetlands more vulnerable.
3. Extreme temperatures - Maximum and minimum recorded temperatures have shifted from usual trends which decreased the agricultural productivity.

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where the need to establish the behavioural patterns of a person are discussed. A man of culture is one who grows or evolves into a person who can face the complex realities of life with finesse. In this context it may also be recalled that allied expressions like culture shock, culture vulture, corporate culture too deserve to be discussed.

I would like to conclude this preface by invoking forces of mediation which operate with and between/across terms, "nature" and "culture". "Here is a process by which anything "cultural" tend to (or rather made to) look "natural". Roland Barthes has discussed the way a family photograph (a tradition with a definite history) has come to be accepted as "natural". Media in other words reconstructs the cultural in such a way that what appeared historically contingent would in course of time start looking natural and unproblematic. The bridges over the rivers, the cow sheds by the side of houses, the lamp posts by the way side and the telecommunication towers on hilltops have all given you this feeling. In fact they all had been installed from (historical) time to (cultural) time. But these cultural tropes (though the inevitable has relegated many into the hole of oblivion) have come to redefine the skyline of "modern" life.

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Introduction

Himself through the Media was the theme of *TRANSIT* ... *Transit: Media, Culture and the Media* ... a National Symposium on *Nature, Culture and the Media* conducted by Dept. of English, K. E. College Mannanam on the occasion of its Golden Jubilee. *Transit* was an umbrella enfolding innovative thoughts about the three realms: Nature, Culture and the Media. The topic was brainstormed with an eye on the pressing concerns of the present times: *transgressions* on nature, *transmutations* in culture and *transformations* through media. The symposium was a fertile ground for the transmission and exchange of ideas, bringing out a kaleidoscope of novelty.

Representations of the Mother Earth and the nurturer called Culture abound today through diverse media and the topic- "Nature, Culture and the Media" was envisioned to make a deep reflection in the erudite minds about the inextricable connection between nature and society. Man's derivations and narratives on nature, expressed through several media, is often a sieve through which the ethos of a society is manifested. Culture is a potent space where various streams – gender, ecology, race, class, ethnicity – shake hands with millions of meanings. As technology progressed Culture

പി.എസ്.രാധാകൃഷ്ണൻ

സമാന്തരമാസികകളും മലയാളി ജീവിതവും

വിലയകാലത്തിന്റെ സ്പന്ദനങ്ങൾ ആവാഹിച്ച ചെറിയ ജീവിതമായിരുന്നു ചിറ്റിൽമാസികനുകളുടേത്. വില കുറഞ്ഞ കടലാസുകളാൽ വിലയേറിയ ചരിത്രം നിർമിച്ചവരാണ് ചെറുമാസികക്കാർ. പ്രദീപ് പനങ്ങാട് എഴുതിയ മലയാള സമാന്തര മാസികാ ചരിത്രം എന്ന ഗ്രന്ഥത്തെപ്പറ്റി.

മലയാള സമാന്തര
മാസികാ ചരിത്രം

ഗ്രന്ഥലോകം Vol.70

-പി.എസ് രാധാകൃഷ്ണൻ

ചിന്താവിഷ്ടയായ സീതയുടെ അന്തരംഗങ്ങൾ വിചാര-വിധാരണങ്ങളുടെ സമ്മിശ്രാനുഭവമാണ് പകരുന്നത്. ഉന്നതത്തിലും വിഷാദത്തിലും നിന്ന് പ്രത്യാശയിലേക്കും പ്രശാന്തിയിലേക്കും സമക്രമിക്കുന്ന അതിജീവനാഭാഷയാണ് സീതയുടേത്. ഭാരാനുഭൂതി യാതൊരു ഉടമ്പടിയുമില്ലാത്ത ജീവിതത്തിലേക്കാണ് സീത പ്രവേശിക്കുന്നത്. അഭയവും വിരഹവും തന്യതാഭാവവും വിരക്തിയുമൊക്കെ ഇടകലരുന്നതാണ് സീതാത്വം. ഇതിനിവിടെ 'പ്രതിപക്ഷ'ത്താണ്. രാമ് എക്കാലവും വലുത് തന്റെ പ്രതിഛായയായിരുന്നു. രാജജീവിതം നയിക്കുമ്പോഴും കിഷ്കിന്ധയും ലങ്കയും സമന്തരാജ്യമാക്കി മടങ്ങുമ്പോഴും രാമനിലൂടെ പ്രകടമാണ്. സീതയ്ക്കും ലക്ഷ്മണനും മാധ്യപ്രഷ്ഠ് കല്പിക്കുന്ന രീതി ഇതിനുദാഹരണമാണ്. നീതിശാസ്ത്രവും വിശ്വാസ്യതയിലും പ്രാമാണികയാണെന്നാണ് പറയുന്നതെയിലും തത്വത്തിൽ അങ്ങനെയായിരുന്നില്ല. രാമഹിതം മാത്രമാണ് അയോധ്യയിൽ നടപ്പിലായിരുന്നതെന്ന് സീത കരുതുന്നു. അതിനാൽ അനേകം യുക്തികൾ സീത നിരത്തുന്നുണ്ട്. ജനാഭിപ്രായം പാലിച്ചിരുന്നെങ്കിൽ രാമനെന്തിനാണ് കൈകേയിയുടെ ആവശ്യം അംഗീകരിച്ച് വനവാസത്തിന് മുതിരായത്. ദശരഥന്റെ 'വരം' പാഴാകാതിരിക്കാൻ ജനസമ്മതിയുള്ള യുവരാജാവ് എടുത്ത തീരുമാനം സ്വാർഥമായിരുന്നില്ലേ? പ്രജാഹിതം രാമ് അനുകൂലമായിരുന്നിട്ടും എന്തേ അത് അവഗണിച്ച് കാട് പുകി? എന്നിങ്ങനെ ചോദ്യങ്ങളുടെ ഒരു നിര തന്നെ രാമനോട് സീത ഉന്നയിക്കുന്നുണ്ട്. സീതയുടെ പ്രതികരണം പ്രജാത്വത്തിനും രാജത്വത്തിനും ഇടയിലെ വൈരുധ്യത്തെയാണ് വെളിവാക്കുന്നത്. ലങ്കയിൽ വച്ച് സീതയെ പരസ്യമായി അഗ്നിപരീക്ഷക്ക് വിധേയമാക്കിയത് രാമന്റെ മാത്രം തീരുമാനമായിരുന്നു. പിന്നീട് സീതയെ കാട്ടിൽ വെടിയുന്ന കല്പനയും മറ്റൊരുടേതുമായിരുന്നില്ല. രാജഹിതവും ജനഹിതവുമായുള്ള പൊരുത്തക്കേടിലേക്കാണ് ഇത് നയിക്കുന്നത്. ജനഹിതമെന്ന വ്യാജേന പലപ്പോഴും നടപ്പാക്കുന്നത് രാജഹിതം തന്നെയാണ്. ബഹുജനം പലവിധമാണ്. അവരുടെ പ്രകൃതമാവട്ടെ, അന്യോന്യം ഒത്തുപോകുന്നതല്ല. ഏതെങ്കിലുമൊരു പ്രജയെ പ്രമാണമാക്കിയല്ല നീതി നടപ്പാക്കേണ്ടത്. മാനവരുടെ അഭിപ്രായാന്തരങ്ങളെ ശരിയായി വിചാരണ നടത്താമായാണ് സീതയ്ക്ക് വനവാസം വിധിക്കുന്നത്. സ്ത്രീയെന്നും ഭാര്യയെന്നുമുള്ള നിലയ്ക്ക് തയ്ക്ക് നഷ്ടമായ ദൈധികമായാണ് സീത വിഷയമാക്കുന്നത്. ജനവാദം അർഥശൂന്യമാണെന്നും തന്റെ വ്യക്തിചിത്രം ആർക്കും വഴങ്ങിടില്ലെന്നും മറ്റൊക്കെയും ഉറപ്പ് സീതയ്ക്ക് തന്നെയാണ്. തന്റെ പാതിവ്രത്യചോദനയ്ക്ക് സാക്ഷി താൻ തന്നെയാണെന്ന് പറയാനുള്ള ആത്മവാത സീതക്ക് അപ്പോഴേക്കും ശകൈവന്നിരുന്നു. കൈകേയി വരമായി ആവശ്യപ്പെട്ടത് രാമന്റെ 14 വർഷത്തെ വനവാസമായിരുന്നു. എന്നാൽ അതിന്റെ പ്രത്യാഘാതം ഏറ്റെടുക്കേണ്ടി വന്നത് സീതയ്ക്കാണ്. സീതക്കും രാമനുമിടയിലെ വൈരുധ്യം ഇവിടെ കൂടുതൽ വ്യക്തമാകുന്നുണ്ട്. രാമന്റെ നായകത്വം (Heroism) വാരതച്ചേന രേഖീയമാണ്. രാമായണത്തിന് അനേകം പാഠങ്ങളും പാഠഭേദങ്ങളുണ്ടെങ്കിലും രാമന്റെ വഴികളിൽ സാരമായ മാറ്റം പ്രകടമല്ല. മറിച്ച്, സീതാത്വം റേറിട ദിശകളിലൂടെയാണ് നീങ്ങുന്നത്. സഞ്ചലിതവും ബഹുസ്വരവുമാണ് സീതാത്വം. പ്രകൃതത്തിലും ഗ്രാമീയത്തിലും മറ്റനേകം പ്രാദേശികഭേദ്വകളിലുമായി സീതയ്ക്ക് എത്രയോ ജന്മാന്തരങ്ങൾ.

ഭർത്താവ്, രാജാവ്, ധാർമ്മികൻ എന്നിവയാണല്ലോ രാമനിൽ ആരോപിതമായ പരിവേഷങ്ങൾ, എന്നാലിവ, പരസ്പരപൂരകമാകുന്നതല്ലാതെ ആന്തരികമായി വ്യത്യാസപ്പെടുന്നില്ല. സാമ്രാജ്യത്തിന്റെ വിപുലനം, അതിനായി നടക്കുന്ന വേലന്ത്രങ്ങൾ, സ്വാർഥമായ ധർമകഥനകൾ എന്നിങ്ങനെ രേഖീയമായ പാഠയിലൂടെയാണ് രാമചരിതം നീങ്ങുന്നത്. ഇവിടെ സീതയെപ്പോലൊരാൾക്ക് ലഭിക്കാവുന്ന പരിഗണന എന്താകുമെന്ന പ്രശ്നം ഉയർന്നു വരുന്നു. നൃപൻ, പതി, രണശാലി, രാഘവൻ, അജപുത്രൻ തുട

പൈതൃകവിമർശം

തുഞ്ചത്തെഴുത്തച്ഛൻ മലയാളസർവകലാശാല
സംസ്കാരപൈതൃകപഠന വിഭാഗം ജേണൽ

സംസ്കാരപൈതൃകപഠനം
സങ്കല്പനം സിദ്ധാന്തം മാതൃകകൾ

ലക്കം എഡിറ്റർ കെ.വി. ശശി

■ പ്രൊഫ. പി. എസ്. രാധാകൃഷ്ണൻ*

സിനിമ: ആധുനികത ദേശരാഷ്ട്രം പൗരത്വം

ആധുനികമായ പൗരത്വത്തെ സിനിമ സ്ഥാനപ്പെടുത്തിയത് പര സ്പരസംഘർഷത്തിലായ നിരവധി താത്പര്യങ്ങൾക്കുള്ളിൽനിന്നാണ്. ബഹു ദേശീയതകളുടെ ആകത്തിൽനിന്നും ദേശീയമെന്ന സങ്കല്പനത്തെ നിർദ്ധ രിച്ച് ഏകപക്ഷീയമായി അവതരിപ്പിക്കുക എളുപ്പമല്ല. സ്വാതന്ത്ര്യസമര കാല ത്തുതന്നെ ഗാന്ധിജിക്ക് ഇത് ബോധ്യമായിരുന്നു. ഉറുദുവും ബംഗാളിയുമൊക്കെ വശമാക്കാനുള്ള ഗാന്ധിയുടെ തീരുമാനം ഇതിലേക്കുള്ള വഴിയാണ്. ബഹു ഭാഷകളും ബഹുസാംസ്കാരികതയും പുലരുന്ന ദേശത്തിനുള്ളിൽ നിന്നും ഏകതാനമായ ദേശീയാവബോധം തീർത്തെടുക്കുക അസാധ്യമാണ്. ഭരണ ഘടനയുടെ നിർമ്മാണവേളയിൽ അംബേദ്കർ ഇതിക്കും മനസ്സിലാക്കിയി രുന്നു. അറിയപ്പെടുന്ന ഇന്ത്യൻ സംസ്കാരത്തിന്റെ വിജ്ഞതകളിൽ പെട്ടുഴ ലുന്ന ജാതി വർണ ബാഹുല്യത്തെ മുഖ്യധാരയിലേക്ക് വീണ്ടെടുക്കുകയെന്ന ധർമ്മമാണ് ഭരണഘടനയുടെ ഉള്ളടക്കത്തിലേക്ക് അംബേദ്കർ സന്നിവേശി പ്പിച്ചത്. അതിലേക്കുള്ള വഴി സുഗമമാകാതിരുന്നപ്പോഴാണ് 'കേന്ദ്ര'ത്തിൽ തുടരാതെ സമൂഹവിലുമ്പുകളിലേക്ക് അദ്ദേഹം മടങ്ങിയത്. കേന്ദ്രീകരണത്തിന് വിസമ്മതിക്കുന്ന ബഹുദേശീയതകൾ പ്രമേയത്തിലും വഴക്കങ്ങളിലും പര സ്പരഭിന്നം പോലുമായ അസ്തിത്വം പുലർത്തുന്നവയാണ്. സമീകരണ ത്തിന്റെ സമ്മർദ്ദങ്ങളെയും പ്രകോപനങ്ങളെയും അതിജീവിക്കുന്ന ബഹു നദേശീയതയുടെ വഴിയും സ്ഥാനവും പ്രശ്നഭരിതമാണ്. കലാരൂപവും ദേശീ യവ്യവഹാരങ്ങളുമായുള്ള സമ്പർക്കം നിലനിൽക്കുന്നത് പലപ്പോഴും തൊുു തീർപ്പുകളിലൂടെയാണ്. ബഹുസാംസ്കാരികതയ്ക്കാൾ ഉദ്ഗ്രഥിതദേശീയ സാംസ്കാരികതയാണ് കലാവിഷ്കാരങ്ങളുടെ സ്വീകാര്യതയ്ക്ക് ഉപകര വുക. സിനിമയുടെ കാര്യത്തിൽ ദേശീയ സിനിമയെന്ന സംവർഗത്തെ സാധു കരിക്കാൻ എത്ര സിനിമയ്ക്കാവുമെന്ന ചിന്ത ഇവിടെ പ്രസക്തമാണ്. വിക്രം ഭട്ടിന്റെ രാമരാജ്യ (1943)ത്തിന് ദേശീയ തലത്തിൽ വലിയ അംഗീകാരം നേടി

ഞാൻ സിനിമ സിനിമ എന്റെ ജീവിതം

കെ.പി. കുമാരന്റെ ചലച്ചിത്രപര്യടനങ്ങൾ

9.7, 51.9 (60)

The Dynamics of Microfinance – A Brief Review of Existing Literature

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ARTICLE DETAILS	ABSTRACT
Article History Published Online: 29 Sep 2018 **Keywords** Microfinance, Financial inclusion, Micro Finance Institutions, Financial performance and outreach ***Corresponding Author** Email: anjaljjacob18[at]gmail.com	Microfinance is getting wider attention these days with the concept of inclusive financing, through its outreach to the rural households. More and more institutions are taking up microfinance to uplift the poor and the marginalized. It is really important to look in to several aspects of microfinance in this regard. In order to find out the efficiency of microfinance programmes in reaching out to the rural poor and analyzing the sustainability of its business operations, a conceptual review has to be made. The article therefore tries to fulfill the same. It provides a theoretical review of microfinance and it brings forth the issues such as modes of lending of microfinance, financial performance, outreach and sustainability of micro finance Institutions and also the recent trends in the microfinance sector.

1. Introduction

It was a shot in arms for microfinance when its founder Prof. Mohammad Yunus won Nobel Prize for peace in the year 2006. He conceptualized the idea of providing credit to the rural poor particularly women in groups. Microfinance is defined as the provision of thrift, credit and other financial services such as money transfer and micro-insurance products for the poor, to enable them to raise their income levels and improve living standards. It has been considered as an instrument for saving the poor from financial isolation by mainstream and formal financial system all over the world. The basic idea of microfinance is that the poor people are ready to pull themselves out of poverty if given access to financial service at lower cost (Shihabudheen, 2014). Microfinance initially emerged as a not for profit effort to establish microcredit services to the poor, with the hope that access to loans would help alleviate household poverty. These programmes have been established in developing economies around the world (Samuelson, 2013). The potentiality of such programmes in uplifting the rural poor is conditioned upon its linkages to the poverty alleviation (Laha & Kuri, 2015). A well-targeted microfinance programme can address gender-specific poverty by expanding economic opportunities to women. In fact, it can be argued that outreach of microfinance is one of the anti-poverty measures that could avoid the problem of wrong targeting and promote the empowerment of rural women (Devi, Prabakar, & Ponnarsi, 2011). The principle of microfinance focuses on equipping the poor people to take an active role economically in their lives through financial and technical support that encourage enterprise development (Hulme & Mosley, 1997). Microfinance programmes in Asia and Pacific countries are found to be successful in extending the services to the poorest and women sections of the population. In these continents, nearly 62 percent of the members covered under such programmes are considered as poor women (Maes & Reed, 2012). It is widely believed that microfinance programme is not a panacea to alleviate poverty from grass root level. The programme is considered only as a means and not an end (Laha & Kuri, 2015). Microfinance is the key to improve access to financial services by the poor people at an affordable cost. In

other words it helps to promote the process of financial inclusion. The main objective of financial inclusion is to ensure access to formal credit for people who depend on informal sources for fulfilling their financial needs at an affordable cost, in a fair and transparent manner and to promote financial education (EY, 2016). The outreach of microfinance programme could play a significant role in facilitating financial inclusion, as they are uniquely positioned in reaching to the rural poor (NABARD, 2008).

2. Microfinance – Modes of Lending

The microfinance programmes generally operates through two types of granting credit to the rural poor. These are Joint Liability Group (JLG) lending and individual based lending. The JLG model functions by providing loans to a group of people. It will be a group of 5-10 borrowers. Individual based lending involves a one to one relationship with the institution and the individual. Currently, most of the borrowers accept loans through group lending programme or we can say that they have prior access to the JLG lending model (Hermes & Lensink, 2007). According to one recent survey of a sample of microfinance programmes, only 16% of these made use of group lending model to provide credit to the poor. Yet, they served more than two third of all borrowers from the microfinance programmes included in the survey (Lapenu & Zeller, 2001). The MFIs can select either of the two modes of lending. Many cases they choose a mode of lending based on their convenience and transaction costs. The sustainability of the MFI depends on the choice of the model and hence it is an irreversible decision. The need for a structural and optimized model is high since the microfinance sector is growing at an abnormal rate (Singh, 2010). Through group lending MFIs focus on using social collateral. The group takes over the underwriting, monitoring and enforcement of loan contracts from the lending institution (Wenner, 1995). The social collateral operates through reputational effects on group members in which they consider loan repayment as a necessity to maintain their social standing in the community (Woolcock, 2001). Group lending not only increases repayment rates and welfare through social collateral but also with peer selection by

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AWARENESS, PERCEPTIONS, AND PROBLEMS OF SMALL SCALE TRADERS IN THE IMPLEMENTATION OF GOODS & SERVICE TEX IN THE STATE OF KERALA

E. Sulaiman

Abstract:

The implementation of Goods and Service Tax (GST) is an important step in the field of indirect tax reforms in India. The state of Kerala being as a consumer state, before and after the implementation GST in the state, lot of discussions were conducted by the different stakeholders to highlight its emerging merits and demerits. But, during the transition period of implementation of GST, various commotions rose from the business community especially among the small scale traders in the state. Further, several issues and challenges were faced by the traders in the implementation of GST in the State. In this context, the present paper discusses the awareness level and perception about GST among the traders; and investigating the factors underlying it. Further, the study identifying the major problems and challenges faced by the traders in the implementation of GST in Kerala; and examines the intensity of these problems/issues. The study found that there is a significant difference in the awareness/ perception about GST; and problems in the implementation of new tax regime among the traders.

Key Words:

Goods and Service Tax, Awareness Level, Perceptions, Small Scale Traders

Effects of Pre-processing Phases in Sentiment Analysis for Malayalam Language

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Abstract— Over the last few years, the generation of computerized information has increased exponentially. Most people use digital media to share news and their views on a topic. To analyze this outsized web information, new analytical techniques are required which automatically portrays the data open on the Web. Most of us are more comfortable in expressing our viewpoints and outlooks in Mother tongue. Sentiments of the social users on various topics expressed in their own mother tongue leads to the necessity of mining the sentiments in various dialects. In fact, some data do not have an effect on the classification result even removing them and some carries similar meanings, therefore a pre-processing phase has to accomplish and thus the dataset can be more precise. In this paper, the authors are focusing on pre-processing the words given by the user through their reviews in the social networking sites expressed in Malayalam language. The authors calculated the reduction in word count after performing the preprocessing processes and the experiments shows that more than 20% of word count reduction occurred.

Keywords— Opinion Mining, POS Tagging, Stemming, Stopword Removal, Malayalam

I. INTRODUCTION

Since English is a universal language, many research works in Opinion mining is mostly done in English dialect. Most of the social users are more comfort in expressing our views and opinions in their own local dialect. In India, 30 official local languages are there and a great many individuals convey viably in their local dialect hence creating huge amount of information. These information can well be routed to extract many valuable patterns like the customers' buying pattern, product feedback, and so on at a regional level. The aforementioned work is lagging in these local dialects. Standpoints of the social users on diverse topics communicated in their own mother tongue leads to the necessity of mining the sentiments in various dialects. More than 35 million people spreading along the regions of Kerala, Pondicherry and Lakshadweep are using this Malayalam.

The article is framed as follows. The subsequent section explains the works related to the study followed by the section which explains the various methodologies used to implement the work. The implementation section portrayed the framework of the proposed work and in the Results and Discussion section the results are analyzed which is followed by the Conclusion section which concludes the work.

II. RELATED WORK

Various works done in Indian dialects are - Kannada Morphology Analyzer is brought in by Shambhavi et.al in 2001 [1]. A Stemmer for Hindi was proposed by Ramanathan et al. [2]. Sentiment analysis on Punjabi News Articles using Support Vector Machine is done by Gagandeep Kaur in [3].

A stemmer for Bengali language is introduced by Khan et al. in [4]. An Urdu stemmer was proposed by QuratUlAin et al. in [5]. In 2013, Dutta, P. K., introduced an online POS tagging method for Assamese [6]. In 2014, Kasthuri, M., & Kumar, S. developed a rule based stemmer for Tamil language[7]. So many works have been proposed for Sentiment Analysis in Universal Languages like English, although it is comparatively less for Malayalam. Prajitha, U et.al in the year 2013 introduced a light weight Malayalam stemmer called LALITHA [8] and Pragisha et.al developed a stemmer called STHREE [9]. Jisha P Jayan et.al in the year 2013 demonstrates that TnT and rule based suit combination is better for Malayalam [10]. In the year 2014, Deepu S Nair in his paper, proposed a rule based approach for sentiment analysis from Malayalam movie reviews [11]. Manju K, et al stated that they face a lot of difficulties while dealing with Malayalam because of the inflectional and morphological variations of the language [12]. Renjith S R, Sony P in their

Opinion Mining on Twitter Data Using Supervised Machine Learning Algorithms

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Abstract— The emerging digital era generates heaps of computerized information. The greater part of the electronic data in the world today has been created over the last recent couple of years. The velocity of data generation is unimaginable and incomprehensible. People nowadays are commonly using the digital media to express their stand point about a topic. These opinions are analyzed automatically to know whether the client remark is ideal or not good to the said theme. This ought to be possible by Opinion Mining, also called as Sentiment Analysis. The basic chore in Sentiment Analysis is to categorize the orientation of a given review and subsequently identifying whether the sentiment implied is positive, negative or fair. In this paper, the tweets based on the news thread "Whether National Anthem is needed at Cinema theatres?" are analyzed based on the user rating for the opinions. The classifiers like Bernoulli and Multinomial Naive Bayes, Random Forest, k-Nearest Neighbor (k-NN) and Support Vector Machine (SVM) have been used for analyzing the opinions and found that the Random Forest classifier and Multinomial Naïve Bayes classifier is the top rated classifier based on their accuracy values.

Keywords— Sentiment Analysis, Naive Bayes Classifier, SVM, Random Forest Classifier, KNN Classifier

I. INTRODUCTION

We exist in an advanced time where information is intensifying quickly as a result of the increasing utilization of the web, sensors, and demonetization and so on. As per the statistics based on internetlivestas.com, in a second there are 8039 tweets, 1,377 Tumblr posts, 136,000 photographs transferred on Facebook, 56,844GB of Internet traffic, 2,691,713 Emails sent etc shows the significance of technologies and information systems used in this era. Major part of these data is in the textual format and is unstructured. With the tremendous accessibility of archives which express suppositions on various issues, the challenge arises to analyze it and produce useful knowledge detach from it. The exploration of these users created content and the exact aspect of client standpoints towards items and events is rather valuable to many applications. To break down this large amount of data, different opinion mining techniques can be used.

The Opinion mining leads to dig out the user perspectives, outlook, feeling and sentiments from the user generated data. The process identifies the direction of a given text data to know whether the communicated sentiment is sure, negative, or fair. The authors here evaluated the sentiments of the users who posted their opinions about the Supreme Court decision – "Whether National Anthem is to be played in the Cinema theatres?". The reviews are taken from the Twitter. The authors explored the possible ways to analyze the user sentiments using Python programming

libraries and various Machine Learning algorithms. The classifiers like Bernoulli and Multinomial Naive Bayes, Random Forest, k-NN and SVM have been used for analyzing the opinions. The authors performed a comparison among these classifiers and found that the Random Forest classifier and Multinomial Naive Bayes classifier is the top rated classifier based on their accuracy values on validation set.

Rest of the paper is organized as follows, Section II contain the literature survey done related to the topic. Section III explain the methodology and the algorithm used, Section IV describes results and discussion. Section V concludes research work with future directions.

II. RELATED WORK

All through recent years, a recurrent number of discussions learning varied class of opinion mining in English annals have been observed. Cases of such sorts incorporate objectivity and subjectivity recognition, polarity classification, perspective based conclusion arrangement and so forth. Various methodologies used for opinion mining can be found in [5, 6, 7]. In the article [2], authors concluded that classification models can be selected based on resources, accuracy requirement, training time available etc. Ankita Gupta et.al introduced a hybrid model of k-Nearest Neighbor and Support Vector Machine in [3]. Lopamudra Dey [4], et.al, in their paper performed Sentiment Analysis using SVM and kNN classifier. In [1], the authors proposed a method that used

An Adaptive Learning Frame Work for Slow Learners In An E-Learning Environment

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Abstract— One of the biggest challenges that many of the 21st-century teachers face in traditional classroom teaching is the difficulty to deal with students from diverse backgrounds. Especially in the case of slow learners they find it so hard to deal with and make them learn their academic subjects. Teachers are giving instructions or delivering learning contents to learners, without understanding the learner profile parameters such as learning style, motivation, attitude, aptitude etc. They should understand the art and science of teaching. In the current education paradigm students are compelled to learn the same learning material at the same time and rate. Hence teachers are expected to adopt new methods and technologies to eliminate this problem. E-learning is an activity where learners are able to achieve their educational goals based on their skills, interest, motivation, learning style etc. Through adaptive learning learners' exact needs, their goals, preferences, etc. can be achieved during the learning process. Hence, the objective of the study is to develop a frame work of an adaptive learning system which helps the slow learners to be more active and engaged in their learning process.

Keywords—Adaptive learning, E-contents, Instructional Design, Learning Management System, Slow Learners

I. INTRODUCTION

Educational institutions all over the world have become very much reliant on information technology to service their big business needs and they are moving to e-learning environment[1]. In most of the institutions teaching learning process is undergoing revolutionary changes and the students are becoming more and more technology oriented. In this 21st century teachers are expected to be worked with difficult children, poor, culturally different and special-needs populations. Hence it is essential to combine most recent technologies into the teaching and learning process to make the changing learning environment more effective and efficient so that it can provide quality education to these kinds of students.

A study by [2] explains the importance of moving to a new paradigm in the area of education. There are many studies explaining different methods to improve the performance of slow learners. Classroom performance of slow learners can be improved by adopting proper teaching method as well as by the use of materials which are suitable to their level of learning [3]. Instructional design is one method which can be used to teach, the way students could learn. In the study of Sadler-Smith (2000) and Brown et al (2001) explained about advantage of e-learning for disabled people. E-learning helps these people by giving an opportunity to advance their education from any location. The most vital characteristic, as well as the advantage of e-learning in education is the capability of personalised learning because it centres more on learners[4]. In the study [5] author explained about learner autonomy in e-learning through the concept of adaptive e-learning. They demonstrated that adaptive web-based learning is one way to provide the ideal instruction to learners. It provides an appropriate way to deliver the right content, to the right person, at the right time. Adaptive learning is an alternative way to the traditional one for all approach. It provides a dynamic learning environment where an adaptive learning object can be provided to a learner which suits their personalized needs.

Learners in an e-learning environment have individual differences. Many are having various interests and those who are sharing these common interests may be at different levels of expertise. In the study [6] author mentioned about the importance of incorporating learning style of learners in technology enhanced learning. A study on the learning style of students suggested that information about students' learning style can be used for providing teachers with more information about their students and showing them that their students have different preferences and ways in which they learn[7]. Integration of learning styles into personalised e-learning system can solve problems in many ways. It helps to provide suitable learning material according to the needs of learners and satisfy the requests of these learners [8].

Many educational theories recommend to the incorporation of learning styles in learning activities for getting better learning

HRM PRACTICES WITH EMPLOYEE PERFORMANCE OF BANKING SECTOR IN KERALA

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Abstract

The purpose of this paper is to examine the relationship among the HRM Practices, and Employee Performance. The last two decades have witnessed a dramatic shift in human resource management (HRM) research from a micro-analytical approach to a macro-strategic perspective. Apart from the traditional administrative role, HRM has identified new roles in terms of employee champion, change agent and strategic partner (Ulrich 1997). The focus of attention in HRM research in recent years has been more on linking HRM practices with business strategy and employee performance. Despite the HRM–performance connection having been proved, the linkage process remains a black box yet to be unlocked for a breakthrough in HRM research. Direct linkage between HRM practices and employee performance has always been a matter of concern in HRM research. Gaining insights from the concept of the balanced scorecard, conceptual models and immediate HRM outcomes identified by prior researchers, it is possible to develop an integrated HRM- Employee performance model. Banking industry viewed from personnel angle has its peculiarities. It is a labour intensive industry and efficiency of employees got a bearing on the quality of services offered. The banking industry, one of the major segments of the financial system plays a crucial role in the economic and social development of a country. A strong and healthy banking system is indispensable in a modern society as a financial intermediary and occupies a unique position in a nation's economy. Indian banking sector has been passing through different phases such as pre-nationalization, post-nationalization and post liberalization phase. For this study, a sample of 250 employees is taken and using a structured questionnaire data is collected from employees of Banks in Kerala. The results of Partial Least Square Path Modelling (PLS-PM) shows that out of the HRM practices, Two HRM practices viz., Recruitment and Selection, Training and Development are found to be significant predictors of employee performance.

Key Words : Employee Performance, HRM Practices, Banking Sector

Consumer Perception of E-Payment Mechanism In Rural Areas

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Abstract - As there is a boom in the use of internet and technology in the last few decades people began to depend more on electronic payment transactions rather than direct money transaction. Payment system in which money value is exchanged electronically or digitally between two entities as remuneration or consideration for the receipt of goods or service is known as e- payment. In order to study the perception of consumers towards e payment in rural areas a structured questionnaire was distributed among 120 respondents in Kallar Panchayat of Kerala, India. It was identified that the perception of consumers towards e- payment is not influenced by gender, area of residence and occupation but as educational qualification increases people began to develop a positive attitude towards electronic payment.

Key Words - E payment, Customer perception, Customer satisfaction, E banking

I. INTRODUCTION

Electronic payment system is a mode of payment over an electronic network such as the internet. In other words we can say that e-payment is a method in which a person can make online payments for his purchase of goods and services without physical transfer of cash and cheque, irrespective of time and location. E-payment system are becoming central to online business process innovation as companies look for ways to serve customers faster and at lower cost. Innovation in payment for goods and services electronic commerce promise to offer a wide range of new business opportunities.

E-payment system intricately given that online consumers must for product and services. Clearly payment is an integral part of the mercantile process and prompt payment or account settlement crucial. E-payment system are proliferating in banking, retail, healthcare, online market and even government organization are motivated by the need to deliver products and services more cost effectively and to provide a higher quantity of service to customers .E-payment first emerged with the development of wire transfer electronic fund transfer is an electronic transfer of information that equates to making fund from one financial institution to another. E-payment systems are alternative cash or credit payment methods using various electronic technologies to pay for product and services in electronic commerce.

II. LITERATURE REVIEW

According to (Tan, 2004) E-payment is considered as a part of e- commerce exchange that incorporates electronic payment for purchasing and selling goods or services offered on the Internet. At the end of the day, it is a payment system in which money value is exchanged electronically or digitally between two entities as remuneration or consideration for the receipt of goods or service. An entity in such manner refers to a bank, business, government or even an individual client. The author considers any payment not affected by paper-based instruments as an e-payment transaction.

E-payment users have the chance of sending or instructing payment orders through electronic terminals either through selves or by approving other individuals, to acknowledge cash payment and capital transaction. E-payment subsumes online payment, phone payment, mobile payment and self-service terminal payment. E-payment clients refers to people who utilize e-payment channels and tools to finish cash payment. In a more extensive sense, electronic payment frameworks can be sorted into four. These are: Online Credit Card Payment System, Online Electronic Cash System, Electronic Check System, and Smart Cards based Electronic payment System. Every classification has benefits and bad marks both for the clients and vendors. There are number of criteria unconventional to these installment frameworks, for

REBUILDING KERALA'S TOURISM INDUSTRY IN THE AFTERMATH OF THE FLOODS OF 2018

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ABSTRACT

This is an analytical and descriptive study that aims at finding out the types of losses incurred and further suggests actions to be considered; challenges and the way to help the Tourism sector Rebuild Kerala post floods 2018. This study focuses on Central Kerala using Judgment Sampling Technique and respondents were selected using Convenient Sampling technique. The infrastructure loss and business loss have significant impact on mental strain and physical strain. The highlight is the narration of four case studies that shows best practices adopted to rebuild Kerala Tourism.

Keywords: Tourism, Floods, Mental Strain, Physical strain, Infrastructure loss, Business loss, Good practices, Rebuilding Kerala.

INTRODUCTION

Tourism is one of the world's largest economic sectors. Tourism remains one of the largest employers' accounting for 9% of global GDP. (ROHATGI, 2016) In the Travel and Tourism Competitive Index of the World Economic Forum in 2017, India holds the fortieth place. But this did not happen overnight. In 2008 when the rate in growth of tourism dipped due to the global economic meltdown and terrorist attacks in Mumbai 2008, the Ministry of Tourism came back with many plans and strategies and revived the industry back. Each year the number of foreign tourists that come to India increases. From 2015 it increased from 8.3 million to 8.80 million.

In the first quarter of 2003 the British Broadcasting Corporation (BBC) conducted a survey with its visitors to its website. Among the 'fifty things to do before you die' broadcasted on BBC Holiday programme, item number twenty-second was to "bathe an elephant" and twenty-seven was to "experience a waterfall." (Balyani, 2012)Kerala which is a traditionally agriculture oriented State of Kerala and having a large number of nursing professionals who go abroad on work, took advantage of her varied geographical features. Very stealthily she exploited the looks bestowed on her by Mother Nature and rose up to the call to save her economy which was even otherwise not posing a bright future for farmers. As per the latest Economic Review 2017, the share of tourism in Kerala's Gross State Domestic Product is about 10 per cent. The growth rate in Kerala with respect to foreign tourists' arrivals is higher than that of India. Kerala basked in the glory of her rich cultural heritage and natural ecosystem. Then came the game changer, the Floods in August 2018 that devastated the face of Kerala, especially the Districts that contributed most to Tourism. To add on., the shutting down of the waterlogged Nedumbaserry Airport, affected both domestic & international tourists.

The preliminary report of the Kerala Government on the total loss occurred in the recent floods has been Rs 19,512 crore. The Tourism sector is learnt to have a loss of Rs 500 crores with the Government itself suffering a loss uptoRs. 100 crores.From Rescue Operations to Relief work to Rehabilitation and Rebuilding Kerala, the Tourism industry has been affected too. And it is in this background that the study is based.

REVIEW OF LITERATURE

World Tourism Organization mentions different categories of Tourism: for "leisure, recreation and holidays, visiting friends and relatives, business and professional (including for study), health treatment, religion, pilgrimage, and any others." Kerala has been getting a major chunk of its revenue from the tourism industry.Nature-based tourism is her niche. In 2008, she introduced community participation in tourism development as part of corporate social responsibility. (Board, Economic Review 2016, 2016)

The total revenue (including direct and indirect means) generated from tourism during the year 2015 comes to 26,689.63 crores showing an increase of 7.25 per cent over the last year.As per the Economic Review 2017 the

A STUDY ON LOYALTY OF STUDENTS IN THE MANAGEMENT INSTITUES INTHE KOTTAYAM DISTRICT,KERALA

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Abstract

Student loyalty is purported to be positively related to student satisfaction and to the long term performance of an educational institution. Most of the respondents are from Semi urban area. Reputation and campus placement of the institute are significant befor selecting the institute ,the results of previous years Good library are insignificant factors before selecting to join the institute. Interaction of Teachers,Infrastructure of the Institute, Approach of the administrative section,SeniorsBehavious of the institute are significant factors of loyalty to the institute

Key words: Student loyalty,higher education, institutions

Introduction

Student loyalty is one of the major goals of educational institutions. A loyal student population is a source of competitive advantage. The specific objective of this study is to observe the student loyalty to student satisfaction and student perception of the reputation of the institution. Student Loyalty is defined as a student favorable attitude toward the higher educational institution through positive word-of- mouth by recommending the institution to others. Student loyalty is a critical measure in the success of higher education institutions that aim at retaining students until graduation and then attracting them back.

A positive image should be generated with the various publics with whom a relationship is established and cultivate positive lines of communication with each. Although organizational image has been studied frequently with the regard of the corporate sector, it has been rarely examined in the non-profit arena. The imageof institute among students, faculty and staff are important. The items such as commitment to

CSR SPENDING PATTERNS: A STUDY OF SENSEX COMPANIES

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Abstract

Corporate Social Responsibility (CSR) is widely considered to be a company's commitment to functioning in an economically, socially and environmentally sustainable way while balancing the interests of diverse stakeholders. Several changes and modifications are features of CSR practices of companies across the globe. Indian scenario is also not different in the sense that companies engage in varieties of schemes to build brand image and also to fulfil compliance mandated by recent amendments to Companies Act 2013. In this connection, it is essential to investigate the CSR practices in terms of their breadth and scope of major companies in India. The present work considers a sample of thirty large, liquid and profitable firms representing the major Indian stock index BSE-Sensex. Periods of optional CSR and mandatory CSR are considered and compared. Company wise and industry wise break ups are provided to identify the areas of focus for CSR spending, relationship between profitability and CSR practices, and also the effect of recent amendment to the Companies Act. The results are mixed and suggestive of new areas of attention on the part of companies in their social engagement activities. A more systematic approach towards CSR would prove to be more effective. Certain practical and policy implications are expected through the study.

Keywords: Corporate Social Responsibility (CSR), Profitability, Companies Act 2013

I. INTRODUCTION

An increased attention of Corporate Social Responsibility (CSR) in recent years has created a new milestone on companies as well as societies. CSR is a company's commitment to operating in an economically, socially and environmentally sustainable manner whilst balancing the interests of diverse stakeholders. While many companies now undertake some kind of social responsibility schemes, some consider it as a core activity. The importance of CSR emerged significantly in the last decade. Over the years, CSR grew enough to involve economic as well as social interests on a large scale.

In India, CSR was earlier treated as philanthropy, charity or social giving. With globalization, the scope of CSR has changed significantly. There is a growing realisation that people and planet also deserve much attention of businesses. This brought about a new corporate philosophy, in which caring for employees, communities and environment is the best approach for continuity and profitability. Also, an amendment was brought to the Companies Act, 2013 to incorporate mandatory CSR norms for companies in India. Section 135 of the new Companies Act 2013, dealing with the CSR Rules makes it mandatory for companies, meeting certain criteria, to set aside two per cent of their net profits for undertaking and promoting socially beneficial activities and projects in India. To implement this, the Ministry of Corporate Affairs (MCA) issued the CSR Rules, 2014, to effect from April 1, 2014.

CONSUMER ADOPTION OF MOBILE BANKING IN INDIA
Examining the Role of usefulness, ease of use, perceived risk and trust

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ABSTRACT   *The past decade has been the emergence of digital mobile devices as the main means of communication among consumers. Internet banking has been in existence during the past few years. The natural progress from that is Mobile Banking. The purpose of this paper is to examine the key factors influencing Indian customers' adoption of mobile banking. The research model was based on the Technology Acceptance Model (TAM). This was extended by adding perceived risk and trust as an external factors. Correlation and t – test was conducted to analyse the data collected from the field survey questionnaires administered to a convenience sample of Indian mobile banking users. The result showed that mobile banking adoption is significantly influenced by perceived usefulness, perceived ease of use, perceived risk and trust. This submission has attempted to fill this gap by empirically examining some of the important factors influencing the adoption of mobile banking from the Indian customers' perspective.*

Keywords: *Mobile Banking, Adoption, TAM, Indian*

INTRODUCTION

Mobile device usage is witnessing a new paradigm by enhancing its application from mere connectivity to a lifestyle device. Customers are increasingly using their mobile devices to find stores, research about products, make purchases, and manage their accounts. Mobile banking is one of the recent mobile technological wonders (Shaikh and Karjaluoto, 2015) and one of the most recent innovations in the financial services sector, which has added the element of pure mobility to service consumption (Oliveira *et al.*, 2014; Mishra and Bisht, 2013; Laukkanen and Sinkkonen, 2007) and enabled consumers to gain convenient access to value – added and banking services, even in countries with low incomes (Wonglimpiyarat, 2014; Boor *et al.*, 2014; Anderson, 2010). According to a report by the Telecom Regulatory Authority of India (TRAI, 2016), there are 936 million wireless subscribers in India.

To meet customer expectations, banks now offer a wide range of services delivered through mobile technologies. Mobile banking which was introduced in India in the late 1990s and early 2000s, is defined as "a channel whereby customers interacts with a bank Via mobile device, such as a mobile phone or personal digital assistant" (Barnes and Corbitt, 2003). The banking activities you can do in your cell phone depend on the banking institutions. The most involved type of mobile banking allows the users to log into his or her account from a cell phone, and they can do activities like making payments, checking balances, transferring money between accounts, notifying the bank of a lost or stolen credit card, stopping payment on a check, receiving a new PIN, or viewing a monthly statement, among other transactions. This type of banking is meant to be more convenient for the consumer than having to physically go into bank. The banks in India are racing to use this latest technology to reduce their operational cost and increase customer base (Peterson, 2009). In India the transactions have been increased after the launch of mobile banking. Round the clock availability and ease of transactions are the main attracting factors of mobile banking.

There are 18.7 bank branches per 100,000 adults in urban areas of India, whereas this proportion is only 7.8 in semi – urban and rural areas. The number of ATMs in India is just 205,151, which indicates that mobile banking in India has great potential to deliver banking services to an untapped market (RBI, 2016). In rural India, only 5 percent of the adult population has access to a commercial bank branch and only 40 percent have bank accounts (India Brand Equity Foundation, 2016). Furthermore, internet penetration is much less in rural areas in India compared with mobile penetration. It may thus be easier to offer banking services through mobile phones in rural areas, where, bank branches are scarce, than through any other delivery channel.

Despite the advantage of mobile banking, few customers actually use these services in India (Poddar *et al.*, 2016). According to a survey conducted by Poddar *et al.* (2016), 21 per cent out of the 32 per cent of customers using online banking use a mobile wallet from a non bank instead of mobile banking from their own banks. India is presently in a demonetisation wave, with the government of India and Reserve Bank of

Inner Correlation between Work Life Balance Dimensions and Specific Demographic Factors- A Study Related to Women Police Personnel in Kerala

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Abstract

Work Life Balance is the harmonious blending between work demands and personal demands of the working people. The job of women police with lot of challenges stresses and strains. So they hardly get time to spend for their family. This paper aims to analyze the influence of demographic factors on balancing their work life and personal life. The data for the representative sample of 90 women police personnel from south zone and north zone of Kerala. As per the police classification, Alappuzha has been taken from Ernakulam range. Thiruvananthapuram is selected from Trivandrum range. Thrissur is selected from Thrissur range. 30 samples were picked from each district. "Work Life Balance Scale" developed by Udai Pareek and Surabhi Purohit (2010) was used for data collection. Descriptive statistics is used for the demographic variables. Bivariate correlation can be done for work life balance and one way ANOVA has been used to analyze the influence of demographic profile of respondents with work life balance. The study found that there is an association between work life balance dimensions excluding compensation and benefit with social needs and also compensation and benefit with time management. The study explored that age of the employees creates a differential impact on work life balance dimensions. Furthermore ANOVA results revealed that the marital status also create difference in work life balance perceptions. This study emphasis the view point that the support from the family influence to improving the work life balance of employees. This paper endows with a conceptual linkage between age and marital status with work life balance and the association between work life balance dimensions. It acts as a pedestal for upcoming research.

KEYWORDS: Work-Lie Balance, Women Police Personnel, Social Needs.

INTRODUCTION

Work life balance means the capacity to schedule the hours of personal life and professional life so as to lead a healthy and prosperous life. Balancing the two sphere of life is the tricky game for the employees. Because, we know that work life and the family life are the two sides of the same coin. The striving aim for a successful life the individuals are needed to match the personal demands and work demands in a proper way. Work family conflict and family work conflict can be traced in the poor work life balance. The cascading effect of poor work life balance badly affect the family as well as to the department concerned. Hercules and masculine nature are mixed in police job so obviously hard to maintain personal life smoothly with this job except some sacrifices. 24 hours duty is the main feature of this job. The restless and painful duties that create tiredness, tension and stress in the mind of the persons and finally it lead to imbalance in

A Study on the Relationship between Demographic Variables and Job Stress Due to Biometric Attendance Punching

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Abstract

Most of the employees working in IT field are being electronically monitored in the workplace. The time spend by the employees in the workplace is one of the measure to estimate performance of the employees. Employees are supposed to spend the prescribed time in the workplace and the manager monitors it with the help of biometric punching system. Biometric attendance and the salary of the employees are linked in almost all the IT firms. This study must represent the first in a relatively unexplored area. There seem to be very few studies of stress due to Biometric punching. The study was conducted among 154 IT employees in Info Park, Kerala, India to identify the Relationship between Demographic Variables of the employees and Job Stress Due to Biometric Attendance Punching. The study identified that most of the employees working in IT parks are facing stress due to the implementation of biometric attendance system. It was identified that stress level of employees due to biometric attendance is independent of educational qualification, experience, age and department in which employees are working but it is associated with the gender of the employees. Female employees are found to be more stressful than male employees.

Key Words: Biometric Attendance Punching, Electronic Monitoring, Demographic Variables, Job Stress

Introduction

All though employee monitoring has been done by the organizations since centuries, the development in science and technology widened the scope of monitoring in recent years. Organizations uses employee monitoring for several reasons such as to track employee performance, to avoid legal complications, to protect trade secrets, and to address other security issues. Employees in most of the cases knows that they are electronically monitored but are not sure in all the cases. Many organizations effectively uses monitoring instruments to improve the performance of their workers and guarantee consistence with policies. Employees becomes concerned about electronic monitoring and electronic monitoring methods once it has an impact on their job or job surroundings. Unless and until they are unaware of it. Monitoring in some cases prompts higher feelings of anxiety in employees and might create feelings of distrust and disappointment. From ancient time onwards monitoring was used by the supervisor in order to evaluate the performance of the employee and implement control over them.

Electronic monitoring differs from more traditional forms of monitoring (e.g., direct observation) in that electronic monitoring can occur continuously and can record voluminous data about multiple dimensions of work. Traditional monitoring often relies on the presence of a human observer with all the known limitations of perceptual processing. Other differences between these types of monitoring exist: electronic monitoring is novel, traditional monitoring is not; electronic monitoring can be hidden from workers, whereas traditional monitoring is usually noticeable; electronic monitoring requires machinery, traditional monitoring uses supervisor labor. (Stanton, 2000)

(Q.6) SINO-3

Changing trends and challenges of branding through online visual merchandising

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ABSTRACT: *Online channels such as websites and social media sites have a huge influence on consumer behaviour in current world. Researches show that currently the consumer buying behaviour is highly influenced by online platforms like social media, online display of the websites, online ads etc. So moving up with the trend and giving special attention on online visual merchandising could bring a lion share of profit to the brand.The aim of this paper is to give a theoretical framework and current online marketing trends on branding through online visual merchandising.*

Key Words: *Online platforms, social media, visual merchandising*

1. Introduction

The trend forvisual merchandising is on a rise as there is a huge upward shift in online business in Indian market. The aim of visual merchandising on online platform is presentation of merchandise to attract potential customers and to influence customer's purchase decision process. Visual merchandising processes plays a vital role in the all retailing sector, online merchandising includes demonstrating the look of the product and giving descriptions about the product in such a way as to trigger the feel of the brand and bring in more sales plus increased brand awareness. Online channels such as websites and social media sites have a huge impact on the trends on consumer behaviour. Researches show that currently the consumer buying behaviour is highly influenced by online platforms like social media, online display of the websites, online ads and other e-platforms.So moving up with the trend and giving special attention on online visual merchandising could bring a lion share of profit to the brand.

2. Online visual merchandising

Online visual merchandising is a practice of visual merchandising a product on web sites, social media platforms such as face book, twitter, Instagram etc. Online visual merchandising is expected to do the same goal as visual merchandising in store that is to attract customer's attention, give them awareness and encourage them to purchase goods. Online merchandising is the strategic display and arrangement of products in E- Commerce store, online visual merchandising is the act of using the visual elements to really enhance the overall experience of the viewer. It starts with smart branding and professional product photos, but it expands to more advanced visual marketing concepts like the right placement of customer photos and star ratings to increase trust.According to many researchers visual merchandising has contributed toinfluence impulse buying.Main components of online visual merchandising include presentation, website environment and aesthetic of presentation.Presentation concerns with product presentation, presentation techniques along with supplementary presentation. In website environment, as an alternative of traditional brick-and-mortar store one should be appealing enough to retain customer's attention on the website. The website environment involves design factors, navigation on the web or online platform used.While considering the aesthetics of presentation the main concern is that customer cannot feel the product physically, so the presentation should be in such a way as to give maximum appealing effect on the viewers. Visual merchandising is a multi-faceted field with a number of techniques working in tandem to elevate the overall online shopping experience. The most vital aspects include:

Product photos: Product photos are your number one sales tool in E-commerce. Photos are the best way to answer customer questions about the details and features of an item. Every product must have excellent professional photos that displayed their products accurately and in full detail. Today, customers lack trust inbranded product photos anymore they rather prefer to see customer photos of a product.Displaying customer photos on a product page is a powerful way to improve customer trust (Mandell).

Genuine Customer Experiences: Consumer trust is best earned by showing off the real-life experiences of other satisfied customers. User-generated content (UGC), like customer reviews, photos, and videos, is the

INSIGHTS INTO READING COMPREHENSION IN ENGLISH AMONG PRIMARY SCHOOL STUDENTS OF KERALA

Education

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ABSTRACT

English skills are turning definitive in determining the individual career prospects and economic progress of any individual in today's world. In this context, the study tried to explore reading comprehension in English of primary school students in Kerala, India. The sample for the survey comprised 859 students of Standard VII studying the State syllabus from 12 schools of Kottayam district giving due representation to gender and medium of instruction. The Test of Reading Comprehension in English prepared and standardised by Jaise & Joseph (2014) was used for the study. The study showed low levels of reading comprehension in English for the total sample. Further extreme variations were found to exist among the subsamples. While gender subsamples demonstrated similar performance in reading comprehension in English, subsamples with regard to medium of instruction showed marked differences. The study calls for fresh efforts to enhance reading comprehension in English among primary school students.

INTRODUCTION

Defining literacy has become an increasingly complex task with the progress of the information age with its myriad digital forms. However, language literacy still continues to form the basic requirement for all other higher forms of literacy. The Global Monitoring Report by UNESCO titled 'Literacy for Life' (2005, p. 30) purports literacy to be "a context-based continuum of reading, writing and numeric skills acquired and developed through the process of learning and application in schools and in other settings appropriate to youth and adults".

Basic literacy is still a right denied to a large proportion of the world's population, especially the poor, women and marginalized groups. It exposes them to a serious threat of exclusion from employment and citizenship as literacy generally includes the foundational skills for the educational success of an individual.

The 2011 census declared 26% of Indian population to be illiterate. As regards knowledge and skills in English language, this rate will surely go higher. India will be the youngest nation in the world (with a median age of 29 years) by 2020. ("India's Youth Challenge", 2017) As the potential largest supplier of young skilled labour, India cannot ignore equipping its youth with the essential communication skills in the most influential world language.

NEED AND SIGNIFICANCE

Assessments of basic English in rural India were carried out in 2007, 2009, 2012, 2014 and 2016 named Annual Status of Education Report (ASER) which is the largest citizen-led survey in India. As per their survey in 2016, there is a marked decline in reading abilities in the upper primary grades. In 2009, 60.2% of children in Std VIII demonstrated reading skills in English; in 2014, this figure was 46.7% and in 2016 this figure further declined to 45.2%.

Reading deficits in early grades when not diagnosed and intervened develop into serious reading problems leading to total academic failure for a child. "To detect and diagnose the incipient reading problems, then, is the primary responsibility of the teacher. Prevention of reading difficulties should begin before the child begins formal reading instruction and continue throughout his entire school career. Prevention is best brought about by diagnosis of and constant alertness to any incipient or existing difficulty" (Dechant, 1968, p. 431). In this scenario the present study was undertaken to explore reading comprehension in English of primary school students studying State Syllabus in Kerala.

OBJECTIVES

The objectives of the study were
1. to explore reading comprehension in English of primary school students.

2. to compare reading comprehension in English of primary school students with respect to the subsamples of gender (boys/girls) and medium of instruction (English/Malayalam).

HYPOTHESES

The hypotheses formulated for the study were
1. Primary school students have low levels of reading comprehension in English.
2. There is significant difference in reading comprehension in English of primary school students with regard to their subsamples of gender (boys/girls) and medium of instruction (English/Malayalam).

METHODOLOGY

The survey method was adopted for exploring and comparing reading comprehension in English among primary school students.

Population and Sample

The population of the survey consisted of primary school students of Kerala following the State syllabus. Stratified random sampling technique was applied to gather data for the survey giving due representation to gender and medium of instruction. The sample comprised 859 students (Boys: 434, Girls: 425; English Medium Students: 543, Malayalam Medium Students: 316) of Standard VII studying the State syllabus from 12 schools of Kottayam district.

RESEARCH TOOL UTILISED

The Test of Reading Comprehension in English prepared and standardised by Jaise & Joseph (2014) was used for the study. The Test consists of five passages, with five questions each (a total of 25 questions). A Scoring Key with one definite answer for each question was also framed. Each correct response gets 'one score' and an incorrect response gets a 'zero score'. The maximum score and minimum score on the test are 25 and 0 respectively. Separate Response Sheets are provided. The Test maintains objectivity, ensures ease of assessment and avoids the element of guessing.

Analysis and Results

The scores on the Test of Reading Comprehension in English were analysed with regard to the total sample and subsamples based on gender and medium of instruction.

Reading Comprehension Scores in English of the Total Sample and Subsamples

The reading comprehension scores in English were tabulated and their mean, median, standard deviation, quartile deviation, skewness and kurtosis were calculated for the total sample and for the subsamples.

The details are presented in Table 1.

EFFECTIVENESS OF SELECT SOFT SKILLS IN AUGMENTING BEHAVIOURAL PROFILE OF TEACHER EDUCANDS

Dr. Jaya Jaisa[1] and Shimna Suresh[2]
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ABSTRACT :

Teacher Educands need a repertoire of knowledge about themselves- their attitudes, beliefs, personality, temperament and behaviour. They must acquire general and specific understanding and judgment of their own behaviour to engage all students in worthwhile learning. They need to have opportunities to reflect upon and think about what they do, how to make decisions and how to modulate their behaviour while transacting in the classroom. The goal of the study was to investigate theeffectiveness of select Soft Skillsin augmenting Behavioural Profile of Teacher Educands, thereby initiating and promoting desirable behaviour quotient. The Experimental Method with the Single Group Pre-test Post-test Design was used for the study.The study found that the Behavioural Profile of teacher educands improved considerably after the Soft Skillsintervention.

KEYWORDS : *Soft Skills, Behavioural Profile, Teacher Educands.*

INTRODUCTION

The role of teachers has changed drastically over the few years in our society. In the changed scenario, the additional roles envisaged of a Teacher are that of planner, facilitator, advisor, negotiator among groups, expert in articulation and communication of ideas, mediator, reformer, etc. These roles demand specialized knowledge and skills not ordinarily available in the existing profession. This has necessitated the evolution of teaching schools to equip teacher educands with the essential skills required for the new generation teacher.

To prepare teachers for the unprecedented responsibilities they are required to take on, the teacher preparation programmes must incorporate innovative activities and mentoring programmes. To help the nation compete in the global economy, today's teachers will have to be educated to the same high levels of learning outcomes and 'Graduate Attributes', as stated by the Higher Education Council. It must be ensured that all student teachers are multi-taskers-they master rigorous course content and are master communicators, as well as are able to apply what they learn, think critically and solve problems. They must be able to focus a balance on their emotional self, their academic learning and social and emotional developmental needs(Garcia, 2010).The significance is laid, but there are various questions on the "how" factor, which demands proper tackling.Soft Skills were thought to be most appropriate means of bringing about a positive change in augmenting teacher educands' Behavioural Profile.

A STUDY ON THE LEVEL OF SOCIAL INTELLIGENCE OF COASTAL SCHOOL STUDENTS IN KERALA

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Abstract

The main purpose of the study was to find out the level of Social Intelligence of Coastal School Students in Kerala. It was found that majority of the Coastal School Students in Kerala have only moderate Social Intelligence. And the female students have better Social Intelligence compared to the male students. In total Social Intelligence of Coastal School Students in Kerala is more or less similar.

Keywords: *Social Intelligence; Billows; Coastal School Children; Coastal- area; Marine; online test.*

Introduction

The Indian fisher folk, unlike their counterparts elsewhere, are always exposed to the horrible vicissitudes of life as fishing involves a fierce struggle in the high seas. With the mighty billows and awe-inspiring currents. Practically speaking they are quite under equipped. Fishermen population was 7, 75,130 lakhs according to 2012-13 census. From the total number of marine fishermen population, total number of male is around 1, 75, 411 lakhs, the female 2, 71, 989 lakhs and children 1, 99, 483 lakhs respectively. The details are given below.

TABLE 1

Sl. No	Name of District	2011-2012				2012-2013			
		Male	Female	Children	Total	Male	Female	Children	Total
1	Trivandrum	61261	54120	48120	163501	61568	54397	48362	164327
2	Kollam	38120	32316	18940	89466	38402	32478	19035	89915
3	Alappuzha	42352	38659	26193	107204	42565	38853	26325	107743
4	Ernakulum	28126	26366	16463	70955	28267	26499	16546	71312
5	Thrissur	27489	27697	15768	70954	27628	27837	15848	71313
6	Malappuram	30472	24778	22647	77897	30625	24902	22761	78288
7	Kozhikode	37345	32575	24944	94864	37533	32739	25069	95341
8	Kannur	20104	16269	15615	53988	20205	18361	15693	54259
9	Kasargode	16781	15844	9795	42420	16865	15923	9844	42632
	Total	302140	270624	19485	771249	303658	271989	199483	775130

(Source: Kerala Marine Fisheries Statistics 2013 (Department of Fisheries)

EFFECTIVENESS OF 'LOW COST EXPERIMENTS' IN ASSIMILATING FUNDAMENTALS OF PHYSICS

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Banasthali Vidyapith (INDIA)

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University of Kerala (INDIA)

ABSTRACT

The lab work is an important part of the introductory physics class. It provides the students with a medium to practice their experimental and analytical skills and helps them understand the basis of knowledge and the relation between theoretical and empirical work in physics. But there is a general impression that highly quantitative experiments can only be done in supervised physics laboratories and using specialized and costly equipment. Moreover, many schools are reluctant open up the lab facility to students due to lack of proper provision of lab staff and lack of time brushing through syllabus or lack of safety measures prevent students from using labs for experimentation. Hence an attempt is made for an alternative method, web based low cost experiments, for making the students do the experiments physically according to their convenience at home or school and imbibe the fundamentals of the subject. The study attempted to experiment using low cost physics experiments on a sample of 70 students chosen as two intact class groups and found that low cost experiments are more effective than the prevailing lecture demontrstion method in the total achievement in science among students at high school level

Key words: low cost lab experiments, physics lab, fundamentals of physics, learning outcomes

Relationship Between Academic Achievement And Scholastic Aptitude Of Coastal School Students In Kerala

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Abstract

The main purpose of the study was to find out the relationship between academic achievement and scholastic aptitude of Coastal School Students in Kerala. It was found that scholastic aptitude has a significant influence in enhancing the achievement of coastal school students in Kerala. In terms of scholastic aptitude, it was also found that majority of the coastal school students have only average scholastic aptitude.

Key Words: Academic Achievement, Scholastic Aptitude, Coastal School Students in Kerala

Introduction

Education has been an institution operated for very limited and inherently conservative ends. To the extent that it performed a homogenizing function, it did so for the new entrants to tiny elite. Scholastic aptitude and academic achievement play a major role in the instructional strategy. It is the pivot through which the whole academic system rotates. The higher the aptitude towards one's interest the higher will be the achievement. Scholastic aptitude is the propeller which leads one to the final destination.

Academic Achievement means our learning attainment, accomplishments and proficiencies. It is the criterion for selection, promotion or recognition in various areas of life. Good (1959) states, academic achievement is the knowledge obtained or skill developed in academic subjects usually defined by test scores or marks assigned by the teacher. Achievement is the product of all the educational endeavors. The modern world needs the people with strong personality and academic achievement. The present education system is demanding the maximum potentiality of the individual. It will help to analyse the child's capabilities and potentialities.

Academic Achievement helps he teacher to assess the capabilities of the child. The parents will get awareness about their children with their achievement. The need for the achievement is psychological state of an individual I n which he tries for the success in a competition with some standard of excellence, he is busy in some unique accomplishment or he is involved in attaining a long term achievement goal being success in life.

Achievement in education implies one's knowledge, understanding and skills in a specified subject. Academic achievement is the major concern of educational policy makers of every country. The focus is on the evolution of the past without reference to the future, except for the implicit assumption that acquired skills and knowledge will be useful in their own right in the future. It is the performance in the outcome of education the extent to which a student,

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Influence of multimedia based instruction on academic achievement in social science

Authored by

Prof. (Dr.) T.V.Thulasidharan

Professor and Former Dean, School of Pedagogical Sciences,
Mahatma Gandhi University, Kottayam-Kerala – India

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Ashok Yakkaldevi
Editor-in-Chief

Investigations on the blue luminescence enhancement of organically modified SiO$_2$-TiO$_2$-PDMS glass matrix

Manju Gopinath R.J. [a], Viji Vidyadharan [b,?], Sanu Mathew Simon [a], Saritha A.C. [a], P.R. Biju [a], Cyriac Joseph [a], N.V. Unnikrishnan [a,*]

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[b] Department of Optoelectronics, University of Kerala, Trivandrum, Kerala, 695581, India

HIGHLIGHTS

- Non-hydrolytic synthesis of PDMS modified SiO$_2$-TiO$_2$ ormosil.
- Evidence for the formation of ultra-fine TiO$_2$ nanocrystals in the modified matrix.
- Significant increase in the band gap of the ormosil.
- Enhancement of the defect related blue luminescence by PDMS modification.

GRAPHICAL ABSTRACT
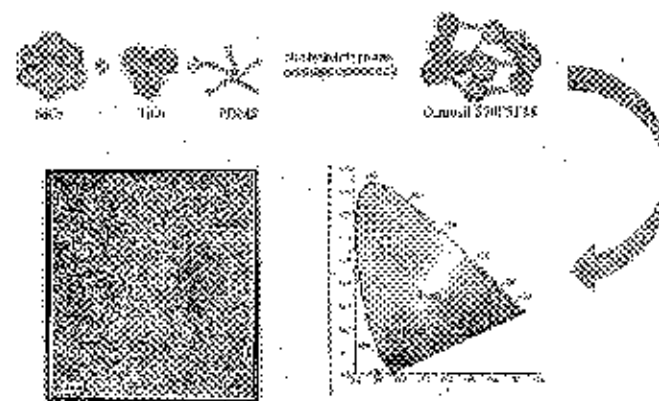
ABSTRACT

A novel class of Organically Modified Silicates (ORMOSILs) has been synthesized by non-hydrolytic sol-gel method at low temperature, incorporating the organic polymer, polydimethylsiloxane (PDMS) in tetraethylorthosilicate (TEOS) and titanium (IV) isopropoxide (TIP) based glassy gels. The structural modification of pure SiO$_2$-TiO$_2$ matrix by PDMS and its effects on optical and photoluminescence spectroscopy were investigated in detail. XRD pattern and HR-TEM images confirm the structural modification of the SiO$_2$-TiO$_2$-PDMS glass matrix. The formation of TiO$_2$ nanocrystals of about 5–6 nm in size, embedded in the amorphous SiO$_x$ matrix, has been confirmed from HR-TEM and SAED patterns. The TG-DTA analysis revealed the improved thermal stability of the ORMOSIL and the DSC analysis shows that its glass transition temperature decreases to 55.23 °C. A distinctive enhanced blue emission at 470 nm has been observed in photoluminescence studies of the prepared samples. FT-IR studies confirmed the formation of Ti–O–Ti, Si–O–Ti and Si–CH$_3$ bonds by the PDMS modification of pure SiO$_2$-TiO$_2$ glass. These bonds and TiO$_2$ nanocrystals embedded in the amorphous glass matrix together play an important role in the photoluminescence properties of the ORMOSIL. SiO$_2$-TiO$_2$ matrix has a luminescence quantum efficiency of 22.2% and the PDMS incorporation has increased the quantum efficiency to 55.8%. Thus SiO$_2$-TiO$_2$-PDMS ORMOSIL can be used as an efficient blue emitting host matrix for WLED fabrication.

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1. Introduction

Organically Modified Silicates, ORMOSILs, is an important family of solids, in which the organic and inorganic constituents are

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Synthesis and hydrophilic mechanism of porous TiO$_2$-ZrO$_2$ transparent coatings

M. S. Sanu, Anoop Chandran, V. P. Prakashan, Gejo George, M. S. Sajna, P. R. Biju, Cyriac Joseph, and N. V. Unnikrishnan

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Synthesis and structural characterization of FeS_2 nanoparticles using rietveld refinement
AIP Conference Proceedings **2100**, 020023 (2019); https://doi.org/10.1063/1.5098577

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മൂലകങ്ങളെപ്പറ്റിയും അവ ചേർന്നുള്ള സംയുക്തങ്ങളെപ്പറ്റിയുമുള്ള പഠനം ലളിതവും ചിട്ടയുള്ളതുമാക്കുന്നതിൽ മെൻഡലീവിന്റെ ആവർത്തന പട്ടികയുടെ പങ്ക് അദ്വിതീയമാണ്.

മെൻഡലീവിന്റെ ജീവിതകഥ

ഡോ. എസ്. അനസ്*

അസി. പ്രൊഫസർ, സ്കൂൾ ഓഫ് കെമിക്കൽ സയൻസസ്,
കണ്ണൂർ യൂണിവേഴ്സിറ്റി. സ്വർഗ്ഗപുരംക്യാമ്പസ്, കേരളം.

ഇന്ന് ഉപയോഗിക്കുന്നതിനോട് ഏറ്റവും സാമ്യതയുള്ള ആവർത്തനപ്പട്ടിക ആദ്യമായി തയ്യാറാക്കിയത് റഷ്യൻ രസതന്ത്രജ്ഞനായ ദിമിത്രി ഇവാനോവിച്ച് മെൻഡലീവ് (Dmitri Ivanovich Mendeleev: 1834-1907) ആണെന്നറിയാമല്ലോ. അതിനാൽ, മെൻഡലീവിനെ ആവർത്തനപ്പട്ടികയുടെ പിതാവായി കണക്കാക്കുന്നു. രാസമൂലകങ്ങളെ അവയുടെ അറ്റോമിക മാസിന്റെ അടിസ്ഥാനത്തിൽ ക്രമീകരിക്കാമെന്ന് അദ്ദേഹം കണ്ടെത്തുകയുണ്ടായി.

സൈബീരിയയിലെ ടോബോ‌ൾസ്‌കിൽ വെർഖ്‌നി അരെംസ്യാനി (Verkhnie. Aremzyani) എന്ന ഗ്രാമത്തിൽ ഇവാൻ പാവ്‌ലോവിച്ച് മെൻഡലീവിന്റെയും മരിയ ഡിമിട്രിയേവ്‌ന മെൻഡലീവിന്റെയും ഇള സന്തുത്രനായി 1834 ൽ ആണ് ഇദ്ദേഹം ജനിച്ചത്. ഓർത്തഡോക്സ് ക്രിസ്തീയ കുടുംബത്തിലാണ് മെൻഡലീവ് ജനിച്ചതെങ്കിലും അദ്ദേഹം പിന്നീട് മതത്തെ നിരാകരിക്കുകയും മതാതീതമായ ഒരു വിശ്വാസത്തിൽ ആകൃഷ്ടനാവുകയും ചെയ്തു.

ഓർത്തഡോക്സ് ക്രിസ്തീയ കുടുംബത്തിലാണ് മെൻഡലീവ് ജനിച്ചതെങ്കിലും അദ്ദേഹം പിന്നീട് മതത്തെ നിരാകരിക്കുകയും മതാതീതമായ ദൈവവിശ്വാസത്തിൽ ആകൃഷ്ടനാവുകയും ചെയ്തു.

മെൻഡലീവിന്റെ മാതാപിതാക്കൾ

Review Article

Treatment of Water Effluents Using Silver Nanoparticles

Abstract

The water from industries with potential hazardous organic matters when discharged into the water bodies cause undesirable effects to the environment, aquatic life and human health. So it is necessary to treat waste water prior to their disposal. Degradation of organic pollutants is a major concern in the present scenario due to its stability, fastness to sunlight, resistance to degrading agents or microbial attack. It is mainly achieved by silver metal nanoparticles synthesised by green route. Degradation of dyes using metal nanoparticles is an environmental benign method. Silver metal nanoparticles show high catalytic potential due to its unique property of smaller structure and large surface to volume ratio. This review provides a detailed report of the degradation of various organic pollutants by phyto synthesised silver metal nanoparticles.

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Introduction

Water pollution is an environmental issue which is gaining global attention in the recent years. The major source of water pollution are the effluents from textile dyeing and finishing industries. Because of drastic changes in customer's demands, the textile industry is a challenge to use high quantity of dyes and auxiliaries that are necessary for modern textile processing. The used water contains various constituents such as dyes and chemicals which are directly released into the sources of water which gets contaminated and thus resulting in water pollution. The discharge of untreated waste into the water bodies has raised much concern because of potential health hazards associated with the entry of toxic components into the food chains of humans and animals. In our day to day demand for potable water is increasing, which is placing an increasing burden on nature's availability of water resource, has forced for new and efficient methods for water treatment.

Sources and effect of dye pollutants

Synthetic dyes and organic colorants used in paint, plastic, paper, printing, textiles, drug, leather and food related industries are the major organic pollutants in water.[1-3] Nitrophenols and their derivatives are produced from agricultural and industrial sources including those manufacturing dyes, explosives, pesticides and other products.[4,5] Dyes are the chemical substances used to impart colour to fabrics, foods and other objects for their beautification and distinction. They are capable of getting fixed to the fabrics permanently and are resistant to the action of water, sunlight, soap, acid and alkalies. The colour of a dye is mainly due to the presence of chromophores and auxochromes. Depending upon the characteristic structural units constituting the dyes, these are classified as azo, phthalein, triphenyl methane, indigoid, anthraquinone and nitro dyes. The dyes are also classified on the basis of their characteristics like fastness to light, resistance to acids and alkalies and the kind of fibre they can dye as acidic, basic, direct, disperse, vat, insoluble azo and mordant dyes. More than 7 x 10⁵ tons of approximately 1,00,000 types of dyes are produced annually.[5] The toxic and carcinogenic effect of dyes causes eutrophication, reduces reoxygenation, and makes severe damage to the aquatic organisms by hindering the infiltration of sunlight and interfering the growth of aquatic species.[3,4] Dyes are not readily biodegradable as they are resistant to microbial attack, aerobic digestion and are stable to heat, light and oxidising agents. The highly persisting nature of organic contaminants even at their very low concentrations make the water more detrimental for use. Therefore, it is essential to remove or minimize dyes to permissible concentration prior to discharge.

Different methods for removal of dye effluents in water bodies

a) Physical

Adsorption is the most efficient method for the removal of dyes, odors, organic, and inorganic pollutants from industrial effluents and is found to be superior to other techniques in terms of initial cost, flexibility and simplicity of design, ease of operation and insensitivity to toxic pollutants.[9] Adsorption does not require an additional pre treatment step before its application and process does not result in the formation of any harmful substance. In ion exchange treatment of dye-containing effluents, wastewater is passed over the ion exchange resin until the available exchange sites are saturated.[10] Both cation and anion dyes can be removed from dye-containing effluent using this approach.[11] Advantages of this method include no loss of adsorbent on regeneration, reclamation of solvent after use and the removal of soluble dyes. Membrane separation including ultrafiltration, nanofiltration and reverse osmosis have been increasingly used recently for the treatment of effluents due to its ease of operation. Electrotreatments such as electrodialysis has also contributed to environmental protection.[12]

b) Chemical

Chemical methods include coagulation or flocculation combined with flotation and filtration, precipitation—flocculation with Fe(II)/Ca(OH)$_2$, electroflotation, electrokinetic coagulation, conventional oxidation methods by oxidizing agents (ozone), irradiation or electrochemical processes.[13-16] These chemical techniques are often expensive, and although the dyes are removed, accumulation of concentrated sludge creates a disposal problem.[17] Although these methods are efficient for the treatment of water contaminated with pollutants, they are very costly and commercially unattractive.

sequenced on an Illumina MiSeq platform.

Results: The cluster-based taxonomy analysis revealed that Proteobacteria and Actinobacteria were the most predominant phyla present in the oral cavities of snakes. This result indicates that snakes show more similarities to birds than mammals as to their oral bacterial communities. Furthermore, our study reports all the unique and common bacterial species (total 147) found among the oral microbes of snakes studied, while the majority of commonly abundant species were pathogens or opportunistic pathogens to humans. A wide difference in snake's oral bacterial flora suggests variation by individual, species and geographical region.

Conclusion: The present study would provide a foundation for further research on snakes to recognize the potential drugs/antidotes for the different infectious diseases.

Keywords: Microbial community, Next-generation sequencing, Venomous snake, Hypervariable region

Background

Vertebrates form mutual relationships with large and complex microbial flora that inhabit their gastrointestinal tract. A major proportion of these microbes probably assist in essential processes of energy and nutrient acquisition in the host [1]. The continuation of next-generation DNA sequencing methods, ecological aspects and bioinformatics analysis tools is rapidly expanding our comprehension of the evolution and function of vertebrate-related bacterial communities [2, 3]. The diet and genotype impact the bacterial diversity, since the bacterial communities co-diversified with their hosts [4]. Most of the studies have tended to characterize fecal microbiomes from captive animals, often from laboratories or zoos [1]. However, captive microbial communities likely do not represent the natural variation of the microbiome of a species (or population), which is necessary for evolutionary analysis [5]. Most studies investigating evolutionary patterns in vertebrate gut microbiomes have focused

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ITEM-7 Chandra G.

Dysregulated calcium homeostasis prevents plasma membrane repair in Anoctamin 5/TMEM16E-deficient patient muscle cells

Dysregulated calcium homeostasis prevents plasma membrane repair in Anoctamin 5/TMEM16E-deficient patient muscle cells

Gagan Chandra, Anita Defoe, Komal Nagori, Nandini Narayana, Soumya Joshi, Vincent Mouly, Siddharth Goswami, Mohammed Nizar, Satish Chandran, Pradeep Kumar, Nived Venugopal, Bhargavi Venkataraman, Shane K. Mercer, Jyoti K. Jaiswal

Abstract

Anoctamin 5/Anoctamin 5 (ANO5/TMEM16E), a member of the transmembrane 16 (TMEM16) family of Ca2+-activated ion channels and phospholipid scramblases, when mutated causes muscular dystrophies limb girdle muscular dystrophy 2L (LGMD2L) and Miyoshi myopathy 3 (MMD3). However, the molecular role of ANO5 and how ANO5 deficiency causes muscle disease remain unclear requirement of ANO5 in muscle. To study the role of ANO5 in human muscle cells we generated a Repaired cell from a ANO5-deficient patient line that carries a c.2272C>T mutation, which we found causes the same phenotype in the disease. The patient myoblasts exhibit reduced myogenesis, reduced differentiation in both disease and healthy myoblasts despite slower death. The repair delay is linked to the poor ability of the endoplasmic reticulum (ER) to clear cytosolic Ca2+ increase caused by focal sarcolemma injury. Expression of ANO5 type AN05 in plasma-damaged sarcolemma of injury-triggered cytosolic Ca2+ stabilizes sarcolemma and restored patient muscle cells to repair. A transcriptomic analysis of ANO5-deficient and ANO5-repaired muscle cells revealed the dysregulated expression of ANO5-patient-implicated genes during differentiation. Our results pointing to a role of cytosolic Ca2+ homeostasis in ANO5 reveals a role for ANO5 in stimulated cytosolic Ca2+ uptake, and identify dysregulated cytosolic Ca2+ homeostasis as a disease mechanism contributing to that muscular dystrophies caused by ANO5 deficit.

The 'normality of unsafety'- foreign solo female travellers in India

Toney K. Thomas & Paolo Mura

Published online: 10 Jul 2018.

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Exploring the Prospects of Tourism Higher Education in Kannur District, Kerala

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Abstract: As a developing tourism destination Kannur requires efficiently trained people in the field of tourism to look after and manage various tourist services. As of now Kannur is considered to have s immense natural splendours like beaches, hill stations, river, backwaters, historic monuments and religious centres and also made its mark in the area of culture, religion and political heritage of Kerala. The Kannur international airport is set to open in the month of December. 2018 and it fuels the demand for tourism professionals with respect to specific skills and related training. The paper attempts a narrative review of the tourism projects and educational courses available in the field of tourism in Kannur. Tourism education is important to improve employee's abilities and promote the tourism industry's capabilities. The educational institutions are the backbone for the societal development of any region. The main objective of this paper is to examine the existing institutional/ infrastructural facilities available for fulfilling manpower requirements of tourism sector in Kannur and to make an analysis of current status of tourism higher education in Kannur. This paper initially starts with introduction followed by the new Initiatives in Tourism Development Activities and projects. The first section of this paper reviews emerging tourism employment opportunities in Kannur, which then continues to highlight and discusses the prospects of Tourism Higher Education in Kannur in the second section. In the end the paper concludes by giving suggestions to improve the status of tourism education in Kannur.

Key Words: Tourism, Higher Education, Kannur.

1. INTRODUCTION:

According to WTTC, travel & tourism is a key sector for economic development and job creation throughout the world. In 2017, the industry directly contributed 118,454,000 jobs worldwide (3.8%of total employment) and this is expected to rise by 2.4% to 121,356,000 in 2018 and rise to 150,139,00 jobs in 2028. Indirectly it contributed 313,221,000 jobs and this is expected to raise 322,666,000 jobs in 2018 and rise by 2.4% pa to 413,556,000 jobs in 2028 (WTTC, 2018). Tourism is the hallmark of Kerala's economic development and a principal contributor to the State's economy. It contributed to generation of large scale employment and promotes traditional industries (Govt. of Kerala, 2016). According to the Kerala tourism statistics, total tourist arrival to Kerala during the year 2017 is 1,57,65,390 showing an increase of 10.94% over the last year figure 1, 42, 10,954. Total Revenue (including direct & indirect) generated from tourism during the year 2017 comes to Rs 33383.68 Crores, showing an increase of 12.56 % over previous year's figure of Rs 29658.56 Crores.

According to the study commissioned by the Ministry of Tourism, Government of India, the total employment in tourism industries is estimated at 14.07 Lakh in Kerala (MoT, 2009). The total number of jobs created directly and indirectly by the sector between 2009 and 2012 turned out to be 23.52 per cent of the total employment in Kerala (Govt of Kerala, 2016). Tourism is labour intensive industry and creates many job opportunities, especially for young people and part-time and full-time workers. In the tourism hospitality and recreation industries alone there are 50 categories of employment and approximately 200 classifications of occupations (Geethanjali, 2010). Formal Education plays an important role in the development of the Human Resource. As tourism is the world's largest industry and it is also known as service industry, hence there is a need of the development of the human resource for this industry (Bansal & Kumar, 2006). Tourism education is a major platform for human capital development for the tourism industry and it has a very close relationship with the economic development of the tourism industry (Wang Jie, 2008). Tourism education is the starting point in the training and development of human capital to undertake occupations in the industry. It not only adds value, personnel quality and sense of tourism professionalism, but also serves to sustain the local communities that support successful tourist destinations (Ladkin, 2005). The main purpose of tourism education is to produce high quality professionals that assists the industry and allied sectors who are capable of working at the cutting edge of modern management (Murugan, 2006).

Kannur is one amongst the northernmost districts in the south western state of Kerala in India. Kannur is rightly called 'The City of Looms and Lores'. It produces world famous handloom cotton fabrics (Mammootty, 2007). Handloom industry is the most important and the largest in the district. The handloom cloths of Kannur have won

GENDER WISE COMPARISON OF PHYSICAL AND HEALTH STATUS

OF PRIMARY AND HIGH SCHOOL CHILDREN OF

UTTAR PRADESH

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Kottayam, Kerala, India
[2]Director of Physical Education, M G University, Kottyam, Kerala, India

ABSTRACT

Childhood and adolescence are critical periods of development in every domain. Children during this stage undergo major physical, cognitive and psychological changes, which have significant impact on their health and wellbeing. Children during this stage make significant independent changes in their diet, physical activity, substance use, sexuality, etc., which have long lasting effect on their lifestyle and health conditions. Lack of physical activity and healthy lifestyle can adversely affect their normal growth and development and hence is a major public health concern. The study results indicating a lesser active lifestyle and exercise patterns among girl school children of Uttar Pradesh, so it is recommended that provision for active involvement in physical activity and sports be provided for girl students in the school based programmes.

Keywords: Gender, Physical, Health and Children.

INTRODUCTION

School has an important environmental influence in shaping the health, hygiene and nutritional habits of children. There is mounting evidence suggesting that the health of a country's population can be greatly improved through changing health-related behaviour. An unhealthy lifestyle resulting from a poor diet and lack of physical exercise is recognised as the leading cause of obesity and overweight and is the main contributor to non-communicable diseases.

Reduced graphene oxide wrapped Ag nanostructures for enhanced SERS activity

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Joby Jacob, József T. Haponiuk, Sabu Thomas, Sreeraj Gopi

Synthesis and characterization of poly (benzyl trimethyl ammonium chloride) ionic polymer

101

Augustine Elizabeth Mathew, Joby Jacob, Sabu Thomas, Sreeraj Gopi, and Mohammed Shamsir

Full Paper

Development and Modification of Cellulose Acetate/Carboxy Methyl Cellulose Blend Films for Enhanced Adsorption of Methylene Blue

(102)

Sreerag Gopi, Preetha Balakrishnan, Anitha Pius ✉ Sabu Thomas ✉

Abstract

Herein, we report polysaccharide blend film such as cellulose acetate/carboxymethyl cellulose (CA/CMC) developed using acetic acid and water mixture using solvent casting method. The material prepared here

Full Paper

Cellulose Nanomaterials in Biomedical, Food, and Nutraceutical Applications: A Review

(103)

Augustine Amalraj, Sreerag Gopi ✉, Sabu Thomas, Jozef T. Haponiuk

Abstract

Nanotechnology with bionanomaterials have tremendous potential to enhance and utilize for nutrient and bioactive absorption, drug delivery systems, pharmaceutical, and nutraceutical field through various applications. Cellulose

Molecular transport of aromatic solvents through oil palm micro fiber filled nitrile rubber composites

(104)

Shaji Joseph, S. Si, Ajith James Jose, Runcy Wilson, Saba Thomas, Kuruvilla Joseph

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Abstract

The cellulose micro fiber reinforced nitrile rubber biocomposites were prepared. The effect of chemical treatment on the fiber surface morphology and fiber–rubber interface was investigated using scanning electron microscopy. The transport

fibers

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Use of Ginger Nanofibers for the Preparation of Cellulose Nanocomposites and Their Antimicrobial Activities

(105)

Joby Jacob [1], Józef T. Haponiuk [2], Sabu Thomas [3], Gregary Peter [1] and Sreeraj Gopi [1,*]

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Abstract

Abstract: Ginger residues left after the extraction of active ingredients from ginger rhizomes are considered to be a bio-waste, available in abundance and very rarely used. Extraction and isolation

Reduced graphene oxide and ZnO decorated graphene for biomedical applications

P.K. Sandhya, Jiya Jose, M.S. Sreekala, M. Padmanabhan, Nandakumar Kalarikkal, Sabu Thomas

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Abstract

The ability of graphene-based materials to enhance the conventional antibiotic resistance is well known and researchers have been interested in improving their antibacterial activity. The reduction of graphene oxide by eco-friendly reducing agents is of great interest on the basis of environmental and human health aspects. Herein we report the synthesis of two forms of graphene derivatives namely, reduced graphene oxide (RGO) through reduction using potato starch and zinc oxide decorated RGO (ZnO-RGO). In the case of ZnO-RGO, the reduction of

RF Sputtered h-BN Thin Film Layer for Printed Circuit Boards as an Insulating Layer

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Abstract— Power electronic devices are usually bulk in size due to the power management systems in them. In normal power electronic devices, the heat sink is used to reduce the temperature in the circuit. The heat sink used is normally larger in size and surface area because large heat sinks have higher convective heat transfer capability. The size reduction of the device is not possible with such large heat sinks; therefore, we need to avoid them. Here, we are trying to create a printed circuit board (PCB) that can also act as a heat sink. This approach will help to reduce device size by avoiding large heat sinks. In this paper, for making thermally conductive PCB, we need a thermally conductive base. Highly insulative Hexagonal boron nitride(h-BN) is thin filmed on a copper plate using RF sputtering. Then we determined the quality of different thickness of h-BN film by finding band gap energy using UV-Vis spectroscopy and also determined the resistance of the films. From the results, it is found that the RF sputtering is not critically affect the quality of h-BN film and the resistance of the layer increases with thickness. So, the h-BN coated copper sheet using RF sputtering can act as a good thermally conductive and electrically nonconductive PCB. In addition, it has very low cost and uses eco-friendly materials and fabrication process.

Keywords— *Hexagonal boron nitride thin films, RF sputtering, printed circuit board, UV- Vis spectroscopy of h-BN films, thickness measurement of thin film h-BN using ellipsometry.*

I. INTRODUCTION

The electronics technology consists of active and passive components, conducting wires and Printed Circuit Boards(PCB)[1], [2]. A PCB mechanically supports and electrically connects the electronic components using conductive tracks and other features etched from copper sheet laminated onto a non-conductive substrate. The performance of the electronic device is depending up on the quality and fabrication method of the PCB[3]. In the high-power application fields such as power electronics[4], [5], the insulating strength of the PCB is very critical. Also, in the multilayer circuits, the individual insulating layer is very thin and it is susceptible to break down. So, a good insulating material is necessary for such kind of applications. The temperature withstanding ability of PCB is critical in the power electronic circuits. Ordinary power electronic circuits use heat sink or liquid cooling system to reduce the temperature of the power electronic parts. These systems are so much weighty and are bulk in size. There is another option to reduce the temperature by transferring the heat to the PCB first and then transfer it from PCB to the air. But in this case, PCB must be thermally conductive and electrically non-conductive. Normal PCB materials are not heat conductive, so we need to make PCBs using heat conductive materials. Copper is a heat conductive material and lower in cost but it is electrically conductive; so, we can't build circuit on it. By creating a thin film electrically nonconductive and thermally conductive layer on the copper sheet, we can avoid this problem. Hexagonal Boron nitride(h-BN) is the most suitable material for this operation because it is highly thermal conductive and electrically non-conductive.

In this paper, we are study about the hexagonal boron nitride (h-BN)[6] thin films[7], [8]with different thickness for PCBs in high power applications. Here, h-BN thin films of different thickness are prepared using physical vapour deposition. In this work, RF magnetron sputtering[9]–[12] is used to create h-BN thin film. The thickness of the film is measured using ellipsometry[13], [14]. The resistance of h-BN layer is measured using source meter and the band gap is measured using UV absorbance value obtained from UV-Vis spectroscopy in different thickness of h-BN film.

II. METHOD OF STUDY

The h-BN films are deposited on the glass substrate and copper plate using RF magnetron sputtering instantaneously at the same time. Here, we used 5cm height between h-BN target and the substrate. The vacuum chamber initially pumps down to 10-5 bar pressure using diffusion pump and argon gas is introduced in the chamber. During deposition, the pressure of the chamber is kept at 0.007 bar. The RF power is kept at 200W during the process. The sputtering process is repeated for making different thickness of samples. The thickness of 92 nm, 586 nm, 842 nm, 2183 nm, and 2620 nm films are created. The ellipsometry technique is used to measure the thickness of the films on glass substrate. Because the ellipsometry can use only in transparent films and substrates. Here, the h-BN film on the glass substrate and copper substrate are created in a single sputtering process. So, the thickness of the film on the glass substrate is equal to the film on the copper substrate. The UV-Vis spectroscopy is used to measure the absorption spectrum of the sputtered h-BN film on the glass plate and similar glass substrate is used as a reference for UV-Vis spectroscopy. Figure 1(a) shows the h-BN film on a glass substrate. Also, 842nm and 2183 nm thin film was created on a copper plate and measured the layer resistance. Figure 1(b) shows the h-BN film on copper substrate. The h-BN film on copper is visible as a transparent film.

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RESEARCH ARTICLE

Chemicobiological Insight into Anti-phytopathogenic Properties of Rhizospheric *Serratia plymuthica* R51

C. Jimtha John[1] · E. K. Radhakrishnan[1]

Abstract Interest in biocontrol of plant pathogens has increased in recent years due to agricultural trend towards greater sustainability and public concern over the use of hazardous pesticides. In the present study, rhizobacteria isolated from *Curcuma amada* were screened for their antifungal activity against phytopathogens. Among these, the isolate R51 was found to have promising activity against selected phytopathogens in dual culture. The antifungal compound containing fraction was purified by column chromatography and was identified by ultra violet spectrum (UV), infra-red spectrum (FT-IR) and mass spectroscopic (LC–MS) analyses as pyrrolnitrin. By scanning electron microscopic (SEM) analysis, the isolate R51 was found to cause vacuolation, swelling, distortion and lysis of mycelia of the pathogenic fungi. R51 was identified as *Serratia plymuthica* and was found to provide effective protection to ginger rhizome from soft-rot caused by *Pythium myriotylum*. Hence, the chemicobiological basis of antifungal activity of *Serratia plymuthica* can be due to pyrrolnitrin [3-chloro-4-(2′-nitro-3′-chlorophenyl) pyrrole] production and is having significant agricultural applications.

Introduction

Plant-growth promoting rhizobacteria (PGPR) promote plant growth through control of pathogens, production of phytohormones or improvement of plant nutritional status [1]. Since members of the genus *Serratia* are frequently associated with plant roots, they are extensively studied for their ability to control soil-borne fungal diseases. *S. plymuthica* strain IC1270 from the rhizosphere of grapes have been shown to have effective mechanisms to control damping-off of cotton caused by *Rhizoctonia solani*. At the same time, *S. plymuthica* (G15) isolated from roots of various plant species were identified to have antagonism towards *Botrytis cinerea, Gerlachia nivalis, Rhizoctonia solani, Fusarium culmorum* and *Pythium* sp. These are indications of highly efficient mechanisms present in *S. plymuthica* to act against diverse phytopathogens [2].

One of the mechanisms by which PGPR inhibit pathogen is through production of antibiotic compounds. Common antiphytopathogenic compounds produced by rhizobacteria include 2,4 diacetyl phloroglucinol, phenazine-1-carboxyclic acid, phenazine-1-carboxamide, pyoluteorin and pyrrolnitrin [3]. The antibiotics that belong to phenylpyrrole group have received much attention due to their broad-spectrum activity. Pyrrolnitrin (PRN) of this group is a dichlorinated phenylpyrrole and is produced by several fluorescent and

Significance statement The broad spectrum antifungal activity shown by rhizospheric *Serratia* sp. R51 in the study indicates need to explore Western Ghats for microorganisms with immense biocontrol potential.

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Pathophysiology

Studies on biofilm formation and virulence factors associated with uropathogenic *Escherichia coli* isolated from patient with acute pyelonephritis

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ABSTRACT

The current study aims to the detection of pathogenic potential and virulence factor identification of uropathogenic *Escherichia coli* BRL-17 isolated from patients urine. The organism was isolated from the patient with chronic pyelonephritis. The identification of organism was done by analyzing gram staining, biochemical, 16S rDNA analysis, Raman microscopy and SEM analysis. The pathogenic potential was identified by multiplex PCR analysis of virulence factor genes like sfa, hly D, pap C. The biofilm forming ability was tested by congo red agar assay and tissue culture plate assay. The result of gram staining and biochemical analysis shows the characteristics of *E-coli*. The 16S rDNA analysis of the clinically isolated uropathogen showed 100% similarity with uropathogenic *Escherichia coli* strain. Raman microscopy and SEM confirms the organism as *E-coli*. The Multiplex PCR study identifies virulence genes like sfa, hly D, pap C in isolated *E-coli*. The presence of P fimbriae coded pap C gene, S fimbriae coded sfa gene and hemolysin-D coded hly D gene discloses its potential to cause urinary tract infection. Biofilm assay result enhances the organism's role as strong biofilm former. This biofilm forming ability of *Escherichia coli* strain BRL-17 made the organism to escape from host immune system and helps to colonize in bladder and kidney. This also helps to enhance the resistance to antibiotics. Our study confirms the organism as multidrug resistant, highly virulent, strong biofilm forming *E-coli*. The strain may be used for the development of animal models of pyelonephritis for the purpose of drug discovery.

1. Introduction

Urinary tract infections (UTIs) are considered as the most common infections in humans all over the world. Majority of community-acquired urinary tract infections are caused by uropathogenic *Escherichia coli* (UPEC) [1,2]. UPEC associated UTI have very serious health and economic impacts on the world [3]. Most of the scientist in recent time generally accepted the hypothesis that "UPEC evolved from non-pathogenic strains". Acquiring of new virulence factors from accessory DNA horizontal transfer located at the chromosomal or plasmid level was the reason for the transformation of non-pathogenic strain to pathogenic one [4]. Progress in molecular technology has facilitated studies on UPEC [5]. The severity of disease conditions associated with UTIs depends upon multiple UPEC virulence factors and host susceptibility. Wide range of virulence factors such as adhesins (fim, afal, sfa, iha, tsh, papC, and papGI, -II, and -III), iron-acquisition systems (iroN, irp2, and iuc), protectins (kpsMT, ompT, and iss), and genes encoding toxins (cnf1, hlyA, set, astA, vat, usp, and cva/cvi) are involved in the pathogenicity of UPEC [6,7]. These virulence factors contribute to bacterial host colonization and invasion, biofilm formation and tissue damage. They also helps to stimulate the inflammatory response, evasion of the immune response, and ascent to the bladder and kidney [8]. The movement of UPEC from bladder to kidney leads to the pyelonephritis and kidney inflammation.

Microorganisms growing in biofilm are highly resistant to antimicrobial agents and are associated with chronic and recurrent human infections [9]. The biofilm formation helps the bacterial population to escape from immune system attack. This may contributes to the pathogenesis of chronic infections such as cystitis and other pulmonary illnesses [10]. Formation of biofilm and its architecture maintenance are controlled by a quorum sensing (QS)-dependent mechanism [11]. Entry of antibiotics and antimicrobial peptides to the biofilm where restricted by an effective barrier made with exopolymeric substance (EPS) [12]. Biofilm formation and QS-controlled virulence factors are another interesting factor that contributes for the development of acute and chronic infections caused by Gram-negative bacteria. These factors result

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Single crystal X-ray studies and Hirshfeld surface analysis of ethoxy phenyl substituted chalcone derivatives

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ABSTRACT

The single crystal X-ray of three chalcone derivatives, (2E)-3-(2-chlorophenyl) –1-(4-ethoxyphenyl) prop-2-en-1-one (I), (2E)-3-(3-chlorophenyl)-1-(4-ethoxyphenyl)prop-2-en-1-one (II) and (2E)-1-(4-ethoxyphenyl)-3-(4-methoxyphenyl)prop-2-en-1-one (III) was determined. The compound (I) crystallized in triclinic $P-1$ crystal system and in the asymmetric unit of the compound (I), two molecules were present. The conformational differences between molecule A and B indicated with the dihedral angles of 3.47 (2)° (A) and 8.12 (16)° (B), measured between chlorophenyl ring (C1A/B–C6A/B) and methoxy phenyl (C10A/B–C16A/B). Similarly the compound (II) crystallized in monoclinic $P-1$ crystal system and in the asymmetric unit of the compound (II), two molecules were present. The conformational differences between molecule A and B with the dihedral angles of 4.50 (11)° (A) and 3.94 (11)° (B) was measured between terminal phenyl rings. The compound (III) crystallized in monoclinic, $P21/n$, with a dihedral angle between two terminal phenyl rings is 13.18 (7)°, indicating the near planarity of the compound. The intramolecular hydrogen bond of the types C–H...O is observed in all compounds (I), (II) and (III). In the crystal structures (I), (II) and (III), C–H...π intermolecular interaction was found in all compounds. The intermolecular hydrogen bond of the type C–H...O was present in compounds (I) and (II). The Hirshfeld surface analysis was carried for compounds (I), (II) and (III). Intercontacts C–C, C–H, C–O, H–H and O–H were common in all compounds which contributed more to the Hirshfeld surfaces. The electrostatic potential surfaces were drawn to understand electrophilic and nucleophilic regions on the molecule.

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Use of Ginger Nanofibers for the Preparation of Cellulose Nanocomposites and Their Antimicrobial Activities

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Abstract: Ginger residues left after the extraction of active ingredients from ginger rhizomes are considered to be a bio-waste, available in abundance and very rarely used. Extraction and isolation of natural nanofibers from the agro-waste is economical, environmentally benign, and an alternate strategy to replace synthetic fibers. Here, we report, for the first time, the isolation of ginger nanofibers (GNF) from ginger rhizomes spent by acid hydrolysis and followed by high-pressure homogenization. Scanning electron microscopy was utilized to identify the surface morphology of the GNF and the widths ranged between 130 to 200 nm. Structural analysis of GNF was identified by Fourier transform infrared spectroscopy, Differential scanning calorimetry, and X-ray diffraction methods. This GNF was used to make natural nanocomposites by the solvent-casting method reinforcement, using potato starch (PS) and tapioca starch (TS), and was characterized through various methods. These composites were prepared by the addition of 1, 3, 5, and 7 weight % of GNF with PS or TS. Among these, 5% of the GNF composites of these starches showed very high mechanical properties. The antibacterial test showed that the bionanocomposites with 5% GNF exhibited good antibacterial activity against *Bacillus cereus*, *Escherichia coli*, *Staphylococcus aureus,* and *Salmonella typhimurium,* due to the addition of GNF in the biopolymer matrices. The viable use of GNF from the unexploited ginger agro-waste would create additional profit and it would help to diminish a large amount of waste generation. Thus, the developed bio-composite could also be employed for development of packing materials and be used in medical applications, such as wound healing pads and medical disposables.

Keywords: ginger nanofiber; starch; bionanocomposites; antimicrobial activity

1. Introduction

Synthetic polymers play an important role in modern research but the accumulation of non-degradable waste is a major environmental concern [1]. Nanocomposites prepared by biopolymers, such as cellulose and starch, attain much attention nowadays due to their versatile applications [2]. These biopolymers are abundant in nature, renewable, sustainable, and economical, when compared with synthetic fibers, and are an alternative to non-degradable synthetic ones [3]. Starch-based nanocomposites, cross-linked with cellulose nanofiber (CNF), would increase the mechanical and barrier properties of starch which could be prepared from biomass residues, hence they could be potential alternatives for fossil fuel-derived plastics, thus minimizing the creation of waste [4,5].

Analysis of Supervised Learning Techniques for Cost Effective Disease Prediction Using Non-clinical Parameters

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Abstract—The rising costs of healthcare services have forced many to undergo annual screening procedures to reduce the incidence of chronic diseases. Diabetes being chronic in nature is always screened in the so called "wellness programs". Data mining models involving clinical parameters obtained from screening procedures have been successfully implemented for disease prediction. This study sheds light on the use of some novel non-clinical parameters to predict diabetes. This move can be successfully implemented to reduce the screening cost of patients for diseases. The proposed model gives the best results with Random Forest classifier for diabetic prediction.

Index Terms—data mining, classification, non-clinical parameters, diabetes.

I. INTRODUCTION

Predictive medical analytics is a data mining activity, which involves data analysis for finding out unexplored paths, patterns, or associations to predict future outcomes and trends [1]. It is a conglomeration of different disciplines such as statistics, machine learning, game theory etc., for evaluation of the present and past facts and thereby arriving at conclusions so as to make predictions in the areas of interest [2]. Predictive analytics has advantages, in terms of producing surprising discoveries and associations that will be never suspected by normal human brain. It can be used to predict infections after a surgery, probability of contracting diseases, and even for the disease prognosis of a patient. A typical predictive modelling activity involves data collection, statistical model formulation and making predictions. The proposed model is revised and validated by supplementing it with more data. In clinical aspects, retrieving, analysing and interpreting qualitative and quantitative information is done on medical datasets [3]. The objective of predictive analytics is to predict the unknown with a higher degree of confidence. The over-abundance of data and improvements in technical know-how, especially with the onset of big data platforms have enhanced personalized analytics in medicine. With the onset of medical predictive analytics, there has been an increase in research outcomes too. Disease management is the key to improving health in populations with chronic conditions like diabetes, asthma

etc., but its cost-effectiveness is seldom analysed. Computer-based prediction models are successfully proven to potentially improve the cost-effectiveness of disease management [4], [5]. Thus computerized prediction models are crucial for disease management to be cost-effective, but the irony is that, patients contracting new diseases are always on the rise. This motivates us to think of alternative cost effective methods for early diagnosis of diseases. This study is conducted on a survey-collected data set to predict diabetes. The rest of the paper is organized as follows. Section II deals with related works; section III shows the architectural setup. In section IV, experimental analysis is discussed; followed by conclusion in section V.

II. LITERATURE SURVEY

A. Predictive Analytics for a Clinical Setting

Diabetes being chronic and critical in nature and difficult to manage, has attracted the attention of researchers worldwide. Ming Yan et al. developed an expert system that can diagnose diabetes [6]. Han et al. used RapidMiner on PIMA dataset to implement a classifier based on decision [7]. Jayalakshmi et al. designed a system using Artificial Neural Network for classification on the same dataset [8]. The efficiency of different machine learning algorithms such as Bayes Network classifier, REP tree, Random tree, J48 and Apriori was classified by Yasoda et al. [9]. Al Jarullah used Weka to design a system for detecting diabetes by using decision tree [10]. Arora et al. made use of five different datasets and applied J48 and Multilayer Perceptron algorithms for classification and comparison [11]. In [12], Naïve Bayes classifier was used to classify diabetic data set with 72.3% accuracy. Similar work has been done for skin diseases, cardiovascular diseases etc., for which promising results were obtained [13]. Data sets used in the above works were obtained from University of California, Irvine, data set for machine learning and intelligent systems.

To meet the challenges of big data, the authors in [14] provide a predictive algorithm based on Hadoop Map Reduce framework. This system provides automated environment for

An Image Encryption Technique using Logistic map and Z-order curve

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Abstract- **Image encryption is an important field in multimedia security. This paper proposes a new encryption technique for gray scale images using Logistic map and Z-order curve. The key stream generated for this algorithm not only depends on the chaotic map but the original image. In this technique the original image is scrambled using Z-order curve. Then this scrambled image is encrypted using the random matrix generated using the logistic map. Experimental results and security analysis shows that the proposed method has high security and can resist various types of attacks.**

Keywords - Logistic map, Z-order curve, Image encryption, Security analysis.

I. INTRODUCTION

Information security has become an important issue with the rapid development of communication networks. Since large amount of digital images are transmitted over the networks, it is necessary to ensure the confidentiality of images in order to protect them against unauthorized access. Image security is very important in almost all areas like military affairs, medical field and confidential business.

Since digital images have bulk data capacity and high redundancy, the conventional encryption methods are not suitable for practical image encryption. To provide a better solution to image security problems, chaotic cryptosystems have been proposed. Chaotic encryption systems provide a good combination of speed and high security level. Among many new image encryption schemes, chaos-based approach shows exceptionally superior properties in aspects like security and complexity.

Chaos has some good features such as unpredictability, ergodicity and sensitivity to initial conditions [1-2]. Many chaos based image encryption algorithms using different chaotic maps have been proposed in the literature [3-10]. In some chaos based encryption techniques digital image encryption is performed in pixel level or bit level.

Various image encryption algorithms use different chaotic maps. In [11], a color image encryption is performed using enhanced chaotic tent map (CTM) and rectangular transform, while in [12-15] Piece wise linear chaotic map (PWLCM) is applied for image encryption. In [13], Piecewise linear chaotic map is used for performing bit level encryption where only higher order bits of each pixel is considered for encryption. Here encryptions are performed in bit level. A Modified

PWLCM (MPWLCM) based on pixel level encryption is used in [14] for image encryption to ensure both confusion and diffusion process.

The basic idea of the encryption scheme in [16] is for performing bit level permutation use Arnold cat map and to ensure diffusion use Logistic map. A new chaotic encryption technique using Josephus traversal and mixed chaotic maps is introduced in [17]. For diffusion process mixed chaotic maps like Logistic map, Chebyshev map, Sine map and Cosine map are employed. Josephus traversal is used to perform pixel permutation process. A 6-D hyper chaotic system and a 2-D discrete wavelet transform (DWT) are used for color image encryption in [18]. Here, using 2-D DWT the color image is divided in to four sub-image bands. A 6-D hyper chaotic system is used for key stream generation. Diffusion is performed on the shuffled image and key stream to get an encrypted image.

The remaining sections of the paper are as follows. The basic idea about the proposed image scrambling and encryption technique is described in section 2. Section 3 specifies various analysis of results after the encryption process. In final section, a brief conclusion about the proposed method is mentioned.

II. THE PROPOSED METHOD

The proposed technique is a symmetric one, in such a manner that the source and the destination use the same secret key.

A. Z-order Curve

SCAN methodology [19] specifies the way in which each and every element of an array can be accessed. Z-order curve is used as a scan pattern strategy [20] to scan every pixel of an image. In this paper, Z-order curve is used to scan the array elements to scramble the pixels of the plain image. Fig.1 shows the Z-order curve of size 8×8 starting at top left and 4×4 starting at bottom left of the square grid.

B. Logistic Chaotic Map

The logistic map [21] is defined by

$$y_{k+1} = \mu y_k(1 - y_k) \qquad (1)$$

Content growth of institutional repositories in South India: a status report

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Abstract

Purpose – The purpose of this study was to evaluate the content growth of institutional repositories (IR) in South India and analyse the type-wise growth of items available in these IRs and also discuss the traits and trends exposed by them.

Design/methodology/approach – With the help of Registry of Open Access Repositories and Directory of Open Access Repositories (OpenDOAR), 39 repositories were located in south India. From these, Personal websites, the IRs that are currently not working and the repositories used for journal archiving were excluded. A total of 22 operational IRs at 21 institutions were identified for the study. Within a 15 month period, the data were collected from the 22 IRs twice for monitoring content growth.

Findings – The content of nearly all IRs have grown over the 15 month period, and the overall content growth rate was 7.82 per cent. Journal articles were the important content type of IRs, while thesis and conference papers were the next common. Moreover, item monographs exhibited the highest growth rate. Other categories, conference proceedings, and conference papers also exhibited a high growth rate. The present study revealed that Indian repositories were actively engaged in data curation activities, depositing a wide variety of items in their respective IRs. Overall, South Indian repositories exhibited a slow growth rate and tended to become inactive. Most South Indian Universities had not constituted the IRs, which led to the dominance of English language material in these IRs.

Research limitations/implications – The study was conducted only in South Indian IRs.

Originality/value – This is the first study in India, attempting to determine the type-wise growth of items in IRs.

Keywords Institutional repository, Open access, Categorisation of item types, Content growth, Institutional repository software, South India

Paper type Research paper

1. Introduction

The growth of institutional repositories (IRs) varies greatly among the world's nations. According to Directory of Open Access Repositories (April 2018) and International Association of Universities (2018), 19.05 per cent (389) institutions in the USA and 27.32 per cent (209) institutions in Japan possess repositories. The rate is really on the higher side when it comes to the institutions in the UK (76.86 per cent [196]) and Spain (88.64 per cent [117]). Germany with half of the institutions (46.18 per cent [163]) and France with 28.18 per cent (104) institutions established repositories is in the middle path. Italy has achieved a very high 96.93 per cent deployment rate of repositories with 95 institutions. The contribution to the deployment of IRs in developing nations is evidently very low compared to developed nations, and many reasons behind this low representation exist.

The economic and socio-political environment of developing countries has a considerable influence on the formation and growth of IR. The initial cost required to establish IRs in developing countries would not as low as in developed countries, which already possess a well-

Diversity of nitrogen fixing bacterial communities in the coastal sediments of southeastern Arabian Sea (SEAS)

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ABSTRACT

The present study depicts diversity, abundance and activity of nitrogen (N_2) fixing bacterial communities in the coastal sediments of southeastern Arabian Sea (SEAS). The diversity of N_2 fixing bacterial community was determined by clone library analysis of nifH gene, the culturable N_2 fixing bacteria was determined by 16s rRNA and nifH gene analysis. The nitrogen fixation rate in the sediments was also estimated by acetylene reduction assay method. The nifH clone library analysis revealed that fifteen putative diazotrophs, belonging to alpha-, beta-, gamma-, delta-, epsilon- Proteobacteria and Firmicutes. The predominant operational taxonomic units (OTUs) among these were related to α-Proteobacteria (with 16% of total sequences); β-Proteobacteria (10% sequences); γ-Proteobacteria (29% sequences); δ-Proteobacteria (11% sequences); ε-Proteobacteria (21% sequences); Firmicutes (3% of sequences) and percent of some sequences remained unknown. The 16s rRNA gene based identification of culturable N_2 fixing bacteria revealed the presence of seven nitrogen fixing bacterial species namely Acinetobacter johnsonii, Rhizobium rosettiformans, Bacillus megaterium, B. circulans, B. flexus, B. oceanisediminis and B. subtilis. The observed N_2 fixation rate in the sediments ranged from 0.12 to 0.36 $nmol\,N\,g^{-1}\,h^{-1}$. Canonical correspondence analysis (CCA) revealed significant influence of the environmental variables such as sediment type, total nitrogen (TN), total organic matter (TOM), total organic carbon (TOC), iron (Fe), manganese (Mn), total sulfur (TS), nitrite (NO_2) and nitrate (NO_3) on the diversity of N_2 fixing bacteria and N_2 fixation rate. The observations of the current study provide a better understanding of N_2 cycling in coastal sediments of the SEAS and sources of fixed nitrogen.

1. Introduction

Bio-available nitrogen (N) often acts as a limiting nutrient that determines the productivity of marine ecosystem (Capone, 2001; Moisander et al., 2012). The primary source of N in the marine environment is biological N_2 fixation, the conversion of atmospheric dinitrogen (N_2) to ammonium (NH_4^+) (Capone, 2000) which is mediated by microorganisms. During the past decade, microbial driven N_2 fixation and the microorganisms involved in this process, especially in the ocean has received much attention among researchers. This is primarily due to previous observations that marine 'fixed N sinks' greatly exceed the measurements of marine 'fixed N_2 sources' (Codispoti, 2007). These results would suggest that ocean has either decreasing level of the bio-available N over time or it is an incorrect estimate of N from the sources or sinks (Capone and Knapp, 2007).

A wide range of prokaryotes (diazotrophs) including archaea and bacteria, are actively participating in N_2 fixation (Gaby and Buckley, 2011). The major classes reported among bacterial diazotrophs are Proteobacteria, Cyanobacteria and Firmicutes while Euryarchaeota is the major phylum among archaea (Widmer et al., 1999; Poly et al., 2001). The enzyme responsible for N_2 fixation is nitrogenase, which consists of two distinct protein subunits, dinitrogenase (also referred to as MoFe protein or protein I) and dinitrogenase reductase (also referred to as Fe protein or protein II) (Burris et al., 1991). The gene that encodes for its iron protein subunit is the nifH gene which is highly conserved among all the N_2 fixing microorganisms and hence serves as an ideal molecular marker for understanding the diversity of N_2 fixers (Deslippe and Egger, 2006). Though the cloning and sequencing of nifH gene provide a large database of nifH sequences from different environments, the diversity of N_2 fixing bacteria is still meagerly addressed from marine environment and many of these microorganisms are yet to be discovered (Zehr et al., 2003).

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Laser–plasma driven green synthesis of size controlled silver nanoparticles in ambient liquid

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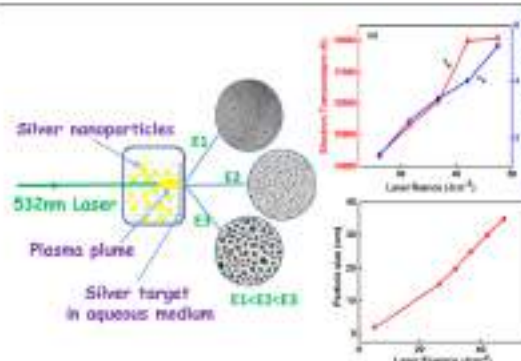[c] International and Inter University Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam 686560, Kerala, India
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HIGHLIGHTS

- Space resolved optical emission spectroscopy of laser produced silver plasma in liquid media.
- Effects of laser fluence and properties of the ambient medium on silver plasma parameters.
- Laser assisted synthesis of Ag nanoparticles.
- Dependence of laser parameters in nanoparticle size control.
- Optical and morphological characterization of green synthesized Ag nanoparticles.

GRAPHICAL ABSTRACT

ARTICLE INFO

ABSTRACT

This article explores the expansion behavior of laser produced silver plasma in stationary and stirring liquid media using space resolved optical emission spectroscopy and plasma instigated size controlled synthesis of silver nanoparticles via laser ablation. Second harmonics (532 nm) of an Nd:YAG laser was employed for the ablation of a silver target in ambient liquid for plasma formation. Calculation of plasma parameters — electron temperature and electron number density were done for different laser fluences and in various liquid media at room temperature. The Electron temperature (T_e) was measured by exploiting the Boltzmann plot method and the electron number density (n_e) was estimated from Stark broadened profiles of isolated lines from optical emission spectra. UV–Vis spectroscopy, fluorescence spectroscopy and high-resolution transmission electron microscopy further substantiated the optical and morphological characteristics of silver nanoparticles. Obtained novel versatile results pave way for a far-reaching understanding in creation and characterization of silver plasma, in ambient liquid; and provides a methodical green approach towards the synthesis of metallic nanoparticles that can be fine tuned for size and morphology, by varying laser parameters.

1. Introduction

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Pulsed laser ablation is used for innumerable applications with expansion of plasma plume into environments, ranging from liquids to high vacuum. Among various analytical applications of laser ablation, laser-induced breakdown spectroscopy (LIBS), laser

E-resources sharing through Linux based Virtual Private Network (VPN): a case study

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Mahatma Gandhi University Central Library has established an SSH-based VPN (Virtual Private Network) service to share e-resources with off-campus libraries. The VPN service ensures seamless access to e-resources to the academic community at off-campus departments and Study Centre libraries. Extension of e-resources access to off-campus has increased the usage of electronic resources subscribed by the university. The article presents the first-hand experience of establishing Open Source based VPN service in a university environment.

Introduction

Information resources, especially scholarly literature, are vital for education, research and development activities. The expression of Isaac Newton, "If I have seen further, it is by standing on the shoulders of giants"[1] confirm the significance of scholarly literature in on-going education, research and development activities. Providing seamless access to electronic resources (e-journals, e-books, bibliographic and full-text databases) to off-campus locations and users is an important task of the libraries. Accessing these electronic resources from off-campus locations is generally an issue and more so, where connectivity is poor. Education institutions make use of Virtual Private Network (VPN) service to enable access of the e-resources at off-campus locations.

Universities and colleges in India access e-resources mainly through e-ShodhSindhu consortium coordinated by UGC INFLIBNET. e-ShodhSindhu offers 15000 peer-reviewed journals and a number of bibliographic databases[2]. Universities and colleges receive e-ShodhSindhu services in campuses mainly through IP-based access. IP-based access is a convenient method to make available e-resources in campuses with well-connected Local Area Network.

There are four study centre libraries located in as many colleges, in two districts that are away from the main campus where the Mahatma Gandhi University Library is located. In addition to these four study centre libraries, a few university study departments are also located outside the university campus. Athough the study centres and departments maintain their own network infrastructure and they were not in a position to access e-resources available in the main campus. The university library established the VPN service at off-campus centres to extend the access of e-resources.

Mahatma Gandhi University Library team reviewed available technological solutions suitable for the delivery of e-resources to the off-campus study centre libraries and departments. The team found that the popular e-resources sharing methods such as proprietary VPN solutions and IP-based access followed by other higher education institutions are not feasible in terms of cost and technology adoption. As the Mahatma Gandhi University Library and study centre libraries own good IT infrastructure, in-house manpower and have the experience in managing open source software, it was decided that SSH-based VPN is suited for the sharing of e-resources in terms of cost and convenience in the context of Mahatma Gandhi University Library system.

Mahatma Gandhi University Library

Mahatma Gandhi University is a state university established in 1983 in Kottayam district of Kerala

Original Article

Low power organic field effect transistors with copper phthalocyanine as active layer

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ABSTRACT

Bottom gate, top contact Organic Field Effect Transistors (OFETs) were fabricated using copper phthalocyanine (CuPc) as an active layer. The electrical properties of OFETs fabricated with CuPc annealed at different annealing temperatures and different channel length to width (L/W) ratios were studied. The transfer characteristics of the devices appear to improve with annealing temperature of CuPc and increasing L/W ratios of the devices. Upon annealing, the field effect mobility increased from 0.03 ± 0.004 cm^2/V to 1.3 ± 0.02 cm^2/V. Similarly, the interface state density reduced from $5.14 \pm 0.39 \times 10^{11}$ cm^{-2}eV^{-1} for the device fabricated using as deposited CuPc, to $2.41 \pm 0.05 \times 10^{11}$ cm^{-2}eV^{-1} for the device with CuPc annealed at 80 °C. The on/off current ratio increased from 10^2 for the as-deposited device, to 10^5 for the device with CuPc annealed at 80 °C. The dependence of the subthreshold swing on the L/W ratio was also investigated.
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1. Introduction

The major challenge in the realization of low power organic field effect transistors (OFETs) is the reduction of the manufacturing cost, especially when scaling up to meet industrial demands. Low leakage current, reduction in power consumption, high mobility, light-weight and low-cost are the advantages of organic thin film transistors (OTFTs) [1]. An efficient way to reduce the overall size of the device is the use of thin inorganic dielectric and organic semiconducting layers [2]. Even though a large spectrum of organic semiconductors has been proposed for the fabrication of OFETs, only a few can meet the requirements for electronic device applications in terms of processibility and stability in normal atmosphere [3]. There has been a growing interest in developing new organic channel materials in order to fabricate the electronic devices [4]. OFETs provide two principal advantages over field effect transistors (FETs) based on inorganic semiconductors. Firstly, they can be fabricated at lower temperature and lower cost [5].

Among various organic materials that have been extensively studied for FET applications, phthalocyanines are organic dyes that attained a lot of research interests. These materials have potential applications for various electronic components such as thin film transistors (TFTs), light emitting diodes (LEDs) etc. [6]. In this work, TFTs fabricated with a typical p-type organic semi-conducting material, copper phthalocyanine (CuPc), are used as the channel material for OFET fabrication. CuPc based TFTs have shown better current saturation and high field effect mobility [6]. Due to its good chemical stability and heat resistance [7], CuPc thin films can be fabricated using physical vapour deposition techniques, which is ideal from the perspective of scaling up with good uniformity for large area electronics. In addition, CuPc has good stability in ambient conditions.

CuPc is a stable compound, normally found with a monoclinic crystal structure [8]. The solubility of CuPc in common organic solvents is very less, but due to its thermal stability, uniform films can be fabricated using thermal evaporation technique, which allows industrial level scaling up. Fig. 1 shows the molecular structure of CuPc.

The dielectric material plays a crucial role in device operation since it influences the electric field, current leakage through the gate insulator and the quality of the interface between the organic semiconductor and gate dielectric [5]. Organic dielectric materials show high leakage current with decreasing the film thickness and

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Original Research

Electrospun polylactic acid-chitosan composite: a bio-based alternative for inorganic composites for advanced application

Merin Sara Thomas[1,2,3] · Prasanth K. S. Pillai[4] · Marisa Faria[5,6] · Nereida Cordeiro[5,6] · Hernane Barud[7] · Sabu Thomas[1] · Laly A. Pothen[1,3]

Abstract

Fabricating novel materials for biomedical applications mostly require the use of biodegradable materials. In this work biodegradable materials like polylactic acid (PLA) and chitosan (CHS) were used for designing electrospun mats. This work reports the physical and chemical characterization of the PLA–CHS composite, prepared by the electrospinning technique using a mixed solvent system. The addition of chitosan into PLA, offered decrease in fiber diameter in the composites with uniformity in the distribution of fibers with an optimum at 0.4wt% CHS. The fiber formation and the reduction in fiber diameter were confirmed by the SEM micrograph. The inverse gas chromatography and contact angle measurements supported the increase of hydrophobicity of the composite membrane with increase of filler concentration. The weak interaction between PLA and chitosan was confirmed by Fourier transform infrared spectroscopy and thermal analysis. The stability of the composite was established by zeta potential measurements. Cytotoxicity studies of the membranes were also carried out and found that up to 0.6% CHS the composite material was noncytotoxic. The current findings are very important for the design and development of new materials based on polylactic acid-chitosan composites for environmental and biomedical applications.

Graphical Abstract
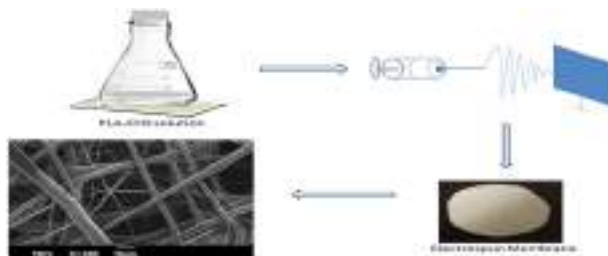
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Spectral behavior of Eu^{3+}; Dy^{3+} co-doped Gd$_2$O$_3$ phosphor and color tunability by variation in excitation wavelength

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Topics

UHF RFID Tag Based on Modified Dihedral Corner for Enhanced Read Range and Broadband Operation.

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Abstract

This paper presents the design and development of a novel UHF RFID tag which exhibits enhanced read range over the entire UHF RFID band of 860-930MHz. This novel UHF RFID tag consists of an antenna based on modified dihedral corner with an embedded double T-match and a Murata LXMS 31ACNA010 chip attached to the terminals of the antenna. Measured read range variations over the azimuth and elevation angular ranges show enhanced read range over wide angular ranges as compared to conventional RFID tags.

1. Introduction

Radio Frequency Identification (RFID) is an automatic identification method based on data storage and backscattering [1]. Various RFID systems use different frequency bands like Low Frequency (LF, 125 - 134 kHz), High Frequency (HF, 13.56MHz), Ultra High Frequency (UHF, 860 - 960MHz) and Microwave (MW, 2.45 & 5.8GHz). The long read range, high read rate and large information storage capacity of the UHF RFID systems have resulted in the widespread use of this systems in supply chain managements and other applications. A passive backscattering UHF RFID system generally consists of two basic components, a reader and a tag, in which the reader and the tag communicate with each other by using electromagnetic waves. The reader uses an antenna to transmit an electromagnetic wave to wake up the passive tag, which is mounted on the object being identified. The tag consisting of an antenna and a chip, responds by backscattering the electromagnetic wave which is modulated by the data stored in the chip. RFID tag antenna must be conjugately matched to the impedance of the chip for enabling maximum power transfer to the chip and thereby resulting maximum read range for the RFID tag. Several researchers published papers on the design of UHF RFID tags and their performance evaluation employing different methods like read range measurement, antenna impedance measurement, radar cross section (RCS) evaluation etc. [2-4]. Many of the basic designs of the UHF RFID tags were based on dipole and folded dipole structures [5-6]. The main challenge in the modern UHF RFID tag design is to develop a miniaturized tag antenna with appreciably good read range

characteristics. Dipole structures with meandered arms are effective in the development of miniaturized RFID tag antennas and are widely employed in various designs [7, 8]. T-matching technique is widely used in the design of RFID tags for achieving the impedance matching between the tag antenna and the chip [9-10]. Manju et al. reported an UHF RFID tag composed of modified multi-fractal cantor arms for enhanced read range. Good impedance batching between the chip and the tag was achieved by optimizing the iterated function system (IFS) coefficients of the multi-fractal cantor geometry and the dimensions of the embedded T-match [11]. Designing of an UHF RFID tag with broadband characteristics over the entire UHF RFID band (860-960MHz) is a requirement for the universal deployment of RFID tags. Recently various techniques for producing miniaturization and broadband characteristics were attempted by many researchers [12-14]. Jibish et al. designed a UHF RFID dipole tag antenna with tapered meandered arms for better broadband characteristics and miniaturization [15]. Split Ring Resonator (SRR) is topic of immense interest in electromagnetics and was investigated by many researchers for various applications in antenna designs. Aju et al. reported a compact UHF RFID tag for broadband operation. The miniaturization and broadband characteristics were achieved by loading square split ring resonator (SRR) symmetrically on both arms of the dipole with short circuited strip between the SRRs [16].

Many researchers have studied the back scattering properties of perfectly conducting as well as loaded dihedral corner reflectors [17-20]. A right angled corner reflector provides a large back scattering over a wide angular range in a plane normal of its wedge [21-24]. The possibility of using dihedral corner in the design of UHF RFID tags with enhanced read range has not been seen in literature. An enhanced read range of the UHF RFID tag is a prime concern in applications like vehicle identification, toll collection, and sensor based RFID etc.

In this paper we propose a novel UHF RFID tag based on modified dihedral corner with embedded double T-match which exhibits enhanced read range and broadband characteristics over wide azimuth and elevation angular ranges.

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What is Beautiful is Good : An Evaluation of Effectiveness of Attractiveness in Celebrity Endorsements

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Abstract

The studies in the field of marketing have shown that characteristics of the source will influence persuasiveness of an advertisement. Attractiveness is one such celebrity characteristic that is widely studied by researchers in the field of marketing. However, still, literature failed to explain how attractiveness of celebrity endorsers influenced purchase intentions. This study tried to fill this gap by modelling the influence of celebrity attractiveness on purchase intention. It also evaluated the effect of respondents' gender on the model. The data collection for the study were carried out during March - June 2017. The study found that the effect of celebrity attractiveness on purchase intention was mediated by celebrity brand fit, attitude towards the advertisement, and attitude towards the brand. The study also evaluated the moderating effect of respondents' gender using chi- square analysis, which found no significant model difference among male and female respondents. These findings indicated that celebrity attractiveness created purchase intention in a mediated manner among the respondents, irrespective of their gender.

Keywords

Celebrity Endorsement, Advertising, Purchase Intention, Attitude Towards Brand

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Development and Modification of Cellulose Acetate/Carboxy Methyl Cellulose Blend Films for Enhanced Adsorption of Methylene Blue

Sreerag Gopi, Preetha Balakrishnan, Anitha Pius,* and Sabu Thomas*

Herein, we report polysaccharide blend film such as cellulose acetate/ carboxymethyl cellulose (CA/CMC) developed using acetic acid and water mixture using solvent casting method. The material prepared here subsequently treated using potassium hydroxide solution in order to remove acetate content from CA/CMC film to make them more active adsorbent. FTIR analysis is carried out to understand the chemical moieties present in CA/CMC films and to confirm the disappearance of acetate group from the blend films. Morphological analysis revealed the surface changing due to the addition of CMC on CA and the deacetylation of CA/CMC. Dye wastewater treatment has been carried out using synthetic methylene blue water solution and found that deacetylated film with higher amount of CMC has more adsorption capacity compared to all other films displayed in this study.

1. Introduction

Among numerous industries, textile industry ranks first in tradition of dyes for coloration of fiber. At present, more than 9000 types of dyes have been introduced in the color index (dye1). Dyes are low biodegradable and due to that the conventional biological treatment procedure is less effective in treating dye wastewater (dye1). Previously, adsorption on activated carbon has been found to be an effective process for dye removal, but it is not cost effective (dye 1). Consequently numerous cost effective materials have been proposed including wood,[1] vermiculite,[2] sawdust,[3] peat,[4] waste coir,[5] and banana pith.[6] There is need of cost effective, efficient, biodegradable, and economical adsorbents have been increased drastically. Cellulose acetate and carboxy methyl cellulose are kind of biodegradable materials and easily available. In this work, we developed blends of cellulose acetate and carboxymethyl cellulose followed by chemical modification, and their ability investigated using adsorption of methylene blue.

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2. Experimental Section

2.1. Materials

Cellulose Acetate (CA, acetyl content of 39.8 wt%, degree of substitution 2.5 with average $M_w \sim 30\,000$ and Carboxymethyl cellulose sodium salt (CMC) with low viscosity were obtained from Sigma–Aldrich, Slovenia. Analytical grades of potassium hydroxide (KOH), methylene blue and glacial acetic acid with a purity of $\geq 99.7\%$ were also purchased from Sigma–Aldrich, Slovenia. The mixture of glacial acetic acid and mill-Q water with a resistivity of $18.2\,\Omega\text{m}$ were used as solvent.

2.2. Preparation of Cellulose Acetate/Carboxymethyl Cellulose Films

Glacial acetic acid and the water in a ratio of 80:20 were used as the solvent mixture for making a homogeneous solution of CA/CMC. A 1.00 and 3.00 g of CMC were added to three different 250 mL beakers and 100 mL of solvent was transferred into it. The mixture was thoroughly mixed followed by added 5 and 7 wt% of CA into it and stirred for 12 h in order to get homogeneous solution. Later the solutions were casted over a Petri dish and left for 24 h to get films of CA/CMC.

2.3. Deacetylation of Cellulose Acetate/Carboxymethyl Cellulose Films

For the deacetylation of CA/CMC films, 6 M potassium hydroxide solution was used. The films were dipped in 6 M KOH solution at 90 °C for 3 h. Later the films were soaked and washed in distilled water thoroughly. It was repeated for several times and dried at room temperature. Based on deacetylation the samples were named as CA (neat cellulose acetate), CMC (neat carboxymethyl cellulose), CA1 (5 wt% CMC), CA2 (7 wt% CMC), DAC1 and DCA2 (deacetylated samples of CA1 and CA2).

2.4. Fourier Transform Infrared Spectroscopy (FTIR)

FTIR analysis was carried for all films using a PerkinElmer Spectrum GX Series-73565 FTIR spectrometer at a scan range of 4000 to 400 cm^{-1}. Prior to analysis, all the samples were dried in

Cellulose Nanofiber vs Nanocrystals From Pineapple Leaf Fiber: A Comparative Studies on Reinforcing Efficiency on Starch Nanocomposites

Preetha Balakrishnan,* Sreerag Gopi, V. G. Geethamma, Nandakumar Kalarikkal, and Sabu Thomas

Cellulose nanofibers (CNFs) and nanocrystals (CNCs) are nanoscale materials obtained from nature by various physical and chemical treatments that has a strong reinforcing ability. CNFs and CNCs have different size, shape, viscosity, and other properties. This study focusses on comparative studies on reinforcing effect of CNFs and CNCs on thermoplastic starch (TPS). The nanocomposites with different weight percentage of reinforcing fillers are fabricated via solvent casting. The transparent TPS/CNF and TPS/CNC films are well characterized using dynamic mechanical analysis to study the effect of filler loading on viscoelastic behavior. All the nanocomposite films has better properties compared to neat TPS. But comparing the properties of CNFs and CNCs on the starch matrix, at some point of time, TPS/CNC composites are more transparent. But due to higher degree of entanglement, strong intermolecular attraction between starch and nanofibers, TPS/CNF composites are better, and the authors modeled the data with DMA and found that the nanofibers have better reinforcing ability and stress transfer character than CNCs. This type of comparative studies helps to find out the proper criteria to reinforce bio-based material like starch for various applications.

1. Introduction

Recently, lots of research has been carried out to the use of biopolymers because of their inherent properties like biodegradability, non-toxicity, low cost, and ease in availability especially in the field of packaging industry.[1,2] But major problem associated with the use of biopolymer for several applications are their low mechanical and water barrier properties. This can be overcome by various methods, like blending,[3,4] crosslinking,[5,6] and nanoreinforcement. Reinforcing thermoplastic starch with naturally derived nanomaterials like nanocellulose,[2,7] nanoclay,[8] nanochitin[9] etc is one of the best practices to improve the properties of biopolymers by conserving its biodegradability. Starch is one of the promising biopolymer that can be used as a matrix for preparation of biocomposite films due to its film forming ability. But starch as such are brittle in nature and can be converted into thermoplastic starch by the addition of plasticizers like glycerol,[10] citric acid,[11] sorbitol etc.

Nanocellulose is one of the most reliable material for improving the properties of starch such as mechanical, water sorption, moisture sorption due to its high aspect ratio, less weight, and biodegradability.[12–15] Cellulose nanomaterial were typically isolated from lignocellulosic plants like sisal,[16] hemp,[17] jute,[18] bamboo,[19] pineapple leaf[20] etc by a series of physical and chemical pre-treatments. Cellulose nanofibers (CNF) prepared using mild acid hydrolysis (oxalic acid) that could retain their fibrous structure. Cellulose nanofiber consists of alternating crystalline and amorphous part. Cellulose nanocrystals were on contrary prepared via strong acid hydrolysis using like sulphuric acid. Hydrolysis using strong acid removes all the amorphous region leaving behind crystalline regions. Furthermore, cellulose is also a polysaccharide like starch which consisting of repeating units of glucose units. Since both starch and cellulose are polysaccharide, compatibility between filler and matrix is not an issue.

One of our previous work,[7] we studied the transport and viscoelastic behavior of thermoplastic starch nanocomposite reinforced with nanofibers from PALF. We could find that increasing nanofiller up to 3 wt.% improves mechanical response of starch nanocomposite with improved reinforcing efficiency and decreased water sorption. Haaj et al.[21] studies the effect of starch nanocrystals on the final performance of starch nanocomposite and found that inclusion of starch nanocrystals to thermoplastic starch improves the property. In this work, we try to compare the reinforcing efficiency and barrier

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Cellulose Nanomaterials in Biomedical, Food, and Nutraceutical Applications: A Review

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Nanotechnology with bionanomaterials have tremendous potential to enhance and utilize for nutrient and bioactive absorption, drug delivery systems, pharmaceutical, and nutraceutical field through various applications. Cellulose nanomaterials are green materials that are obtained from renewable sources and possess exceptional mechanical strength and biocompatibility. The associated unique physical and chemical properties have made various nanocomposite materials an intriguing prospect for different application in the biomedical, food, and nutraceutical industries. In this review, we have discussed and provided a summary of the recent researches in the utilization of cellulosic nanomaterials in applications related to food packaging, bone tissue engineering, wound dressing, drug delivery, and nutraceutical research area and industries.

1. Introduction

Biopolymers demonstrate elevated prospective to be utilized as a preference to plastics and synthetic polymers as they are more eco-friendly and are simple biodegradable and renewable materials. The development of innovative technologies and the growth of biological products decrease confidence on synthetic polymers and plastic materials.[1] Natural world has offered different natural biopolymers particularly polysaccharides such as starch, chitosan, and cellulose; among them cellulose based materials are the most feasible alternative for fabricating green materials in the near future.

Cellulose is one of the most important and plentiful biopolymers in nature, which is a linear syndiotactic homopolymer of β-(1–4)-glycosidic bond linked D-anhydroglucopyranose.

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Cellulose is generally known to be fibrillar and semi-crystalline.[2] Rapid advancement in the field of nanotechnology has opened up prospects for cellulose, the most abundant natural polymer on earth. Cellulose has gained prominence in the form of cellulose nanofibers (CNF) that can be used as advance and novel biomaterial because of its incredible qualities like biodegradability, biocompatibility, renewability, sustainability, chemical stability, and economy.[3–5]

Recently, CNF derived from agricultural byproducts or wastes that are abundant and cost effective have paid attention greatly importance as an option to nanosized reinforcements in composite materials.[6,7] Generally, the CNF are isolated from ligno-cellulosic plants have exact distinctiveness predominantly high modulus and surface area. It shows huge potential for utilizing as reinforcement in biopolymer atmospheres.[8] CNF possesses a high crystalline and they are the perfect fillers for various biomaterials, polymeric materials, metal oxides, etc. due to their alike chemical configurations which offer superior compatibility between them through hydrogen bonding. CNF has gained growing attention recently in the field of pharmacology and medicinal applications because of their great potential to improve the functional properties of drug delivery and antimicrobial action.[9]

Recently, CNF have been utilized as a strengthening phase in various nanocomposites. Cellulose nanomaterials represent the innovative generation of hybrid nanostructured materials in the cutting edge between nanotechnology, material science, and life science. Attempts have been committed to the development of cellulose nanomaterials through improved thermal, mechanical, and functional properties due to the environment of nanofillers/nanocross linkers.[1]

The focus of this review is to discuss the recent developments on the utilization of cellulose nanomaterials in the field of food packaging materials, bone tissue engineering materials, wound dressing materials, drug delivery systems, and nutraceutical applications and the outline of this review is also schematically represents in **Figure 1**. The review will provide the readers with the recent trends and an in-depth understanding of the role of cellulose nanomaterials matrix for the immobilization of bioactive agents, use in the development of food packaging solutions, tissue engineering, and drug delivery systems.

Biopolymers and Their Composites for Drug Delivery: A Brief Review

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In recent years, excipient development has become a core area of research in pharmaceutical drug delivery because it influences the formulation development and drug delivery process in various ways. Polymeric drug delivery systems have been of great interest for controlled delivery as they show the great advantage in drug delivery systems because of optimized drug loading and releasing property. Then, the side effects of synthetic polymers far exceed that it leads to some difficulties like they impose dose reduction, treatment delay, or the given therapy is not continuous. With this in mind and together with the need for a protective delivery system for drugs, natural polymeric substances such as biopolymers and their composites are the choice of research as excipient because of their low toxicity, biodegradability, stability, and renewable nature. Furthermore, they have a wide variety of structures, different physiological functions and may provide a variety of biomedical applications, owing to their distinctive properties. The present brief review explores the concept of excipient delivery and the recent advances in both the biopolymers and the methods in the pharmaceutical drug delivery systems.

1. Introduction

Drug delivery system (DDS) refers to a biological system which can be defined as a formulation or a device that enables the transport of a therapeutic agent in the body through controlling rate, time, place, and release of the drugs to the target site in the body.[1] Thus, being an interface between the patient and the

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drug, refinements in drug delivery will facilitate the development of personalized medicine, which includes pharmacogenomics, pharmacometrics, and pharmaco-proteomics. Consequently, a suitable pharmaceutical formulation with various components in addition to the active pharmaceutical ingredients contributes to an improved delivery process.[1,2]

A drug therapy of any disease involves the regimen of attaining desired therapeutic concentration of drug in plasma. This is achieved in conventional drug therapy through "particular drug dose at particular interval," which solely depends upon the half-life period of the drug and its therapeutic index. Generally, the inevitable fluctuation can be observed due to poor patient compliance or missing the dose of a drug, or in the case of under medication or over medication. Then, to achieve an effective therapeutic drug concentration, a definite drug release kinetics must follow, to maintain dose, thus enabling the controlled release system of drugs within the therapeutic window.[3] Further, bioavailability of drugs greatly depends on its route of administration. Different routes of administration namely, enteral (oral, nasal, ocular, transmucosal) or parenteral (intravenous, intramuscular, and subcutaneous), could affect the bioavailability of drugs by changing the number of biologic barriers a drug must cross or by changing the exposure of drug to pumping and metabolic mechanisms.[4,5] To overcome these limitations effective and safe use of existing drug through concepts and techniques of sustained/controlled and targeted drug delivery systems are to be developed. Also, to triumph over the downsides of conventional drug delivery systems where the use of drugs is in the form of capsules, tablets which are formed by compression, coating, and encapsulation of bioactive drug molecules, several technical advancements have led to the development of the improved drug delivery system that could revolutionize methods of medication. In such advancements, biopolymers play a versatile role, where they serve as binding agents in capsules, film coating agents in tablets and viscosity enhancers in emulsions and suspensions with additional therapeutic benefits like multiple dosing and single doses of sustained and controlled delivery formulations.

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Properties of biocomposites based on poly (hydroxybutyrate-co-valerate)

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Topics

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Computational Design and Fabrication of Enantioselective Recognition Sorbents for L-phenylalanine Benzyl Ester on Multiwalled Carbon Nanotubes Using Molecular Imprinting Technology

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Abstract

Computational strategies have been employed to investigate the influence of the nature of monomers and cross-linker in order to design three dimensional imprinted polymers with selective recognition sites for L-phenylalanine benzyl ester (L-PABE) molecule. Here, computational chemistry methods were applied to screen the molar quantity of functional monomers that interact with one mole of the template molecule. Effects of the nature of functional monomer, cross-linker, and molar ratio were determined computationally using density functional calculations with B3LYP functional and generic 6−31G basis set. Methacrylic acid (MAA) and ethylene glycol dimethacrylate (EGDMA) were used as the functional monomer and crosslinking agent, respectively. L-PABE imprinted polymer layered on multiwalled carbon nanotube (MWCNT) and conventional bulk MIP were synthesised and characterized as well. To investigate the influence of pre-organization of binding sites on the selectivity of L-PABE, respective non-imprinted polymers were also synthesised. MWCNT-MIPs and MIPs exhibited the highest adsorption capacity towards L-PABE. The synthesized polymers revealed characteristic adsorption features and selectivity towards L-PABE in comparison with those of its enantiomer analogues.

Keywords

Acute oral toxicity and anti-inflammatory evaluation of methanolic extract of *Rotula aquatica* roots in Wistar rats

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ABSTRACT

Background: The plant *Rotula aquatica* Lour. was traditionally well known due to its large number of pharmacological action and medicinal uses. The plant is a necessary component of many Ayurvedic drug preparations since historical times. It is widely used as a crucial ancient drug for kidney and bladder stones.
Objectives: The main objective of the study was to evaluate the acute toxicity and anti inflammatory efficacy of methanolic extract of *R. aquatica* Lour. in *in vivo* models.
Materials and methods: The qualitative phytochemical analysis and invitro antioxidant activity of the roots of methanolic extract of *R. aquatica* Lour. (MERA) was evaluated. The acute toxicity effect of MERA was evaluated with two different doses (550, 2000 mg/kg body weight), were administrated orally to Wistar rats. The rats were observed for sign and symptoms of toxicity and mortality for 14 days. The parameters measured including relative organ weight, blood, biochemical and histopathological parameters of hepatic and renal toxicity. The anti-inflammatory effect of MERA was also evaluated in carrageenan and dextran-induced paw edema models.
Results: The phytochemical evaluation of MERA shows the presence of secondary metabolites like alkaloids, flavonoids, phenolics and tannins, phytosterols, reducing sugars, proteins and terpenoids. The results of in-vitro antioxidant evaluation of MERA reveal its capability to scavenging free radical at a lower concentration. The MERA did not show any visible signs of toxicity up to the dose of 2000 mg/kg body weight. The results obtained from our carrageenan and dextran-induced paw edema model study also proved the anti-inflammatory effect of MERA in rat model.
Conclusion: The result shows the potential of MERA as an anti-inflammatory drug to reduce the signs of inflammation devoid of any toxic effect.
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1. Introduction

Around the world numerous native communities possess knowledge, innovations and peculiar practices developed from expertise gained over centuries and tailored to the native culture and environment, such knowledge is categorized as traditional knowledge. The biodiversity rich areas are also an abode of various ethnic groups possessing a valuable reservoir of indigenous knowledge system (IKS) acquired and developed over a long period of time [1]. Within the indigenous system of medicine that

prevalent in India, *R. aquatica* Lour. is a controversial drug and is a widely distributed shrub commonly found in the sandy soils and rocky beds of streams and rivers throughout India. The plant has been reported to be used for diabetes, treatment of piles, vineral disease, cancer and also exhibited anthelmintic activity [2], cardiotonic activity, antimitotic activity [2], antiurolithiatic activity etc. Despite the increasing number of reports on the medicinal benefits of the *R. aquatica* Lour., the *in-vivo* toxicological effect of the MERA has not reported so far. It is therefore deemed necessary to evaluate the acute toxicity of the MERA in a rat model. The toxicity study would serve as a very important baseline for further studies in developing this plant as a herbal medicine.

Inflammation is a major process involved in the pathophysiology of several diseases like arthritis and cardiovascular disease [3]. The anti-inflammatory drugs exert its anti-inflammatory

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actions by inhibiting cyclooxygenase (COX) which exists as two isoforms: cyclooxygenase-1 (COX-1)and cyclooxygenase-2 COX-2 [4]. The COX-1 is constitutively expressed in most cells under physiological conditions and helps in maintaining gastrointestinal tract mucosal integrity, renal protection and normal homeostasis of the body [5]. COX-2, the form induced by pro-inflammatory agents such as tumor necrosis factor-alpha (TNF-α), lipopolysaccharide (LPS) and tumor-promoting factors are associated with inflammation [6]. Current treatment strategies are mainly associated with the usage of nonsteroidal anti-inflammatory drugs (NSAIDs) which are the known inhibitors of COX isoforms [7]. The usage of such kind of drugs causes serious side effects to human kind. For years, research has been focused on developing COX-2 inhibitors but recent investigation points out that COX-2 specific inhibitors are associated with adverse renal effects like sodium, potassium and water retention as well as decreases in renal function. The inhibition of COX-2 was associated with increase in production of leukotrienes (LT) by 5-lipoxygenase (5-LOX). The 5-LOX inhibitors possess protective effect but they lack inhibitor specificity, bioavailability and also leads to serious abnormalities [8]. Such complex side effects have limited COX and 5-LOX inhibitors for the long-term treatment of inflammatory disorders. Now a day, research has been focused on finding anti-inflammatory agents with selective pharmacology and less toxicity. From the above context, the study was designed to evaluate the anti-inflammatory effect of MERA in *in vivo* model.

2. Materials and methods

2.1. Chemicals

All the chemicals used were high-quality analytical grade reagents. Indomethacin (Merck, Bangalore, India) and Carrageenan (Sigma Chemicals, St. Louis, MO, USA) were procured from the respective companies and were used in the study.

2.2. Plant materials

R. aquatica Lour. roots were collected during March–April, 2016 from Meenachil river (Kalathukadavu area, 9.7°N, 76.78°E) in Kottayam district, Kerala, India. The plant material was authenticated by taxonomist Dr. Jomy Augustine, St. Thomas College, Palai, a voucher specimen (SBSBRL.22) is maintained in the institute.

2.3. Preparation of MERA

Plant root powder (40 g) was extracted with 400 mL of 99% methanol using a Soxhlet apparatus. The solvent was evaporated under reduced pressure at 50 °C using a rotary evaporator to produce a yield of 4.28% of dry extract. The dried MERA was used for further analysis.

2.4. Phytochemical analysis

The qualitative phytochemical analysis of MERA was carried out by the following methods proposed by Evans et al. [9]. The total phenolic content was determined by spectrometry using Folin–Ciocalteu reagent assay [10]. Total flavonoid content was determined by a colorimetric assay using a method described by Zhishen et al. [11].

2.5. In-vitro antioxidant assay

DPPH assay, ABTS assay and Superoxide scavenging assay were carried out for the determination of antioxidant activity of MERA.

DPPH free radical scavenging activity of MERA was determined by the method described by Sanchez-Moreno et al. [12]. For ABTS assay, the procedure followed the method of Arnao et al. [13]. Superoxide scavenging assay of MERA was done by Gulcin et al. [14].

2.6. Toxicity studies of MERA

The oral acute toxicity study of MERA was evaluated according to Organization for Economic Cooperation and Development (OECD) guideline 423 [15]. LD_{50} was determined by using Acute Oral Toxicity Statistical Program (Version: 1.0).

2.6.1. Animals
Adult female Wistar rats (weighing 150 ± 10 g) were purchased from small animal breeding station (SABS), Kerala Veterinary and Animal Sciences University, Mannuthy, Thrissur, Kerala used for this study. They were kept in a controlled environment for temperature (24–26 °C), humidity (55–60%) and photoperiod (12:12 h light–dark cycle). A commercial laboratory balanced diet (Amrut Laboratory Animal Feeds, Maharashtra, India) and tap water were provided ad libitum. The animals received humane care, in compliance with the host institutional animal ethics guidelines. Experiments were conducted as per the guidelines of Institutional Animal Ethical Committee, School of Biosciences, Mahatma Gandhi University (Reg. No. MGUSBS/IAEC/2016-B11042016/5) according to Government of India accepted principles for laboratory animals' use and care.

2.6.2. Experimental design for acute toxicity studies
Animals were categorized into three different groups with 6 rats in each group. The group-I was treated as the control group (received distilled water only). Group II (MERA was administered orally at 550 mg/kg body weight) and group III (MERA was administered orally at 2000 mg/kg body weight) served as test groups. All the rats were fasted prior to oral gavage with MERA for 1–2 h. Individual body weights of animals were taken before dosing. Food or water was withheld for 2 h after drug treatment. The animals were closely monitored for initial 4 h after the administration of MERA and then daily for 14 days to record any signs of toxicity such as tremors, convulsions, salivation, hyperactivity, diarrhea, lethargy, sleep, coma and mortality [16,17]. At the end of the study, all the animals were sacrificed to analyze the effect of MERA on different organs of the rat.

2.6.3. Measurement of relative organ weight
After the experiment, organs like kidney, liver and heart were taken and organ weight (absolute organ weight in g) was recorded. The relative organ weight (ROW) of kidney, liver and heart were calculated as per the method described by Pichika et al. [18].

2.6.4. Estimation of hepatic and renal toxicity markers
Alkaline phosphatase (ALP), Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), blood urea nitrogen (BUN), Creatinine activity in serum and protein concentration were assayed using commercial kits obtained from Span Diagnostics Limited, India, and the absorbance was read in a UV–Vis spectrophotometer (U-5100, Hitachi High Technologies, America, Inc.).

2.6.5. Histopathological study
Small blocks of tissues were taken from the organs (kidney, liver and heart) harvested from the rats and processed using an automated tissue processor. After processing, the tissues were sectioned to a thickness of 5 μM using a rotary microtome and dried overnight in an oven at 37 °C. The sections were stained with hematoxylin and eosin (H&E) and examined microscopically for signs of toxicity.

2.7. Anti-inflammatory studies

2.7.1. Carrageenan-induced paw edema

Adult female Wistar rats (weighing 150 ± 10 g) were used for the study. An edema was induced on rat's right hind paw by subplantar injection of 0.1 ml of 1% carrageenan in 0.9% saline. The experimental groups consisted of 30 rats divided into five groups — Group I: control (received saline only), Group II: carrageenan alone, Group III: carrageenan + indomethacin (3 mg/kg orally), Group IV: carrageenan + MERA-100 (100 mg/kg orally), Group V: carrageenan + MERA-200 (200 mg/kg orally). The MERA and reference drug were given 1 h before the injection of carrageenan. The volume of the right paw was measured using a paw edema meter (Marsap Pvt. Ltd., USA) before injection and 1st, 2nd, 3rd, 4th and 5th h after induction of inflammation. The results were obtained by measuring the volume difference before and after injection of the right paw. The swelling degree of paw and inhibition rate of edema was calculated as follows: % edema inhibition $= (Vc - Vt) \times 100/Vc$; Vc and Vt are average edema volume of control and test, respectively [19].

2.7.2. Dextran-induced paw edema

The animals (Adult female Wistar rats) were treated in a manner similar to that of carrageenan-induced paw edema protocol, differing only in the administration of the inflammatory stimulus, which was induced by subplantar injection of 0.1 mL of 1.5% w/v dextran. The edema was measured as mentioned earlier [19] at hourly intervals for 5 h [20].

2.7.3. Histopathological analysis of paw tissue

The entire paw tissue sections (5 μm) fixed by immersion at room temperature in 10% formalin solution. For histopathological examinations, paraffin-embedded paw tissue sections were stained with hematoxylin–eosin (H&E) followed by examination and photographed under a light microscope for observation of structural abnormality. The severity of paw tissue inflammation was judged by two independent observers blinded to the experimental protocol.

2.8. Statistical analysis

The results were expressed as mean $\pm$ SD where each value represents a minimum of 6 rats (n = 6). The data for relative organ weights, hematology and serum biochemistry were tested for one-way analysis of variance (ANOVA) followed by Dunnett's multiple comparison tests in which the results were compared with that of control rats. The results were considered statistically significant at $p \leq 0.05$ level. GraphPad Prism© version 5.03 for Windows (GraphPad Software, USA) was used for all statistical analysis.

3. Results

3.1. Phytochemical analysis of MERA

Qualitative detection test for important phytochemicals present in MERA revealed the presence of secondary metabolites like alkaloids, flavonoids, phenolics and tannins, phytosterols, reducing sugars, proteins and terpenoids. The qualitative phytochemical screening proved the presence of phenolic compounds as major principle components. Total phenolic content was found to be 51.27 ± 0.68 mg of gallic acid/g Dry weight of the sample. Total flavonoid content was found to be 16.59 ± 0.1 and expressed in mg of quercetin/g Dry weight of the sample.

3.2. In-vitro antioxidant effect of MERA

In-vitro antioxidant effect of MERA was examined using three different assays. The IC$_{50}$ value of DPPH radical scavenging activity of MERA was 14.71 ± 0.03 μg/mL. The IC$_{50}$ value of ABTS$^{\bullet+}$ scavenging and superoxide scavenging activity of MERA were 12.82 ± 0.08; 36.02 ± 0.05 μg/mL respectively.

3.3. Acute toxicity study of MERA

Oral administration of MERA at a dose of 2000 mg/kg body weight did not produce any mortality or adverse effects during the 14 days' period of study and also observed no abnormal clinical signs. The body weight and food consumption were also remaining unchanged, when compared to the untreated control group of animals.

3.3.1. Measurement of relative organ weight

There was no significant change ($p > 0.05$) in the weight of liver, kidney and heart of the treated and non-treated rats (Table 1). The relative organ weight of the rats of treatment, as well as control groups, also remained insignificant.

3.3.2. Estimation of hepatic and renal toxicity markers

The results of liver function markers (AST, ALT, ALP) used in the acute toxicity study (Table 1) showed no significant change ($p > 0.05$) between the control and MERA administered rats. Table 2 represents the results of renal function tests used to assess the kidney function status during the acute toxicity study. The MERA treated rats even in the highest concentration showed no significant change in the levels of renal toxicity markers like BUN, creatinine and total protein when compared with the control rats. The WBC count also showed no significant change ($p > 0.05$) between the control and MERA administered rats (Table 2).

3.3.3. Histopathological study

Histopathological analysis of the vital organs such as liver, heart and kidney of the MERA treated animals showed no altered histology and signs of toxicity. The liver showed normal architecture with a clear lumen of central vein and without any lesion or necrosis. Heart tissue of MERA treated rat showed no signs of toxicity. There was no renal injury evident in the histopathological evaluation of MERA treated rats. The renal tissues were free from any degeneration of Bowman's space, glomeruli, proximal and distal tubules (Fig. 3).

3.4. Anti-inflammatory studies

3.4.1. Carrageenan-induced paw edema

The treatment with MERA-100, MERA-200, as well as indomethacin (3 mg/kg) inhibited significantly ($p < 0.05$) the carrageenan-induced rat paw edema formation, which was measured at the third hour of the experiment (peak of edema formation) by 63.4%, 72.5% and 62.2% respectively (Fig. 1).

3.4.2. Dextran-induced paw edema

There was a significant reduction ($p < 0.05$) in dextran-induced rat paw edema in all groups, at 1st, 2nd and 3rd hours of the experiment. The treatment with MERA-100, MERA-200, as well as indomethacin (3 mg/kg) inhibited significantly ($p < 0.05$) the dextran-induced rat paw edema formation, which was measured at the third hour of the experiment (peak of edema formation) by 58.4%, 69.5% and 62.2% respectively (Fig. 2).

Table 1
Effect of MERA (Dose in mg/kg body weight) on biochemical parameters in acute oral toxicity study. Values are expressed as mean ± standard deviation (n = 6 for each group).

	Relative organ weights			Biochemical parameters		
	Liver	Kidney	Heart	AST (U/L)	ALP (U/L)	ALT (U/L)
Control	3.76 ± 0.03	0.93 ± 0.12	0.63 ± 0.03	135.01 ± 0.51	141.7 ± 0.82	44.27 ± 0.39
MERA-550	3.65 ± 0.02	0.93 ± 0.06	0.61 ± 0.05	134.23 ± 0.84	141.1 ± 0.58	44.33 ± 0.85
MERA-2000	3.71 ± 0.03	0.94 ± 0.03	0.60 ± 0.02	133.9 ± 0.86	140.8 ± 0.63	45.04 ± 0.52

Table 2
Effect of MERA (Dose in mg/kg body weight) on renal parameters in acute oral toxicity study. Values are expressed as mean ± standard deviation (n = 6 for each group).

Experimental groups	BUN (mg/dl)	Creatinine (mg/dl)	WBC (Cells × 10^3/ml)	Total protein (g/dL)
Control	20.6 ± 0.89	0.73 ± 0.02	5.11 ± 0.08	7.56 ± 0.06
MERA-550	20.91 ± 0.7	0.75 ± 0.01	5.13 ± 0.02	7.6 ± 0.01
MERA-2000	21.05 ± 0.8	0.74 ± 0.01	5.16 ± 0.08	7.65 ± 0.12
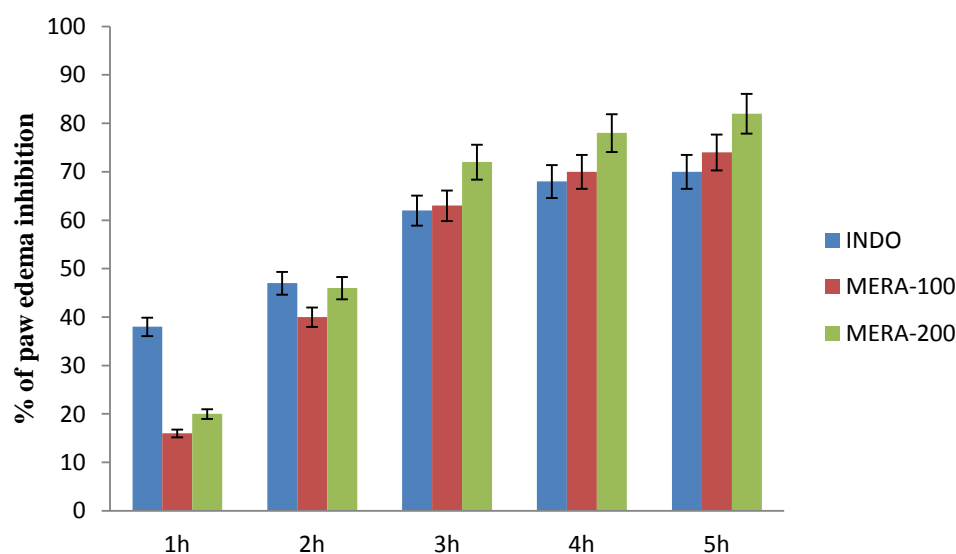
Fig. 1. **Effect of MERA on carrageenan-induced hind paw edema in rats.** All data are expressed as mean ± S.D. (n = 6).
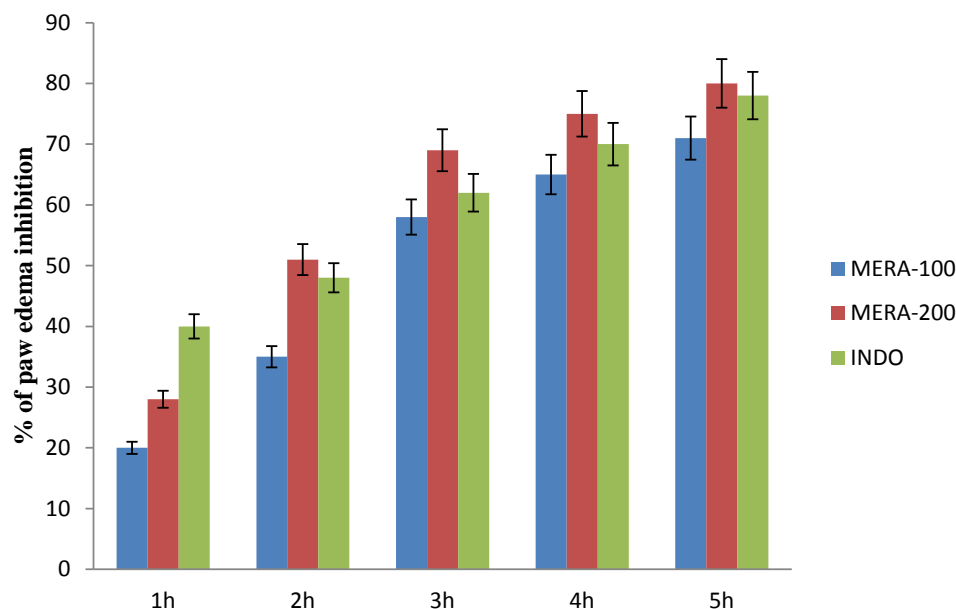
Fig. 2. **Effect of MERA on dextran-induced hind paw edema in rats.** All data are expressed as Mean ± SD. (n = 6).
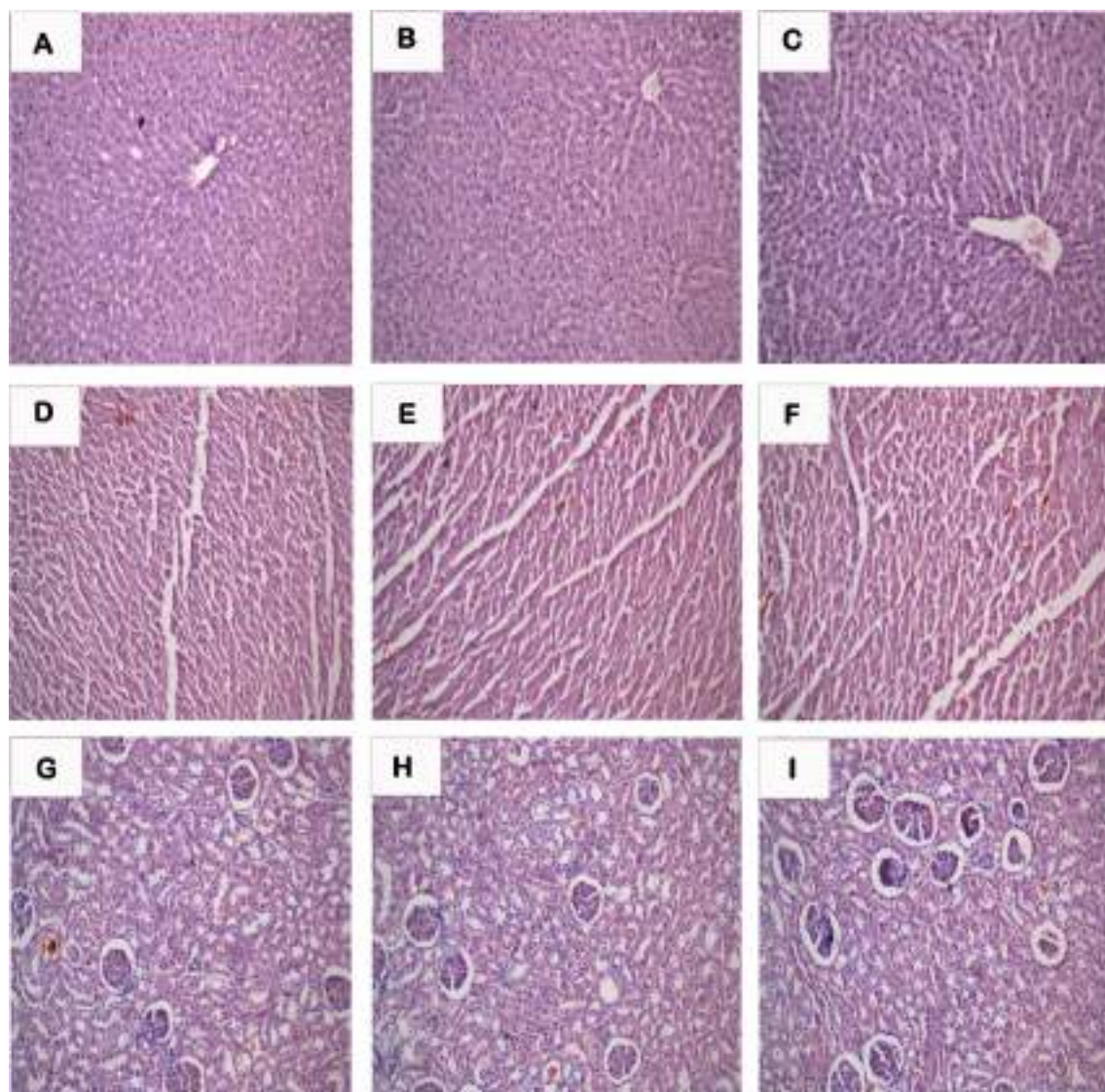
Fig. 3. Histopathology of liver (A,B,C), heart (D,E,F) and kidney (G,H,I) of control and MERA treated rats in the acute toxicity study for 14 days. A, D, G: Control rat; B, E, H: MERA-550 mg/kg b.wt; C, F, I: MERA-2000 mg/kg b.wt.

3.4.3. Histopathological analysis of paw tissue

The histopathological analysis of paw tissue of both carrageenan (Fig. 4) and dextran (Fig. 5) treated group shows massive inflammation and edema formation compared to control rats. Inflammatory cell infiltration, proliferated epithelium, proliferated collagen, epidermal edema was markedly suppressed by MERA-100, MERA-200 and indomethacin administrated group as compared to dextran and carrageenan-treated group.

4. Discussion

Natural therapeutic drugs have become universally popular in primary aid, particularly in developing countries. According to the World Health Organization, 80% of the remote area population rely on traditional medicine and the history of medicinal plants used by the human as a medicine is about 60,000 years old [21]. Bioactive products from medicinal plants are likely to be safe without any compromising health effect, and thus widely used as self-medication [22]. However, the safety and toxicity assessment of herbal medicines is rarely done before their human consumption as they are considered to be inherently safe [23]. The clinical use of herbal drugs without adequate scientific evidence has raised concerns regarding their toxicity status [24]. Thus, toxicity evaluation of herbal medicines is being carried out in various experimental animal models to evaluate their safety for future human use [25,26]. Therefore the current study is designed to evaluate the safety assessment of MERA in an experimental rat model. The study also aims to evaluate the anti-inflammatory effect of MERA in *in-vivo* model.

R. aquatica belongs to the family Boraginaceae is represented by about 100 genera and 2000 species. The plant is scattered throughout Peninsular and Western Ghats of India in the sandy and rocky beds of streams and rivers often were occasionally submerged in floods. It is also distributed in Sri Lanka, China, tropical southeastern Asia, Africa, Brazil and Latin America. The plant is a necessary component of many Ayurvedic drug preparations since historical times. It is widely used as an crucial ancient drug for kidney and bladder stones.
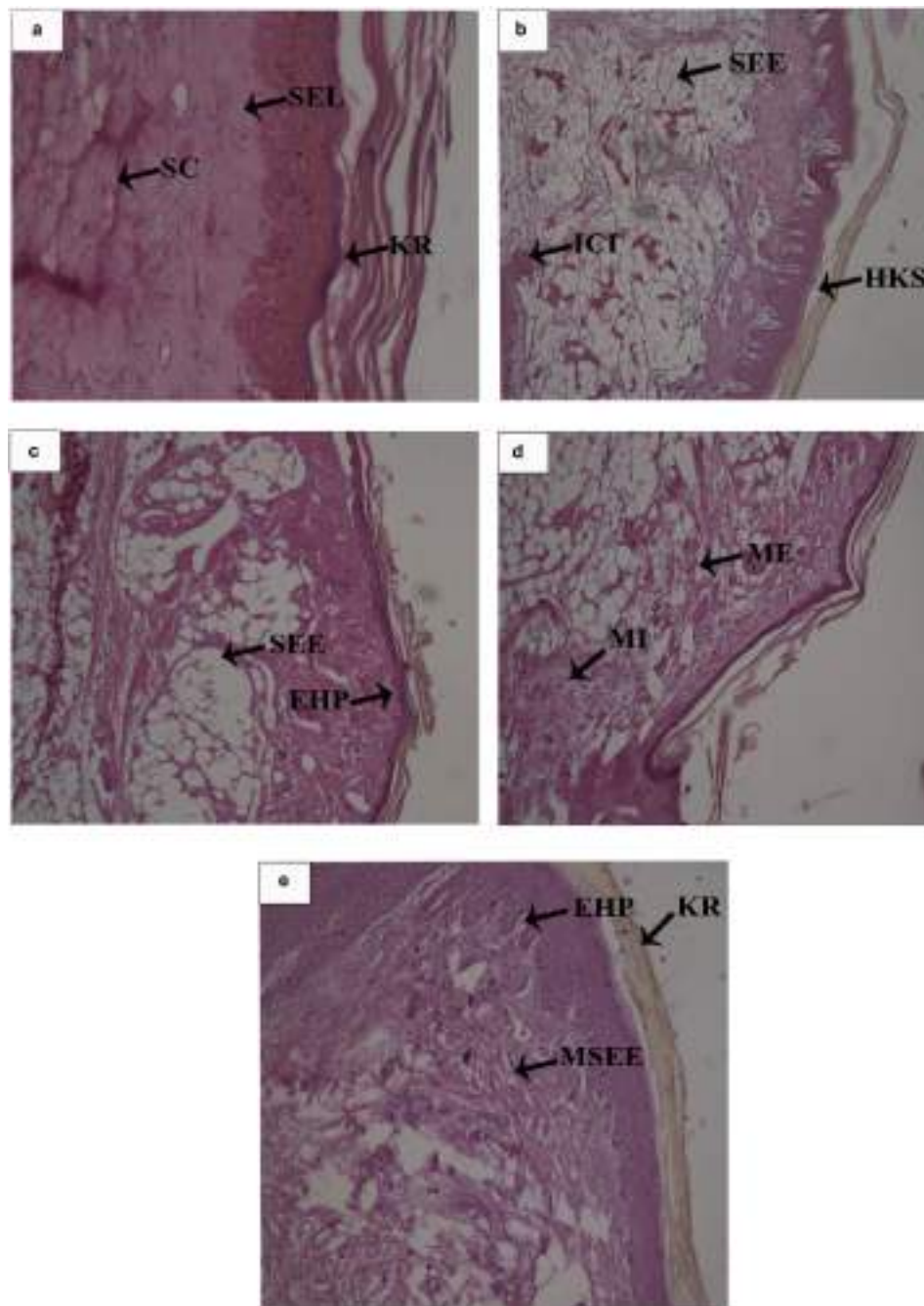
Fig. 4. Histology of rat paw tissue (H&E stain 40×) in carrageenan-induced paw edema. Values expressed as average of 3 samples ± SEM in each group. a: Control; b: Carrageenan; c: Indomethacin; d: MERA-100 mg/kg b.wt; e:MERA-200 mg/kg b.wt. a) Cross section of normal paw tissue shows keratin (KR), Sub epidermal layer (SEL), Sub cutaneous layer (SC). b) Cross section of carrageenan induced rat paw tissue shows Massive influx of inflammatory cell infiltration (ICI), Hyper keratotic skin (HKS), Sub epidermal edema (SEE). c) Cross section of tissue of carrageenan + diclofenac sodium shows sub epidermal edema (SEE), Mild epithelial hyper plasia (EHP). d) Cross section of the paw tissue of carrageenan + MERA (100 mg/kg b.wt) shows Mild edema (ME) and Mild inflammation (MI). e) Cross section of paw tissue of carrageenan + MERA (200 mg/kg b.wt) shows keratin (KR), Mild epithelial hyper plasia (EHP), Mild Sub epidermal edema (MSEE).

Phenols and flavonoids are the major natural bioactive secondary metabolites in plants. These compounds are widely used all over the world to treat various diseases due to its biological properties like antioxidant, anti-carcinogen, anti-aging, protection from cardiovascular, immune/autoimmune diseases and brain dysfunctions viz. Parkinson's, Alzheimer's, Huntington's diseases, etc [27,28]. The phytochemical evaluation of MERA shows the presence of secondary metabolites like alkaloids, flavonoids, phenolics and tannins, phytosterols, reducing sugars, proteins and

terpenoids. The results of *in-vitro* antioxidant evaluation of MERA reveal its capability to scavenging free radical at a lower concentration.

In the acute toxicity study, a maximum dose of 2000 mg/kg b.wt. of the MERA caused neither signs of toxicity nor mortality during the 14 days of the experiment. Throughout the 14 day periods, all animals were found to be healthy with no changes in their skin and fur, eyes and mucous membranes, and behavioral patterns. Therefore, it is safe to propose that its oral LD_{50} value should be greater
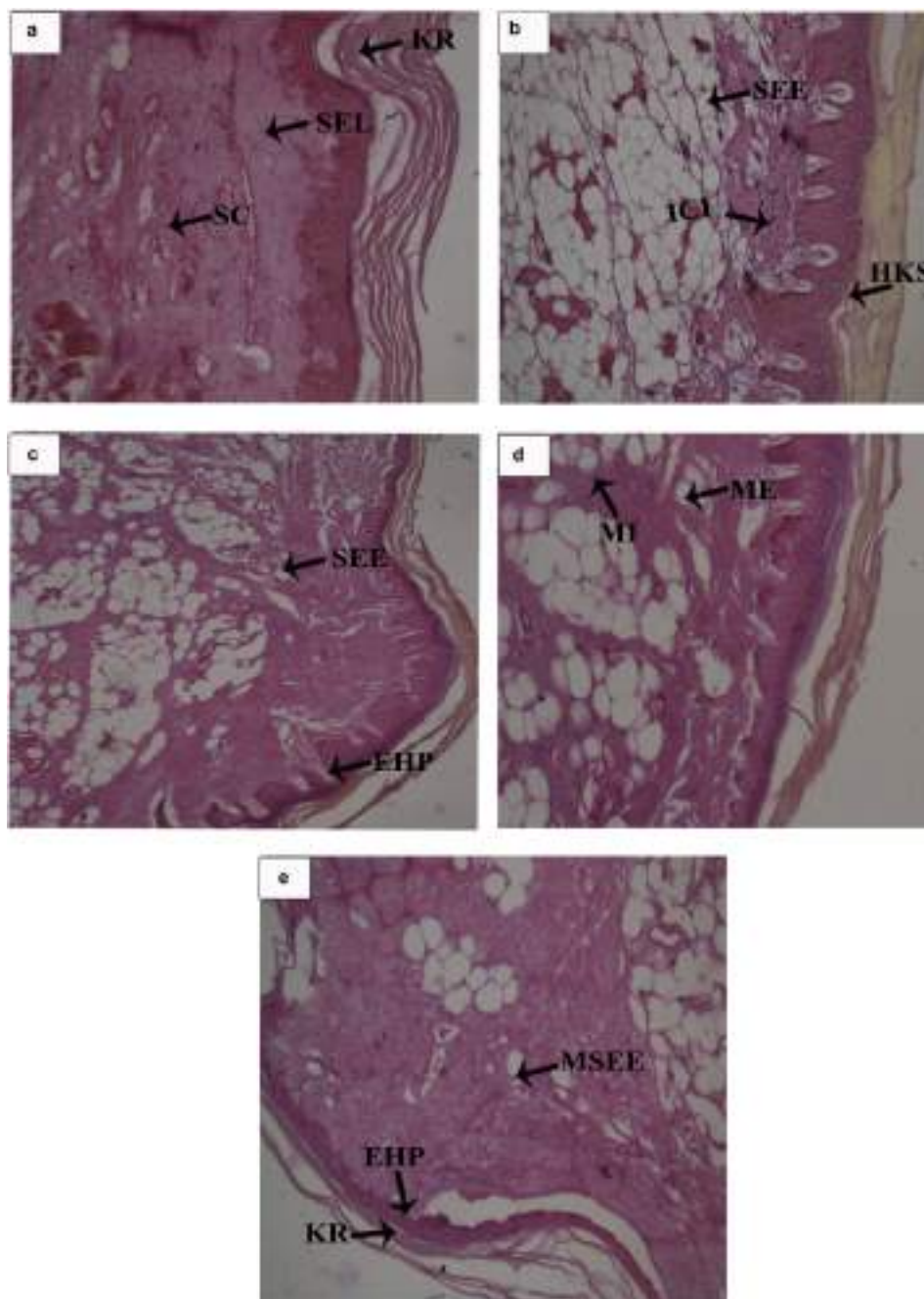
Fig. 5. Histology of rat paw tissue (H&E stain 40×) in dextran-induced paw edema. Values expressed as average of 3 samples ± SEM in each group. a: Control; b: Dextran; c: Indomethacin; d: MERA-100 mg/kg b.wt; e:MERA-200 mg/kg b.wt. a) Cross section of normal paw tissue shows keratin (KR), Sub epidermal layer (SEL), Sub cutaneous layer (SC). b) Cross section of dextran induced rat paw tissue shows Massive influx of inflammatory cell infiltration (ICI), Hyper keratotic skin (HKS), Sub epidermal edema (SEE). c) Cross section of tissue of dextran + diclofenac sodium shows sub epidermal edema (SEE), Mild epithelial hyper plasia (EHP). d) Cross section of the paw tissue of dextran + MERA (100 mg/kg b.wt) shows Mild edema (ME) and Mild inflammation (MI). e) Cross section of paw tissue of dextran + MERA (200 mg/kg b.wt) shows keratin (KR), Mild epithelial hyper plasia (EHP), Mild Sub epidermal edema (MSEE).

than 2000 mg/kg of body weight. The studies are performed according to OECD guidelines 423 [15].

Decreases or increases in the body weights are associated with toxic effects of chemicals and drugs. However, scientific evidence confirmed that increases or decreases in the body weights are accompanied by accumulation of fats and physiological adaptation responses to the plant extracts. The toxic effect of plant materials may leads to a decrease in appetite and lower the caloric intake by animal [29]. The relative weight of the vital organs like liver, kidney and heart were found normal indicating no toxic effect in both control and treated group and was statistically non-significant differences (P > 0.05). All hematological parameters of MERA-extract supplemented rat were within the reference range and were comparable to that of control rat.

Some phytochemicals found in meditative plants is known to cause hepatotoxicity. This was evidenced by the presence of elevated levels of liver injury marker enzymes in the blood. In this light, plasma markers of hepatic damage such as AST, ALT and ALP

were assayed to investigate the possible hepatotoxicity of MERA extract. There was no significant alteration could be recorded for AST, ALT, or ALP, suggesting no inflammatory or necrotic damage of liver due to MERA extract. Histopathological observation of sections of the liver of MERA-treated rat attests to the fact that, there is no hepatic damage as marked by the normal looking integrity of hepatocytes.

The kidney is a sensitive organ whose function is known to be suffered from a number of factors such as drugs including phytochemicals of plant origin that ultimately lead to renal failure [30]. Assessment of possible renal damage due to MERA extract was made by assaying blood urea nitrogen (BUN), total protein and creatinine levels. Results show no significant alteration in the creatinine and BUN level due to MERA treatment. Histological observation has showed no major toxic manifestation in the cortical or medullary areas of the kidney. The histological architecture of glomeruli and tubules in control and MERA extract treated rat being comparable, the nontoxic nature of MERA extract stands validated.

Several experimental protocols of inflammation and pain are used for evaluating the potency of drugs. In the present study, the evaluation of anti-inflammatory effect was undertaken using an animal model to fully investigate the potential of MERA to be used in the treatment of inflammatory disorders.

The carrageenan-induced inflammatory processes are biphasic [31]. The initial phase (first hour) is attributed to the release of histamine and serotonin [32] and the second accelerating phase of swelling is due to the release of prostaglandin, bradykinin and lysozyme. The second phase of edema formation was sensitive to both steroidal and non-steroidal agents [33]. In the current study, edema inhibition by MERA was more prominent at the second phase and it could be due to the inhibition of prostaglandin production by MERA via exerts an anti-inflammatory effect. Another mechanism of action by MERA could be due to suppression of the release of histamine, serotonin and bradykinin which are prominent mediators involved in the primary and secondary phase of carrageenan-induced edema formation [34]. Histopathological analysis of paw tissue of rat shows the inhibition of inflammation and edema formation in MERA treated group as compared to the carrageenan-treated group. The paw tissue of the normal rats showed no signs of inflammation (Fig. 4a) with normal keratin, Sub epidermal layer, Sub cutaneous layer. In the rats treated with carrageenan shows massive influx of inflammatory cell infiltration, Proliferated collagen, Hyper keratotic skin, Sub epidermal edema (Fig. 4b). Treatment with MERA showed marked improvement in the inflammatory signs. Keratinization was decreased and dermis and hypodermis appeared to be normal. Mild sub epidermal edema, mild epithelial hyper plasia and mild inflammation were also observed in MERA treated group (Fig. 4d—e).

Dextran is a polysaccharide of high molecular weight that induces anaphylactic reaction. It was characterized by extravasation and edema formation, as consequence of liberation of histamine and serotonin from mast cells [35]. There was a significant reduction ($p < 0.05$) in dextran-induced rat paw edema in all groups, at 1st, 2nd and 3rd hours of the experiment at a concentration of 200 mg/kg.b.wt. Histopathology of paw tissue also reveals the reduction of inflammation and edema formation in MERA treated group as compared to the dextran treated group.

The histopathological findings also substantiate with the paw edema analyses. Histopathological studies indicated that inflammatory cell infiltration, edema formation and hyperkeratinisation were markedly suppressed in the rats treated with the MERA. This evidence shows the efficacy of MERA as an anti-inflammatory agent.

5. Conclusion

The present study confirms the anti-inflammatory effect of MERA and its safety usage up to the dose of 2000 mg/kg of body weight in an experimental rat. The further studies are needed to reveal the exact mechanism of action of the MERA. A systemic research is needed to produce a nutraceuticals drug from roots of *R. aquatica* Lour. for treating various health problem of humankind.

Conflict of interest

The authors declare that they have no conflict of interest.

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Induction of systemic resistance in chilli (*Capsicum annuum* L.) by *Pseudomonas aeruginosa* against anthracnose pathogen *Colletotrichum capsici*

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Abstract

Colletotrichum capsici Butler and Bisby, the causal agent of chilli anthracnose disease, sternly affects chilli yield and quality worldwide. Biocontrol agents and resistance inducers could be a valid alternative to chemical pesticides. The capability of two phosphate solubilizing *Pseudomonas aeruginosa* isolates *viz.*, Ps 2 and Ps 3 (KR270346 and KR270347) against chilli anthracnose both under *in vitro* and *in vivo* conditions was demonstrated. *Pseudomonas aeruginosa* Ps 2 showed maximum mycelial growth inhibition of 93.41% and the isolate Ps 3 showed 72.5% inhibition of *Colletotrichum capsici* in dual culture inhibition assay after 5 days of incubation. There was a greater reduction of anthracnose infection caused by *C. capsici* on matured fruits in *Pseudomonas aeruginosa* treated plants when compared to untreated control. The strain possessed chitinolytic and proteolytic activities, produced HCN, siderophores, and was able to produce salicylic acid at a moderate level. The isolate produced amylase. However both of them are unable to produce lipase. The isolates induced systemic resistance in chilli corroborated with increased levels of phenylalanine ammonia lyase, peroxidase and polyphenol oxidase under greenhouse experiments. The results indicate the potential of the indigenous *Pseudomonas aeruginosa* isolates as biocontrol agents against chilli anthracnose.

Keywords: Bacterial antagonists, Biocontrol, Chilli, *Colletotrichum capsici,* Dual culture assay**,** Siderophores.

Introduction

Chilli (*Capsicum annuum* L.) is an important vegetable crop due to its large scale consumption as a seasoning vegetable in India and many other countries as well. The crop suffers from many diseases like damping off, foot rot, anthracnose, dieback, fruit rot, wilt, leaf spots, powdery mildew etc. Anthracnose caused by *Colletotrichum* sp. is a major problem in India and results in both pre- and post-harvest fruit decay with yield losses of up to 50% (Pakdeevaraporn et al., 2005). The different species of *Colletotrichum* causing chilli anthracnose reported from India include *Colletotrichum acutatum, C. capsici, C. coccodes, C. dematium, C.* *gloeosporioides* and *C. siamense* (Saini et al., 2016). Economic losses caused by the disease are mainly attributed to lower fruit quality. The fungus very commonly occurs in chilli growing areas of India resulting in disease incidence levels ranging between 66% and 84%, and causing yield loss up to 12-50% (Bagri et al., 2004; Sharma et al., 2005). Typical anthracnose on chilli fruit include sunken necrotic tissues, with concentric rings of acervuli and fruits showing blemishes have reduced marketability (Manandhar et al., 1995). Many species of *Colletotrichum* are seed borne and they may survive in soil on debris and may be spread by water splash dispersal of conidia and transmission

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of ascospores through the air (Nicholson and Moraes, 1980). They are capable of growing in and on seeds as acervuli and micro sclerotia (Pernezny et al., 2003). Chemicals are mainly used in the control of chilli anthracnose and the fungicide traditionally recommended for anthracnose management in chilli is manganese ethyl-enebisdithiocarbamate (Maneb) (Smith, 2000), although it does not consistently control the severe form of anthracnose on chilli fruit. Continuous use of these chemicals led to new challenges like development of pest resistance, food poisoning, environmental pollution, negative effect on farmers health, and increase in cost. To overcome the undesirable effects of chemical usage, there is a need to incorporate alternative control components that are effective in the field.

The diversity of naturally occurring microorganisms of the rhizosphere and phyllosphere and their potential for biological control of plant pathogens have been examined extensively (Jayraj et al., 2007). Pseudomonads are considered to be important rhizosphere microorganisms, and considerable research is underway globally to exploit their potential. A number of fluorescent pseudomonads have been reported to have *in vitro* and *in vivo* biocontrol potential against a wide range of phytopathogens (Gupta et al., 2002; Kishore et al., 2005; Mansoor et al., 2007).

The inhibition of growth of pathogenic microorganisms is mostly due to the ability of bacterial antagonists to synthesize antifungal compounds, antibiotics, cyanide or siderophores. *P. aeruginosa* strain produces numerous compounds which are responsible for disease control. These inhibitory compounds are siderophores, HCN, degradative extracellular enzymes such as chitinase, protease, cellulose, â -1, 3 glucanase and antibiotics such as pyrrolnitrin, pyoluteorin, phenazine (Haas and Defago, 2005; Deshwal et al., 2011) and activation of plant disease resistance. Selected strains of non-pathogenic microorganisms are able to reduce plant disease through activation of a plant-

mediated defense mechanism known as induced systemic resistance (ISR) (Van Loon, 2007).

ISR has been shown to provide protection against different types of pathogens in several plant species (Pieterse et al., 2002). After leaf and root treatment with ISR-inducers, the resistance is systemically activated in untreated tissues, extending to aboveground plant parts, a disease protection phenotypically similar to pathogen-induced systemic acquired resistance (SAR). Biological control using introduced microorganisms with the capacity to elicit ISR against plant diseases has been extensively studied under greenhouse and field conditions (Akram et al., 2015). Thus, in recent years, the induction of systemic resistance has been studied as a new potential measure for controlling crop diseases in the field, and a number of microorganisms and chemical inducers have been examined in various plant–pathogen systems. The present study was proposed with an objective to evaluate the *in vitro* and *in vivo* antagonistic activity of *Pseudomonas aeruginosa* isolates PS2 and PS3 against a phytopathogenic fungi *C. capsici* and to elucidate the mechanism of antifungal activity.

Materials and methods

Materials
All the culture media were purchased from Hi Media, Mumbai, India. Colloidal chitin was obtained from Sigma Chemical Co., Bangalore. All other chemicals used were of analytical grade.

Organisms
The pathogenic organism was isolated from the infected fruits of *C. annuum* (Fig. 1) as a pure culture on potato dextrose agar (PDA) medium. The fruit specimens were washed with tap water, the discoloured parts cut into small pieces (5 mm), sterilized with 0.1% sodium hypochlorite (NaOCl) for two min., rinsed three time in sterile water, and dried between folds of sterilized filter paper. The sterilized fruit pieces were transferred to sterilized oat meal agar plates and incubated at room

temperature for 5 days. Mycelial bits were transferred to sterile petridishes containing oatmeal agar medium; later it was purified by the hyphal tip method and transferred to potato dextrose agar (PDA) slants and pure cultures of the pathogens were maintained for further studies.

Pseudomonas aeruginosa isolates were isolated from the samples of chilli (*Capsicum annuum* L.), fields around India by enrichment culture technique. The isolates were morphologically and biochemically characterized and identified using 16S rDNA sequencing technique and phylogenetic analysis (Linu et al., 2009; Linu et al., 2017). Their sequences were deposited in Genbank with accession numbers KR270346 and KR270347 .The cultures were maintained on Pikovskaya's agar slants at 6 °C in a refrigerator with regular subculturing (Pikovaskaya, 1948).

Dual culture assay
To determine the potential antifungal activity of the selected bacterial isolate *in vitro,* isolates were co-cultured alongside the pathogenic fungus *Colletotrichum capsici*. The fungal strains were cultured on PDA plates for 5 days at 28 °C; bacterial strains were grown in LB liquid medium for 24 h at 37 °C (Barhate et al., 2012). Competitive interactions between the bacterial isolates and *Colletotrichum capsici* were evaluated in dual-culture experiments in 90-mm Petri dishes containing 20 ml of PDA. Mycelial discs (5 mm in diameter) from fungal colonies and 2 ìl of bacterial suspension from the LB cultures were placed on the agar surface, 30 mm apart. Control cultures were inoculated with 2 ìl of distilled water instead of bacteria. Immediately after inoculation, the plates were sealed with plastic film and incubated at 28 °C in the dark for 3–5 days. Visual observations on the inhibition of growth of fungal pathogen were recorded after 5 days of incubation in comparison with the PDA plate simultaneously inoculated with only the fungal pathogen. The percentage reduction in growth was calculated following the formula

$$\text{Percentage of inhibition (\%)} = \frac{C - T}{C} \times 100$$

Where, C-diameter of fungal growth in control plate
T-diameter of fungal growth in test plate

In vitro antifungal bioassay

Production of volatile substance (HCN) and its effect on growth of C. capsici
The screening of the isolates for the production of hydrogen cyanide was done using the method described by Shabana mol et al. (2017). Here, filter paper strips soaked in .0.5% picric acid reagent were placed in the lid of petri dish and the lids were closed. The plates were sealed with parafilm and incubated for 30±10ºC for 48 hrs. The colour change of the filter paper pad was noted by a method described by Lee et al. (2008). The inhibitory effect of HCN on the growth of *C.capsici* was determined by the 'inverted plate technique' where, the pathogens was grown in PDA. The reduction in growth of fungal pathogen was calculated using the formula (Kazempour, 2004):

$$\text{Reduction in growth of fungal pathogen}$$
$$= \frac{\text{Growth in control} - \text{Growth in antagonist inoculated}}{\text{Growth in control}}$$

Non volatile organic compound production
In order to study the effect of nonvolatile compounds, bacterial antagonists were grown on King's B broth and the pathogen was grown on PDA plates. The culture filtrate after 7 days of incubation was filtered through Millipore filters using vacuum pump assembly. 5ml of the culture filtrate was mixed with 20 ml PDA just before pouring into petri dishes and after cooling, inoculated with 5 mm discs of the pathogen. Pathogen inoculated without culture filtrate served as control. The colony diameters of the pathogen after 7 days were recorded and compared with the control.

Chitinase bioassay
The isolates were inoculated on LB plates supplemented with 0.5% colloidal chitin. Plates were incubated at 30ºC for 3 days. Enzymatic

activity was detected by the development of clear halo zones around the bacterial spots (Basha and Ulaganathan, 2002)

Detection of ammonia

Bacterial isolates were tested for the production of ammonia in peptone water. Freshly grown cultures were inoculated in 10 ml peptone water in each tube and incubated for 48–72h at $36\pm2°C$. Nessler's reagent (0.5 ml) was added in each tube. Development of brown to yellow colour was a positive test for ammonia production (Cappuccino and Sherman, 1992).

Detection of hydrolytic enzyme activity

Production of hydrolytic enzyme was qualitatively assayed in minimal medium containing gelatin, starch, pectin and carboxy- methyl cellulose (CMC) for protease, amylase, pectinase and cellulase. Plates were incubated for 48 h at $30°C$ and the formation of a clear zone around bacterial colonies was interpreted as being positive (Kasana et al., 2008).

Siderophore production.

Chrome Azurol S (CAS) agar medium was prepared as described by Schwyn and Neilands (1987) to detect siderophore production. CAS agar (blue agar) was inoculated at the center of the plate with 24-h-old culture of isolates and kept for incubation at $30°C$ for 72 h. The change of blue colour of the medium to orange or the presence of a yellow to light orange halo zones surrounding the bacterial colony indicated the production of siderophores.

Production of salicylic acid (SA)

To determine salicylic acid production of the isolates, the strains were grown in the standard succinate medium (SSM) at $28\pm2°C$ for 48 hrs on a shaker incubator at 180 rpm. Cells were harvested by centrifugation at 10000 rpm for 5min and were re suspended in 1ml of 0.1 M phosphate buffer. 4 ml of the cell free culture filtrate was acidified with 1N HCL to pH 2.0 and SA were extracted with equal volume of chloroform. Four ml of water and 5 ml of 2M ferric chloride were added to the pooled

chloroform phases. The absorbance of the purple iron-SA complex, which was developed in the aqueous phase, was read at 527 nm against blank in UV- visible spectrophotometer. A standard curve was prepared with SA in SSM and quantity of SA produced was expressed as mg/50 ml.

ACC deaminase production

The isolates were screened for ACC deaminase activity using the methods described by Dworkin and Foster (1958). For this, the isolates were inoculated on to DF minimal salt medium amended with 2 g/L ammonium sulphate. The presence of bacterial growth in the media after incubation was considered as a positive result.

Pot culture experiment

Pot culture was conducted to evaluate the effect of two selected *Pseudomonas aeruginosa* isolates PS 2 and PS 3 on control of chilli anthracnose under greenhouse conditions at School of Biosciences, MG University, Kottayam, Kerala, India. Chilli seeds of crop variety Ujwala were obtained from the Regional Agricultural Research Station, Kumarakom, Kottayam.

The properties of the soil were checked in the soil testing laboratory, Alappuzha. The soil (loamy texture, pH- 6.5; electrical conductivity- $0.1x10^{-3}$mhos/cm, organic carbon- 1.32%, organic nitrogen- 0.76 kg/ha, available phosphorus- 9.8 kg/ha, available potassium- 48.8 kg/ha, dehydrogenase activity- 0.75 µg TPF g^{-1}soil/day, phosphatase activity-3.25 µg PNPg^{-1}soil, bacterial total plate count-5.2×10^{6}cfu/ml, phosphate solubilizers- 2×10^{6}cfu/ml) was air dried and passed through 2 mm sieve. The recommended dose of fertilizers (rock phosphate @ 60 kg P_2O_5ha^{-1}, urea @ 75 kg N ha^{-1} and muriate of potash @ 25 kg K_2Oha^{-1}) was used for each pot. Half of nitrogen, full phosphorus and half of potash were mixed with the soil and filled in earthen pots (30×30 cm) before transplanting at the rate of 10 kg per pot. One fourth of nitrogen and half of potash were applied 30 days after planting and remaining quantity of N was

applied two months after planting.

The experiments were conducted in a completely randomized design (CRD) with five treatments each having three replications. A standard culture of *Pseudomonas fluorescens* which can efficiently control chilli anthracnose was obtained from Tamil Nadu Agricultural University (TNAU) to compare the results with our test cultures. The bacterial isolates and the standard culture were inoculated into Kings B broth and incubated at 27°C for 2 days and 5ml of the resultant culture (5×10^9cfu/ml) was used for pot study. The pathogen used in the *in vivo* study, *C. capsici,* was isolated from the infected fruit collected from the Agricultural College Vellayani, Thiruvananthapuram. The pathogen was inoculated on oatmeal agar plates and incubated at $28\pm2^{\circ}$C for 5 days. The resultant culture was used for the induction of anthracnose disease in chilli plants under *in vivo* study.

Inoculation of Pseudomonas aeruginosa in greenhouse experiments

The chilli seeds were surface sterilized with 2% sodium hypochlorite for three minutes and then washed with sterile distilled water. The pots were then sown with sterilized chilli seeds (10 seeds/pot). Thinning was done after germination to retain four seedlings in each pot. After one month the chilli plants were subjected to foliar spray treatments. For foliar spray treatment, the plants were sprayed with 5 ml of 48 hrs old culture (5×10^9cfu/ml) of *Pseudomonas aeruginosa* Ps2, *Pseudomonas aeruginosa* Ps 3 and the standard *Pseudomonas* spp. Fresh seeds without any bacterial inoculum were used in control and fungicide treated treatments. Foliar application of the fungicide Mancozeb (0.2%) was also done after 30 days. A booster dose of cultures (5 ml of 48 hour old culture) was given after 30 days of first treatment. Plants were grown in greenhouse (average RH 78%, temperature 22 – 25 °C, natural day light) and watered regularly to maintain optimum soil moisture regime. The control plants did not receive any bacterial or fungicide treatment at any stage of growth. The pot experiment

was conducted and repeated twice during 2014 – 2015 as Rabi crop.

Disease induction

Chilli anthracnose disease was artificially introduced by challenge inoculation of plants with *Colletotrichum capsici* on the 45th day of plant growth. Conidial suspension of *Colletotrichum capsici* was prepared in sterilized distilled water by harvesting acervuli from freshly sporulating cultures by scraping the surface of OMA slants with sterilized spatula. Serial dilutions of the spore suspension were prepared and inoculum density was adjusted to 5×10^5 spores /ml using a haemocytometer and the resultant fungal suspension was used to introduce anthracnose disease in the chilli plants according to the method described by Oh et al. (1999), with minor modifications. The control plants were inoculated with sterilized water.

The leaves and fruits of all the plants were subjected to examination of the development of anthracnose symptoms. Disease incidence was calculated according to the formula:

Percentage of disease incidence in leaves
= No. of leaves infected ÷ Total no. of leaves x 100

Percentage of disease incidence in fruits
= No. of fruits infected ÷ Total no. of fruits x 100

Effect of Pseudomonas aeruginosa in induction of defense enzymes against Colletotrichum capsici

The ability of the *Pseudomonas aeruginosa* isolates to induce systemic resistance in chilli plants was assessed under greenhouse conditions. Plants and plots were prepared as per the methods described for biocontrol study and three replications were maintained in each treatment. Four pots per replication were maintained. After 45 days, the plants were challenge inoculated with *Colletotrichum capsici*. The plants neither treated with biocontrol agents nor challenged with the pathogen were kept as control. The experiments were conducted using completely randomized design (CRD).

Chilli plants were carefully uprooted without causing any damage to root tissues at different time intervals (6, 12, 18 and 24 hours after the pathogen inoculation) and used for enzyme extraction. Four plants were sampled from each replication of the treatment separately and maintained for biochemical analysis. Leaf samples were washed under running tap water and homogenized with liquid nitrogen in a pre-chilled mortar and pestle and stored at 80^0C for further studies.

Estimation of phenylalanine ammonia lyase (PAL) activity

Plant samples (1 g) were homogenized in 3ml of ice cold 0.1M sodium borate buffer, pH 7.0 containing 1.4 mM of 2-mercaptoethanol and 0.1 g of insoluble polyvinyl pyrrolidone. The extract was filtered through cheese cloth and the filtrate was centrifuged at 16,000 rpm for 15 minutes. The supernatant was used as enzyme source. PAL activity was determined as the rate of conversion of l-phenylalanine to trans- cinnamic acid at 290 nm (Dickerson et al., 1984). Samples containing 0.4 ml of enzyme extract were incubated with 0.5 ml of 0.1M borate buffer, pH 8.8 and 0.5 ml of 12 mM phenylalanine in the same buffer for 30 min at 30^0 C. The amount of *trans*- cinnamic acid synthesized was calculated (Dickerson et al., 1984). Enzyme activity was expressed as n mol *trans* - cinnamic acid $min^{-1}gm^{-1}$.

Assay of peroxidase (PO)

Leaf samples (1 g) were homogenized in 2 ml of 0.1M phosphate buffer, pH 7.0 at 4^0 C. The homogenate was centrifuged at 16,000 *g* at 4ºC for 15 min and the supernatant was used as enzyme source. The reaction mixture consisted of 1.5 ml of 0.05 M pyrogallol, 0.5 ml of enzyme extract and 0.5 ml of 1% H_2O_2. The reaction mixture was incubated at room temperature (28 ± 2ºC). The changes in absorbance at 420 nm were recorded. The enzyme activity was expressed as changes in the absorbance $min^{-1} gm^{-1}$ (Hammerschmidt et al., 1982).

Assay of polyphenol oxidase (PPO)

Leaf samples (1 g) were homogenized in 2 ml of 0.1M sodium phosphate buffer (pH 6.5) and centrifuged at 16,000 *g* for 15 min at 4ºC. The supernatant was used as enzyme source. The reaction mixture consisted of 200 µl of the enzyme extract and 1.5 ml of 0.1M sodium phosphate buffer (pH 6.5). To start the reaction, 200 µl of 0.01M catechol was added and the activity was expressed as changes in absorbance at 495nm in $min^{-1}gm^{-1}$(Mayer et al., 1965).

Estimation of total phenolic content

Chilli leaf tissues (1 g) were homogenized in 10ml of 80 % aqueous methanol and agitated for 15 min at 70ºC. Methanolic extract (1 ml) was added to 5 ml of distilled water containing 250 µl of Folin–Ciocalteau reagent (1 N) and the solution was incubated at 25ºC. The absorbance of the blue colour developed was read using a spectrophotometer at 725 nm. Total phenolic content was calculated from standard graph drawn from catechol and Folin Ciocalteau reagent and expressed as catechol /g fresh weight.

Statistical analysis

The statistical analysis for all the parameters were performed using one way or two way analysis of variance. The means were compared by Duncan's Multiple Range Test using the statistical package SAS version 8.3 (SAS Institute Inc., Cary, NC, USA). The differences among the LS MEANS were analyzed by constructing diffogram (called the mean-mean scatter plot by Hsu, 1996). The diffogram produced by GLIMMIX is a two dimensional plot with both the vertical and horizontal axes of the same length and having the same numerical range defined by the difference between largest and smallest means (with a slightly larger range needed to plot the confidence intervals for the differences within the plotting area).

Results and Discussion

Dual culture assay

The antagonistic effect of the selected two bacterial isolates were tested against the chilli anthracnose pathogen *Colletotrichum capsici* by the standard dual culture method. Among the two isolates of *Pseudomonas aeruginosa,* Ps 2 showed maximum inhibition of 93.41% whereas the other isolate Ps 3 showed 72.5% of inhibition against *Colletotrichum capsici* after 5 days of incubation (Fig.1).
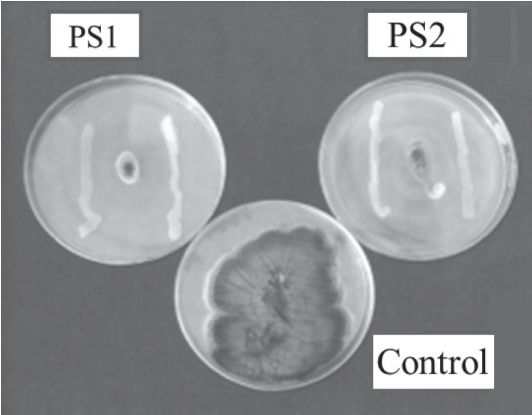

Figure 1. Antifungal activity *Pseudomonas aeruginosa* isolates against *Colletotrichum capsici*

Mechanism of antifungal activity

Both the isolates were capable of producing volatile organic compounds and thereby inhibiting the growth of the pathogen. Among the two isolates, Ps 2 showed maximum inhibition of 46.16% whereas Ps 3 showed inhibition of 40.34% against the growth of *Colletotrichum capsici* through the production of volatile organic compounds. Nonvolatile organic compound production showed a decline of 44.85% by Ps 2 against the growth of

Table 1. Growth reduction of *Colletotrichum capsici* by organic acid production

Isolate	% growth reduction of *Colletotrichum capsici*	
	Volatile organic acid*	Nonvolatile organic acid*
PS 2	46.16±0.28	44.85±0.78
PS 3	40.34±0.29	35.55±0.67

*Values are means of three replications ± SD

Colletotrichum capsici whereas Ps 3 showed 35.55 % of inhibition (Table 1).

Both the isolates were capable of producing siderophore and HCN. The two isolates of *Pseudomonas aeruginosa* namely Ps 2 and 3 are positive towards ammonia formation. Ammonia production by the PGPB helps influence plant growth indirectly. Both the isolates are catalase positive because both of them showed the development of effervescence on addition of hydrogen peroxide to the bacterial culture. Among the two isolates Ps 2 is pectinase and chitinase positive but amylase, protease and lipase negative. The other isolate Ps 3 is amylase, pectinase and chitinase positive and protease and lipase negative. Both the isolates have the ability to produce salicylic acid. Production of salicylic acid by isolates 2 and 3 was found to be 11.3μg/ml and 14.1μg/ml, respectively. In the present study both the isolates showed positive results towards ACC deaminase production (Table 2).

Table 2. Secondary metabolite production and enzyme activity of isolates

Metabolite production*	Isolates	
	Ps 2	Ps 3
Siderophore	+ve	+ve
HCN	+ve	+ve
Ammonia	+ve	+ve
salicylic acid (SA)	+ve	+ve
ACC deaminase production	+ve	+ve
Chitinase	+ve	+ve
Amylase	-ve	+ve
Pectinase	+ve	+ve
Protease	-ve	-ve
Cellulase	-ve	-ve

*Mean of five replicates

The results of the *in vivo* antifungal activity of the selected *Pseudomonas aeruginosa* isolates *viz.*, Ps 2 and 3 and the standard *Pseudomonas* culture obtained from TNAU were recorded after 90 days of pathogen inoculation when standard disease symptoms appeared both on the fruits and leaves (Tables 3 and 4). In control plant 100% of fruits and 80.66% of the leaves were infected by the

Table 3. *In vivo* antagonism of microbial antagonists *Pseudomonas aeruginosa* against anthracnose in chilli fruits

Sl.No.	Treatments	Total number of fruits**	Number of fruits infected**	% of disease incidence in fruits
1	Control	1	1	100
2	Fungicide (Mancozeb 0.2%)	2	0	0
3	*Pseudomonas aeruginosa* Ps 2	6	0	0
4	*Pseudomonas aeruginosa* Ps 3	7.66	0	0
5	*Pseudomonas fluorescens*	3.66	0.66	19.44

*All values are means from two repeated experiments with three replications each with 4 plants (4 plants/pot)
** Values are per treatment i.e., for all the plants in all replications

Table 4. In *vivo* antagonism of *Pseudomonas aeruginosa* against anthracnose in chilli leaves.

Sl.No.	Treatments	Total number of leaves**	Number of leaves infected**	% of disease incidence in leaves
1	Control	22.33 [d]	18 [a]	80.66
2	Fungicide (Mancozeb 0.2%)	34.33 [c]	1 [bc]	3.09
3	*Pseudomonas aeruginosa* PS 2	77.33 [b]	1.33 [bc]	1.70
4	*Pseudomonas aeruginosa* PS 3	91[a]0 [c]	0	
5	*Pseudomonas fluorescens*	73 [b]3 [b]	4.11	

*All values are means from two repeated experiments with three replications each with 4plants (4 plants/pot) and Means in a column followed by the same letter(s) are not significantly different according to Duncan's Multiple Range Test (P=0.05) at 5% level of significance
** Values for all the plants in all replications

pathogen. Typical anthracnose symptoms appeared in the fruits and leaves of control plants which had not received any biocontrol and chemical fungicide treatment. In the case of fungicide treated plants, about 3.09 % of the leaves were infected, but disease development in fruits was zero. There was no disease incidence in the fruits of *Pseudomonas aeruginosa* Ps 2 and Ps 3 treated plants, but 19.44% of fruits were infected in standard treated plants. The leaves of *Pseudomonas aeruginosa* Ps 3 treated plants remained unaffected as where in *Pseudomonas aeruginosa* Ps 2 and standard treated plants 1.70 and 4.11% of the leaves were diseased (Figs. 2 & 3).

The popularity and demand for chilli are providing a boost to the chilli industry, but production is increasingly constrained by the prevalence of plant diseases. Among the diseases, anthracnose caused by *Colletotrichum capsici* is the most important disease. Under suitable weather conditions, the disease may cause 12-15% loss in the crop (Suthin et al., 2006; Suthin and John, 2008). In the present study two *Pseudomonas aeruginosa* isolates namely
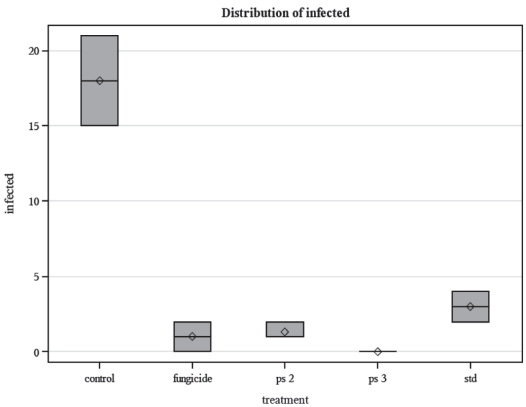
Figure 2. Induced disease suppression of anthracnose in chilli treated with distilled water as a negative control or Mancozeb 0.2% as a positive control or suspensions of *Pseudomonas aeruginosa* isolates *viz.*, Ps 2 and 3, the standard *Pseudomonas* culture. All values are means from two repeated experiments with three replications each with 4 plants (4 plants/pot) under greenhouse experiments.

Ps 2 and 3 showed significant activity against anthracnose fungi *Colletotrichum capsici* under *in vitro* condition. In a study carried out by Shilpa and Gokulapalan (2015), *T. viride* caused 55.5%
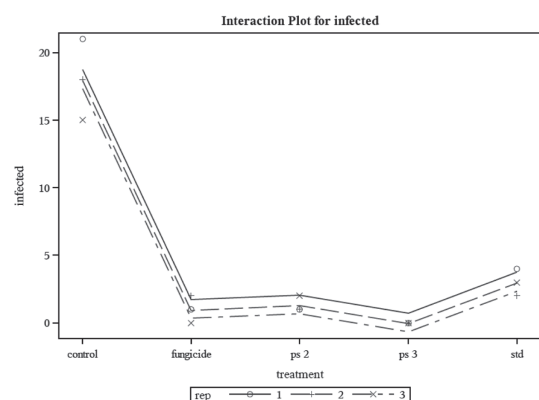
Figure 3. Interaction plot for disease incidence in leaves of different treatments under greenhouse experiments.This plot confirms the results of the F test on whether or not the interaction is significant. The points for each appraiser average measurement per part are connected to form k (number of appraisers) lines. The way to interpret the graph is if the k lines are parallel there is no interaction term. When the lines are nonparallel, the interaction can be significant. Here the lines are nearly parallel, indicating no significant interaction. All values are means from two repeated experiments with three replications each with 4 plants (4 plants/pot)

mycelial growth inhibition of *Colletotrichum capsici* in dual culture. In the same study *Pseudomonas flourescens* showed 90% of the radial growth inhibition of *Colletotrichum capsici*. Similarly Kaur et al (2006) noticed 53.0% inhibition of *C.capsici* by *T. viride* and complete overgrowth by the biocontrol agent. The formation of hyphal coils by *T. viride* on pathogenic colonies was also noticed. Of the various rhizospheric bacteria, the bacteria belonging to *Pseudomonas*, which colonize roots of a wide range of crop plants, are reported to be antagonistic to soil borne plant pathogens (Ehteshamul-Haque et al., 2007; Siddiqui et al., 2000). The production of certain antibiotics (Levy et al., 1992) and siderophores (De Meyer and Hofte, 1997; Buysens et al., 1996) by *Pseudomonas aeruginosa* has been regarded as one of the mechanisms involved in antagonism. In the present investigation, the two isolates tested are siderophore and HCN positive. The iron concentration in the soil is low enough (10-7M) to limit the growth of

soil microorganisms (10-8 – 10-6 M) (Kloepper et al., 2004). Rhizobacteria have to develop some strategies to acquire iron. The major strategy is the production and utilization of siderophores. The rhizobacteria that can produce siderophores could compete for iron with soil borne pathogens. Competition for iron is also a possible mechanism in agriculture to control the pathogenic fungi in the soil. HCN, a volatile metabolite is thought to play a major role in biological control of some soil borne diseases (Siddiqui et al., 2006). In pseudomonad species, HCN is released by the decarboxylation of glycine (Wissing, 1975). Volatile and non volatile organic acid production is also shown by the isolates employed in the present study. Microbial degrading enzymes of the cell wall of fungal pathogens have been reported (Fridlender et al., 1999). Bacterial strains showing catalase activity must be highly resistant to environmental, mechanical and chemical stress (Joseph et al., 2007). Here Ps 2 is pectinase positive, whereas Ps 3 is amylase and pectinase positive. The presence of these enzymes may be the reason for the antifungal activity shown by these isolates. The two isolates also produced salicylic acid at a significant level, which may contribute to the disease suppression ability of the isolates. Hamada and Hashem (2003) found that soaking wheat grains in SA before sowing significantly reduced the values of mean disease rating caused by *Bipolaris sorokiniana, F. oxysporum* or *F. graminearum*. It was also reported that SA induced plant resistance against pathogens and stimulated plant growth (Vidhyasekaran, 1990).

The results of the greenhouse study showed that the selected *Pseudomonas aeruginosa* isolates were excellent biocontrol agents, since they exhibited significant levels of antifungal activity against *Colletotrichum capsici*. There are several studies on biocontrol of chilli diseases by rhizosphere microbes (Rini and Sulochana, 2006; Vasanthakumari and Shivanna, 2013; Sudhir et al., 2014). Suthin and John (2008) reported the ability of *Trichoderma harzianum* to reduce *Colletotrichum capsici* fruit rot in chilli. Sudhir et al., (2014) reported the control

of chilli anthracnose by endophytic *Pseudomonas aeruginosa* isolated from chilli fruits. Majority of antagonistic bacteria are Gram negative and belong to the group of fluorescent pseudomonads, which are efficient biocontrol agents (Bloemberg and Lugtenberg, 2001). Antagonistic activities were also reported in *Pseudomonas chlororaphis, P. fluorescens, P. graminis, P. putida, P. tolaasii* and *P. veronii* (Adhikari et al., 2001).

Induction of systemic resistance by Pseudomonas aeruginosa against Colletotrichum capsici under greenhouse conditions

Activation of the plant's own defense system with the aid of biotic and abiotic inducer is a novel technology in the management of plant diseases. Microbial products have been considered as one of the major groups of compounds that induce systemic resistance. Biologically active compounds present in biocontrol agents act as elicitors and induce resistance in host plants resulting in reduction of disease development. PGPR induced systemic resistance (ISR) is similar to pathogen induced systemic acquired resistance (SAR) in non-infected parts and made plants more resistant to pathogen infection and are effective against a wide range of foliar and root pathogens (Zhang et al., 2002)

Phenylalanine ammonia lyase is the first key enzyme in the phenyl propanoid metabolism and plays a significant role in the regulation of biosynthesis of phenols in plants (Lawton and Lamb, 1987). PAL catalyzes the conversion of phenylalanine to trans-cinnamic acid, which supplies the precursors for flavonoid pigments, lignins and phytoalexins (Hahlbrock and Scheel, 1989). The activation of PAL and subsequent increase in phenolic content in plants is a general response associated with disease resistance (Velazhahan and Vidhyasekaran, 1999). Inhibition of PAL affects subsequent pathways of phenolic compound synthesis.

Peroxidases are involved in phenyl propanoid

metabolism, regulation of plant cell elongation, phenol oxidation, polysaccharide cross-linking, IAA oxidation, cross-linking of monomers, oxidation of hydroxyl cinnamyl alcohols into free radical intermediates and wound healing (Vidhyasekaran et al., 1997). Plant peroxidases are heme - proteins that use H_2O_2 to oxidize a large variety of hydrogen donors such as phenolic substances, amines, ascorbic acid, indole and certain inorganic ions (Van Huystee, 1987). In the present study, a significant increase in peroxidase activity was noticed after 6 hrs of treatment and continued upto 24 hrs of incubation in all the treatments including the control plant (Fig. 4).

Polyphenol oxidase is a copper containing enzyme, which oxidizes phenolics to highly toxic quinones and is involved in the terminal oxidation of diseased plant tissues, which attributes for its role in disease resistance. In the present study, polyphenol oxidase activity was comparatively high in bacteria treated leaf extracts as compared with the control. There was a significant increase in the PPO level with the increase in time (Fig. 4). The increase in polyphenol oxidase activity might be due to activation of latent host enzyme, solubilisation of host polyphenol which was normally particulate or even due to *de novo* synthesis (Rao et al., 1988).

Phenolic compounds act as anti microbials (Jung et al., 2004) and are critical to host defense in sensing and defense-triggering in host pathogen interaction (Beckman, 2000). Studies have demonstrated rapid esterification of phenolic compounds into the plant cell wall as a common and early response in the expression of resistance (Nicholson and Hammerschmidt, 1992). In the present study, phenolic content was comparatively high in bacteria treated plants compared to the untreated control.

The ability of the selected *Pseudomonas aeruginosa* isolates to control chilli anthracnose was proved under greenhouse studies. Management of plant diseases by the application of biocontrol agents provides one component in integrated disease
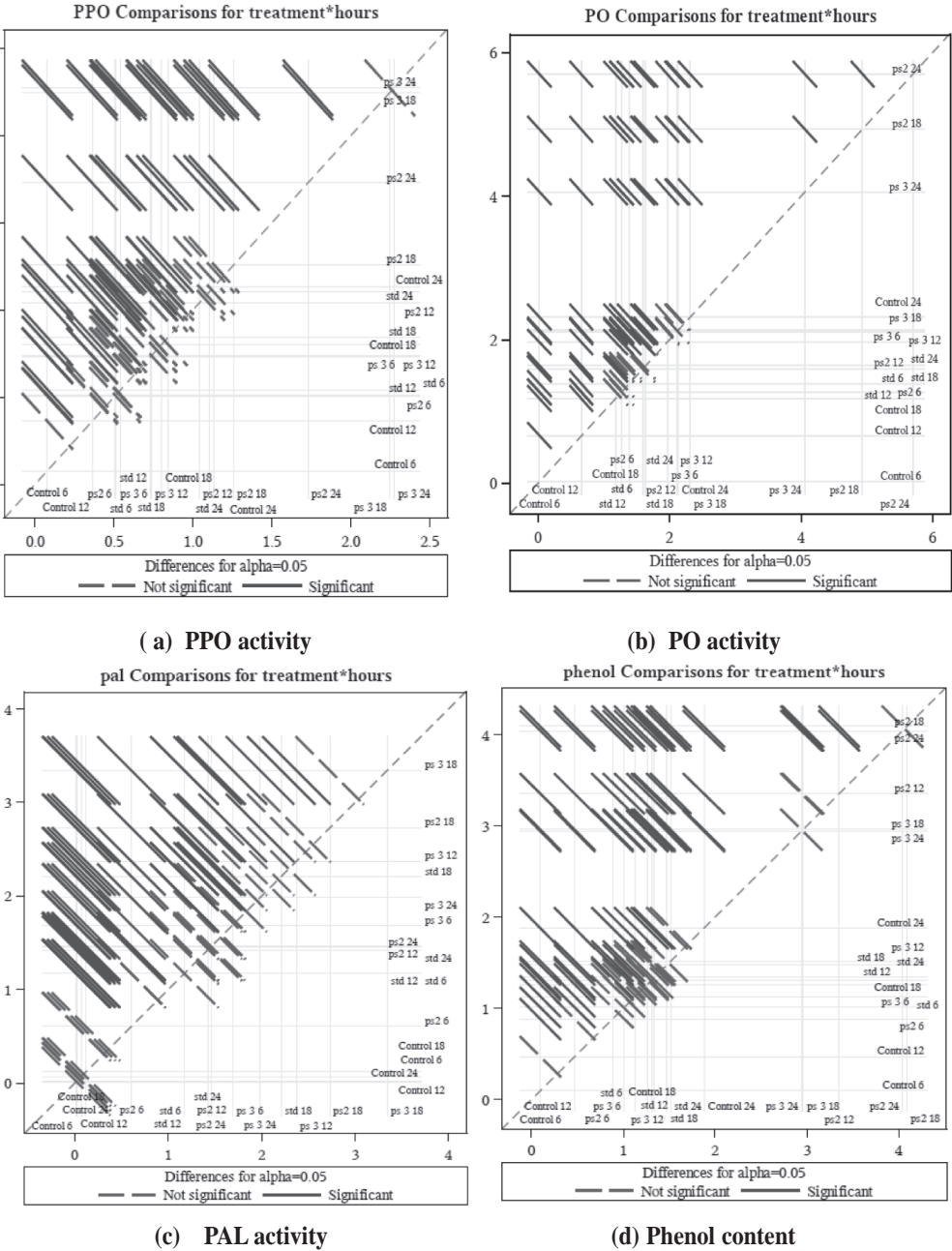
(a) **PPO activity**

(b) **PO activity**

(c) **PAL activity**

(d) **Phenol content**

Fig. 4. Diffogram of of defense enzyme production induced by *Pseudomonas aeruginosa* in chilli against *Colletotrichum capsici.*under green house experiment. .A significant difference between pairs of ls means(i.e., the adjusted pvalue is less than 0.05) occurs when the adjusted lower and upper endpoints of the confidence intervals are both positive or both negative; that is, the solid lines sloping at -45 degrees fall completely above or below the line of equality. This line of equality also identifies non-significant differences; when the line for the confidence interval intersects the diagonal (shown with a dashed line), the value 0 is included within the confidence interval. The attributes are (a) polyphenol oxidase (PPO) (b) peroxidase (PO) (c) phenylalanine ammonia lyase (PAL) (d) total phenolic content.

management. Induction of defense enzymes *viz,* Peroxidase (PO), Polyphenol oxidase (PPO) and Phenylalanine ammonia lyase (PAL), is one of the key factors in the suppression of pathogen and disease development. Here the two *Pseudomonas aeruginosa* isolates induced systemic resistance in host plants. Hence, these biocontrol agents are capable of reducing fungal disease in chilli and will also help to reduce the usage of chemical fungicides which will adversely affect the environment.

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Rietveld refinement and experimental determination of optical and electrical properties of K$^+$ stabilized α-MnO$_2$ nanostructures

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Rietveld refinement and experimental determination of optical and electrical properties of K^+ stabilized α-MnO$_2$ nanostructures

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Abstract. In the midst of strenuous efforts in fabricating materials for supercapacitors, lithium ion batteries, molecular sieves and catalysts, manganese dioxide plays a vital role due to their unique tunnel framework. Alpha phased manganese dioxide (α-MnO$_2$) nanoparticles are synthesized using a low temperature coprecipitation method. The structural and morphological characterization carried out by XRD, SEM and HRTEM techniques, confirms the formation of α-MnO$_2$ nanoparticles. The EDS results confirmed the non stoichiometry and the presence of K^+ ions within the crystal lattice. The non stoichiometry is due to the large number of oxygen vacancies within the crystal. Rietveld refinement of XRD pattern was carried out to study in detail the role of K^+ ions in maintaining the stability of the 2x2 tunnel framework of α-MnO$_2$. The UV-Vis absorption and photoluminescence spectrum were studied for analyzing the energy band structure of MnO$_2$. A direct band gap of 1.66 eV is obtained from the famous Taucs plot. The photoluminescence exhibits strong emission line in the visible region at 743 nm and defect related emission peaks at 757 and 751 nm. The dielectric studies were carried out using dielectric spectroscopy. The temperature dependence of orientation polarization can be understood from the study of variation of dielectric constant and losses with temperature. Moreover, the phase purity of the sample and the Mn-O vibrational frequencies were analyzed using FTIR spectrum.

1. Introduction

Manganese dioxide (MnO$_2$) is an important transition metal oxide which shows versatile properties due to their variable oxidation states. The different polymorphic states of MnO$_2$ arise due to the difference the structural arrangement of the basic MnO$_6$ octahedra. Among the different polymorphic states alpha phased MnO$_2$ (α-MnO$_2$) consists of a 2x2 and 1x1 tunnel structure formed by corner sharing and edge sharing of MnO$_6$ octahedra. This unique structure is useful in lithium ion batteries and molecular sieves which can be applied to areas like long lasting battery technology and water harvesting technology. Various approaches have been used to fabricate manganese dioxide, such as self-reacting microemulsion [1], precipitation [2], room-temperature solid reaction [3], sonochemical [4], hydrothermal methods [5-8]

and co-preciptation [9]. In the present work alpha phased MnO_2 (α-MnO_2) nanaparticles were synthesized using a coprecipitation method. Here in order to study the role of K^+ ions in maintaining the structural framework of the tunnel structure refinement was done with and without K^+ ions.

2. Experimental section

Potassium permanganate (98.5 %, E. Merck), and Manganese Nitrate (99 %, E. Merck) were used as received without further purification. Ultra-pure water was used for the preparation of all reagents solutions. Manganese Nitrate ($Mn(No_3)_2$)and Potassium Permanganate ($KMno_4$) were first dissolved in distilled water the appropriate molar ratio. The solution was heated at 60˚C for 5hrs with continuous stirring .The products were washed and dried. The sample were annealed at 70˚C for 3hrs.

The X-ray diffraction (XRD) patterns were collected with a Bruker AXS D8 advance X-ray powder diffractometer equipped with a scintillation counter using Cu Kα radiation ($\lambda = 1.5406$A^o). Energy dispersive spectrum (EDS) spectrum was obtained from JEOL Model JED – 2300 instrument**.** Transmission electron microscopy (TEM) was carried out on a JEM-2100 transmission electron microscope operated at an accelerating voltage of 60-200 KV in 50 V steps. The band gap studies were carried out by a UV- Vis spectrometer (Varian, Cary 5000). The Fourier transform infrared spectroscopy (FTIR) and photoluminescence (PL) studies were done using Thermo Nicolet, Avatar and Perkin Elmer LS 45 spectrometers.

3. Results and discussion

The phase and purity of the products are first examined by XRD. Figure 1 shows the refined XRD pattern along with the crystal structure with and without potassium in the lattice. All the peaks in the XRD pattern can be indexed to a pure body-centered tetragonal α-MnO_2 phase, with lattice constants of a = 9.72 A^o, c = 2.86A^o, which are in agreement with the standard values of JCPDS 44-0141. With the aid of the famous Scherrer formula the average particle size of the nanoparticles are found to be 24 nm. Absence of additional peaks of other phases indicates the phase purity of the final product. The Rietveld refinement is carried out for a tetragonal unit cell having space group I 4/m using pseudo Voigt function. In MnO_2, Mn is associated with Wykoff position 8h, oxygen at 8h and K+ ions at 2b. Refined unit cell parameters comes out to be $a = 9.8165$ Å and $c = 2.8557$Å. A detailed study of the crystal structures are required so as to analyze the importance of K^+ ions in maintaining the structural framework of α-MnO_2 [10]. The structural framework consists of basic MnO_6 octahedra in an edge shared and corner shared fashion resulting in a (2x2) + (1x1) tunnel structure. It is the size of the tunnel that is capable of accommodating a K^+ ion for structural stability. The potassium ions are distributed throughout the crystal structure. The crystal structure obtained incorporating K^+ ions with the refinement parameters matches well with the reported crypomelane architecture [10]. The 2 x 2 tunnel structure is capable of incorporating a K^+ ion, whereas for the refinement procedure done without K^+ ions the tunnel framework is completely disfigured. Also a collapse of the basic MnO_6 octahedra which is the building block of the tunnel framework is observed. Hence the K^+ ions which gets intercalated to the 2 x 2 tunnel space of the crystal structure is capable of holding the tunnel framework. To gain better understanding of the nanoparticles, SEM and HRTEM images (Figure 2) of the sample is necessary. The SEM image clearly reveals that the synthesized nanoparticles have no defect or dislocation and also they are single crystalline. The particles obtained from HRTEM shows that the particle has a size distribution in the range 19nm – 35nm. These results are in good agreement with XRD result.
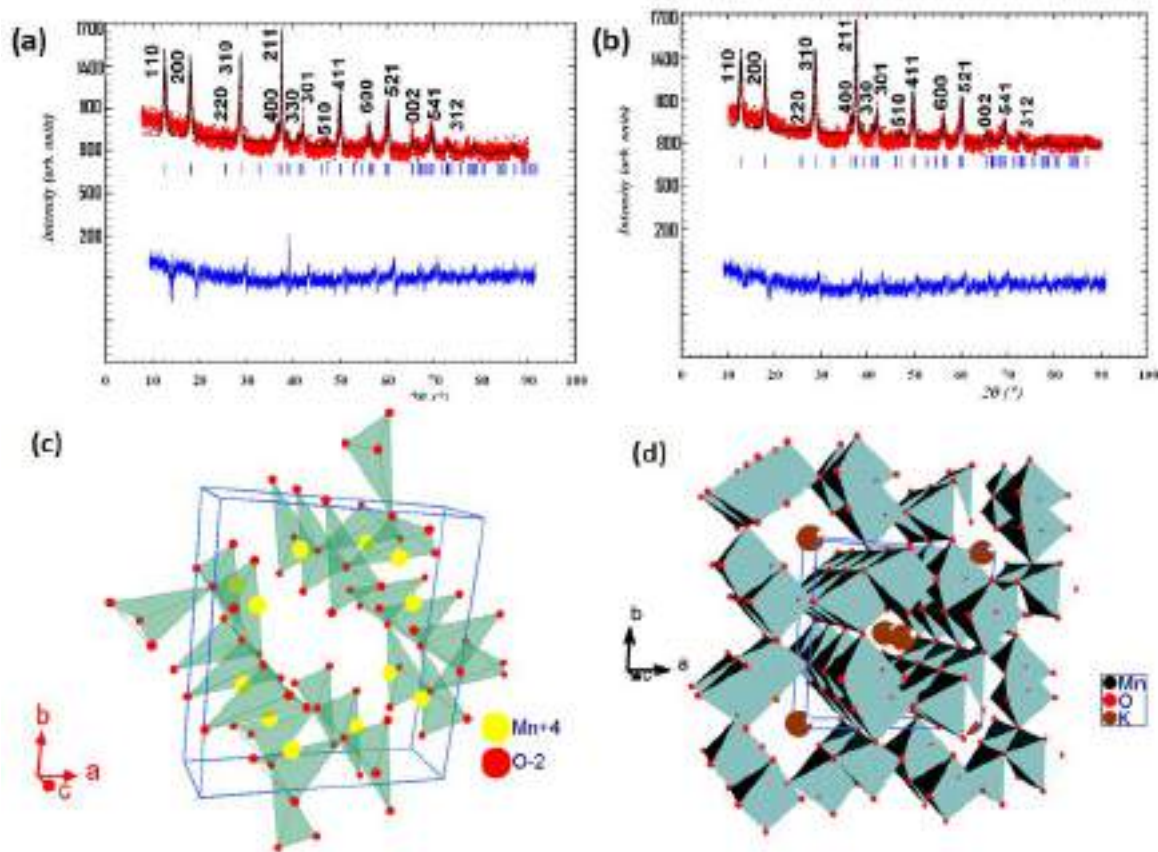
Figure 1. Rietveld refined XRD pattern of (a) without K^+ ions (b) with K^+ ions. Crystal structure of prepared sample (c) without K^+ ions (d) with K^+ ions

The compositional constituency of the prepared sample can be analysed using Energy dispersive spectroscopy (EDS). The EDS spectra (Figure 3 (a)), confirms the presence of Mn, O and K in the sample. The potassium ions stabilize the tunnel framework of the crystal structure. From the analysis it was found that the MnO_2 nanoparticles are nonstoichiometric with a large number of oxygen vacancies. This results in an mixed oxidation state of Mn throughout the sample. Diffuse reflectance spectral studies in the UV- Vis region were used to estimate the optical band gap of the synthesized nanorods. The calculated band gap from the Tauc plot is 1.68 eV and is higher than the reported values for nanostructured MnO_2 [11]. This high value may be attributed to better quantum confinement effect of MnO_2. Figure 3 (c) shows the Pl spectra of MnO_2 nanoparticles with an excitation wavelength of 500 nm. As indicated in the figure the spectrum exhibits prominent emission bands with peaks at 1.66 (743 nm), 1.65 (751 nm) and 1.63 eV (757 nm).

The intense emission peak at 1.66 eV corresponds to the band edge emission. The peak at 1.63 eV may be assigned to the oxygen vacancy related defects. MnO_2 being a highly non stoichiometric material, is rich in oxygen vacancies. The EDS result also confirms the presence of oxygen vacancies. A weak peak at 1.65 eV may be assigned to the surface dangling bonds or surface defects. The phase purity of the sample can be analyzed using FTIR spectrum (Figure 3 (d)). The bands around 3407, 1602 cm^{-1} and 1116 cm^{-1} corresponds to the O-H vibration mode of traces of adsorbed water .The peak at 511 cm^{-1} is due to
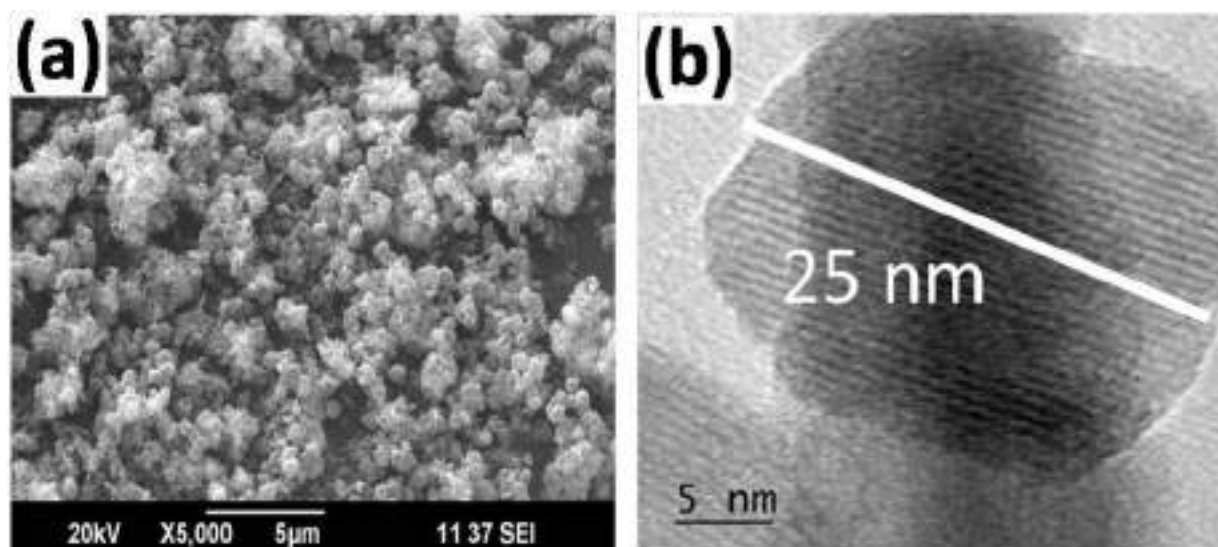
Figure 2. (a) SEM images and (b) HRTEM images of synthesised MnO_2 nanoparticles.
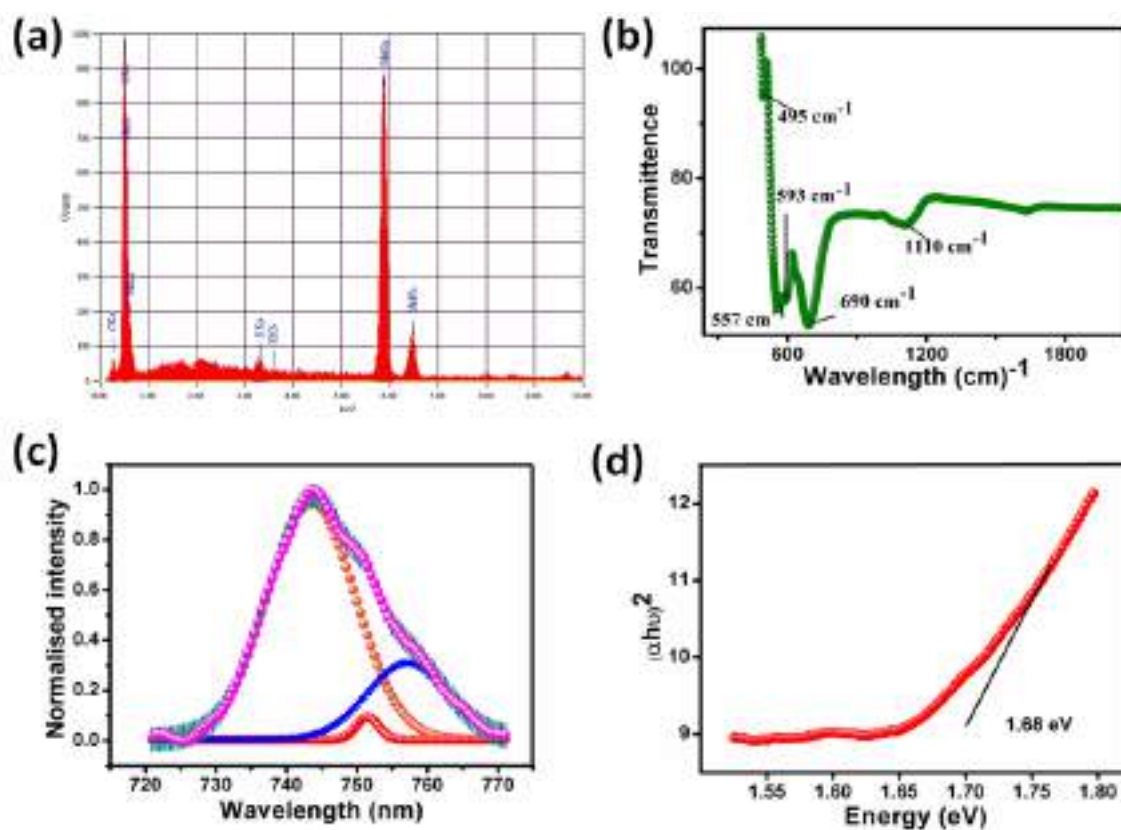
Figure 3. (a) EDS spectrum (b) Tauc plot (c) pl spectrum and (d) FTIR spectrum of α-MnO_2 nanoparticles.

displacement of oxygen anions relative to Mn cation along the direction of octahedron chain, or we can say it is due to metal-oxygen (Mn-O) bending vibrations of $[MnO_6]$ octahedral in α-MnO_2 nanoparticles.

The net polarisability of a composite depends on several components namely, electronic, atomic, interfacial and orientation polarisability. All these contribute towards the dielectric constant of a given material. Only orientation polarisability depends directly on temperature. Figure 3 shows the variation of dielectric constant and dielectric loss with temperature. As the temperature increases the dielectric constant increases to a very high value at 80^0 C and then the values start to decrease. When an electric field is applied on a polar material, the potential energy of the associated dipoles change. The orientations aligned with the field will have a lower potential energy compared to that of the orientations aligned against the field. Less amount of energy is required to get aligned with the applied electric field and more energy is required to get aligned the applied field.
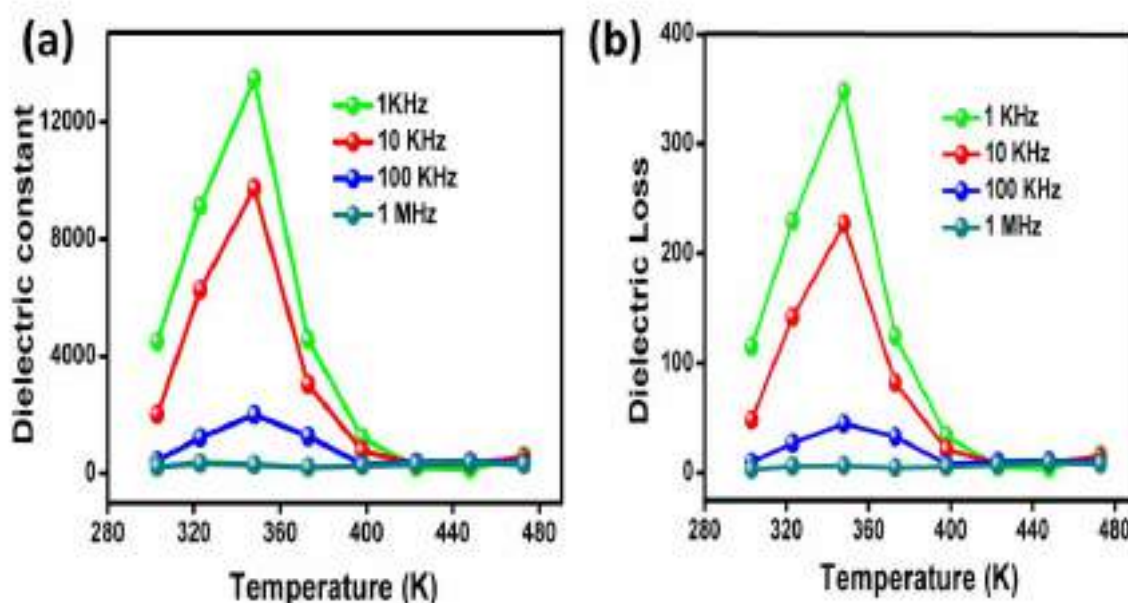
Figure 4. Variation of (a) dielectric constant and (b) dielectric loss with temperature.

At room temperature conditions, only some of the molecules will have the required energy to align themselves with the applied field. On increasing the temperature from 30^0C to 80^0C the energy in the system is enough to increase the potential energy of the remaining orientations to that critical value where they get themselves aligned with the applied electric field resulting in a high net orientation polarization and hence an increase in dielectric constant values is observed.

On increasing temperature further above 80^0C, the dielectric constant values decreases. This is due to the reason that as temperature increases to higher values, the molecular vibrations of the molecules increases along with random thermal motion to such an extent that, the range of deviation from aligning itself to the applied electric field increases resulting in molecules less closely aligned to themselves and applied electric field (Figure 4).
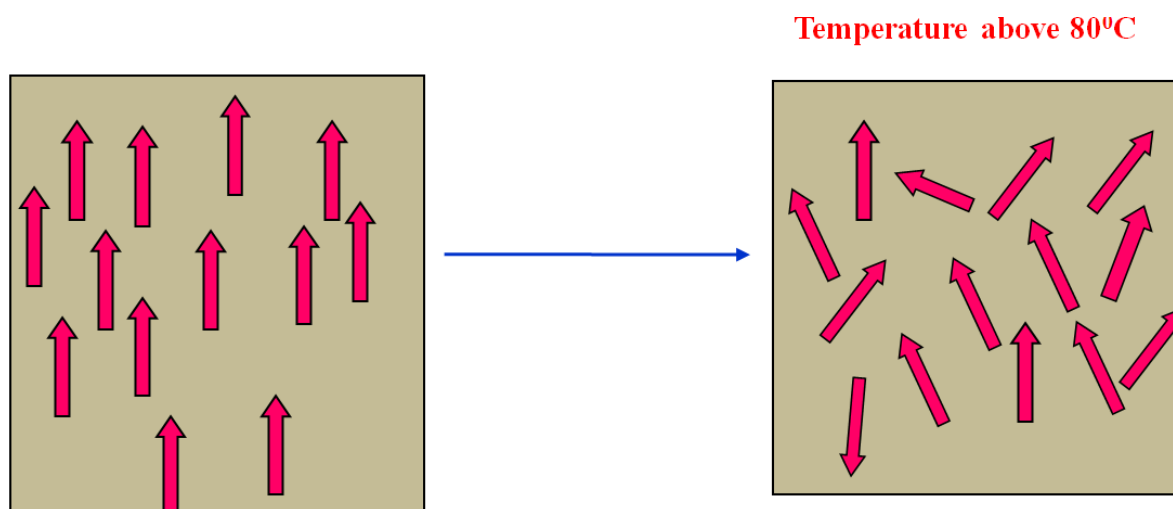
Figure 5. Effect of temperature on orientation polarization

As temperature increases further the energy of the orientations becomes close to the critical potential energy required to align the dipoles or molecules against the applied electric field. Above all mentioned factors contribute to a decrease in net orientation polarisability and hence the dielectric constant values decreases. The same trend is seen in the case of loss factor also. As temperature increases the loss factor increases up to a particular temperature and then starts to decrease. The increase in frequency causes a lag in orientation polarization which in turn results in lowering of the dielectric constant. From the graph it is obvious that at MHz frequency range the value of dielectric constant and dielectric loss of MnO_2 nanoparticles becomes independent of temperature.

4. Conclusion

Manganese dioxide nanoparticles are synthesized using a coprecipitation technique**.** The XRD pattern and Rietveld refinement confirms the phase and the crystal structure formed. The morphology of the sample and material composition has been identified by HRTEM and EDS, respectively. The role of K^+ ions in maintaining the 2 x 2 tunnel framework is studied in detail. The band gap of the sample is found to be 1.68 eV larger than the reported values, which is due to quantum confinement effects. The photoluminescence spectrum throws light on the band structure of α-MnO_2 nanoparticles. The intense emission peak at 1.66 eV corresponds to the band edge emission. The peak at 1.63 eV may be assigned to the oxygen vacancy related defects. A weak peak at 1.65 eV may be assigned to the surface dangling bonds or surface defects due to Mn interstitials. As temperature increases the dielectric constant increases and then decreases after attaining a particular temperature. The increase is due to the increase in mobility of permanent dipoles which leads to orientation polarization.

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Bionanocomposite films based on potato, tapioca starch and chitosan reinforced with cellulose nanofiber isolated from turmeric spent

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ABSTRACT

The aim of this research was to enhance the physicochemical properties of potato starch (PS), tapioca starch (TS) and chitosan (CS) based bionanocomposite films by incorporating with different levels of turmeric nanofiber (TNF). The TNF was prepared from turmeric spent by acid hydrolysis accompanied with high pressure homogenization. The morphology of the bionanocomposites was analyzed by SEM and it revealed their large aggregation cluster with dense structure through tightly packed TNF in the biocomposite films. The attainment of bionanocomposites due to the formation of fresh hydrogen bonds between the hydroxyl groups of PS, TS and CS with TNF authenticated by FT-IR spectroscopy. XRD results exhibited the disappearances of peaks of TNF indicating the reinforcement of TNF in the prepared bionanocomposite matrixes. The tensile strength and Young's modulus of the bionanocomposites were improved tremendously through increasing TNF concentration due to the formation of starch-TNF and chitosan-TNF network. DSC data indicated the addition of TNF significantly increased the onset temperature, peak temperature and conclusion temperature of bionanocomposites; however, the enthalpy change values considerably decreased. The antibacterial test showed the bionanocomposites exhibited excellent antibacterial performance against *Bacillus cereus, Escherichia coli, Staphylococcus aureus* and *Salmonella typhimurium* due to the addition of TNF in the biopolymer matrixes.

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1. Introduction

Biopolymers are defined as biologically degradable polymers which are produced by living organisms. They contain monomeric units that are covalently bonded to form larger structures which are generally sustainable and renewable materials, as they are made from living materials. Biopolymers have a surprising number of responsibilities in our body based on various biomolecular sciences; they hold cells together to form tissues, provide intelligent chemical signals to the cells to guide their behavior, contribute to the hydration of skin and elasticity, lubricate joints and gastrointestinal tracts and protect against pathogens by assembling into the mucus gel that covers the eyes and respiratory tract. The chemical structures and compositions of biopolymers are very similar to the macromolecules of the native extracellular environment. Utilization of these materials in living systems would possibly reduce the simulation of chronic inflammation or immunological

reactions and toxicity which occur frequently when a synthetic polymer device is implanted into the host [1]. The biopolymers demonstrate an elevated prospective to be utilized as a preference to synthetic polymers and plastics, as they are more eco-friendly and are simple biodegradable and renewable materials. The development of innovative technologies and the growth of biological products decrease the confidence in synthetic polymers and plastic materials [2]. Moreover, modified biopolymers can provide the mechanical, thermal and electrical properties required for particular applications. The molecular structures of biopolymers can be altered depending on the plant sources and processing treatments applied, which probably allowed targeted modification of biopolymer molecular structures to design plant based dispersions with tailored properties. Blending of biopolymers are used with the aim to extent their applications especially from natural resources for a wide range of applications like biodegradable, packing materials, automotive industries, agricultural and pharmaceutical industries [1,3].

The natural world has proffered various natural biopolymers particularly polysaccharides such as cellulose, starch and chitosan (CS) and has proven extremely feasible alternative to confect green

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Nanolignocellulose Extracted from Environmentally Undesired *Prosopis juliflora*

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Ⓢ *Supporting Information*

ABSTRACT: Rising sustainability demands the search of new low-market-value sources of lignocellulosic biomass as raw material for nanocellulose processing. In this paper, we accordingly propose the isolation of nanocellulose from *Prosopis juliflora*, an abundant but environmentally undesired tree. *P. juliflora* wood was powered, refined by steam explosion and bleaching, and subsequently used to isolate cellulose nanocrystals and nanofibers by means of acid hydrolysis and mechanical fibrillation. The derived nanocrystals had a rod-shaped structure with an average diameter of 20 nm and length of 150 nm, whereas the nanofibers had a diameter of 10 nm and length in micron size. Moreover, we report a simple method to isolate nanolignocellulose by using partially bleached *P. juliflora* as feedstock. The presence of lignin provided antioxidant and antimicrobial activity to nanocellulose, as well as hydrophobicity and increased thermal stability. The study demonstrates the successful use of *P. juliflora* to extract functional nanomaterials, which compensate for its environmental concern and declining market interest.

INTRODUCTION

Wood is considered one of the most successful engineering materials on earth, which has sustained life, environment, and human society for several centuries. The cell wall is rich in cellulose, lignin, and hemicellulose, where cellulose is the load-bearing entity, whereas lignin and hemicellulose act as the polymer matrix. Nanocellulose, isolated through a top-down approach, has generated great interest as a reinforcement and a building block for functional nanomaterials due to its renewability, biocompatibility, high specific surface area, low density, and good mechanical properties.[1,2] There is an ongoing effort to produce nanocellulose more economically and energy efficiently, for which waste biomaterials (agricultural residues,[3] industrial residues,[4] sidestreams,[5] etc.) are being explored.

Prosopis juliflora is a woody, nitrogen-fixing plant that grows to a height of 5−10 m and is native from South and Central America. This plant can grow in semiarid regions and even under harsh environmental conditions but has declining market interest[6−8] due to its invasive nature. *P. juliflora* has invaded India and other regions throughout the world including Saharan and southern Africa, the Middle Eaast, Pakistan, and Hawaii,[9] where it appears to suppress species native to those regions, besides altering ecosystem services such as water supply, hydrological functioning, grazing potential, and soil quality.[10] The chemical composition of *P.*

juliflora has been reported earlier as cellulose 40−45%, hemicellulose 25−30%, lignin 11−28%, and extractives (sugar, resins, volatile oils, fatty acids, tannins, alcohol, and phenols) 3−15%.[11,12] Multiple attempts to introduce a potential application to *P. juliflora* have been previously reported;[13−16] however, there are no reports about the extraction of nanocellulose from *P. juliflora* yet.

In this work, we explore *P. juliflora* as a source of cellulose nanocrystals (CNCs) and nanofibers (CNFs) and also report the isolation of nanolignocellulose (L-CNC and L-CNF) by simply using partially bleached *P. juliflora* as feedstock. Lignin, considered as a side product in the extraction of cellulose, typically needs to be removed for most applications. However, it has been previously proved that the presence of a certain amount of residual lignin in nanocellulose can actually improve the dispersion and compatibility of nanocellulose in hydrophobic polymeric matrices and nonpolar solvents (without affecting intrinsic properties),[2] as well as acting as an effective free radical scavenger that stabilizes the reactions induced by oxygen and its radical species.[17−19] Moreover, the complete removal of lignin from cellulose requires exhaustive bleaching processes, which increases the commercial value of nano-

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ORIGINAL RESEARCH

Novel ethylene diamine functionalised nanocellulose/poly(ethylene-*co*-acrylic acid) composites for biomedical applications

Sangeetha Chenampulli · G. Unnikrishnan · Sabu Thomas · Suresh S. Narine

Abstract Functionalisation is a viable route for enhancing the interfacial interactions between a hydrophobic polymer matrix and a hydrophilic reinforcement. One of the challenges in this strategy, particularly for reinforcements similar to cellulose, is the improvement in interfacial adhesion while not sacrificing the key properties including biocompatibility. In this part of the present investigation, cellulose nanoparticles were functionalised with ethylene diamine to form aminodeoxy cellulose nanoparticles and subsequently incorporated into poly(ethylene-*co*-acrylic acid) to develop composites. The successful functionalisation was confirmed by FTIR. TEM analysis showed that the reinforcement particles retained their nanodimensions even after functionalisation. The mechanical properties of EAA films were found to be improved by the addition of functionalised nanoparticles. Thermal stability of the nanoparticles and composites was seen to be improved by functionalisation. The functionalised nanocellulose reinforced composites showed excellent biocompatibility.

Keywords EAA · Chlorodeoxy cellulose · Aminodeoxy cellulose · Biocomposite

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Introduction

Chemical modification of cellulose was in practice and was used commercially even before the structure of cellulose was precisely determined. Cellulose nitrate was the earliest known derivative of cellulose which was used as an explosive. The other common derivatives of cellulose include esters and ethers (Lonsdale et al. 1965; Salsa et al. 1997; Grunert and Winter 2002; Alizadeh and Rad 2016). The properties of these derivatives can be modified by varying the degree of polymerisation of cellulose as well as the degree of functionalisation. Chemical modification provides a route for an effective and better utilization of cellulose as polymer reinforcement. Deoxycelluloses are the cellulose derivatives in which the hydroxyl groups are partially or completely replaced by other functional groups (da Silva Filho et al. 2006). Halodeoxycelluloses are interesting compounds because of the ease of

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Ionic liquid modified multiwalled carbon nanotube embedded styrene butadiene rubber membranes for the selective removal of toluene from toluene/methanol mixture via pervaporation

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A B S T R A C T

Present work reports the fabrication of elastomeric membrane based on ionic liquid functionalized multiwalled carbon nanotubes (*f*-MWCNT) incorporated Styrene butadiene rubber (SBR) for the separation of azeotropic composition of toluene and methanol. The fabricated membranes were characterized by morphological analysis using transmission electron microscopy and glass transition temperature and heat capacity measurements by differential scanning calorimetry. Composite membranes demonstrate impressive separation performance with preferential selectivity towards toluene and 5 phr *f*-MWCNT loaded membranes was found to show the best result with respect to toluene flux and selectivity. Optimal separation performance with the permeation flux 225% of SBR control membrane and separation factor of 128 (1.6 times of SBR control membrane) is obtained for this membrane. The concurrent optimization of the physical and chemical structures of toluene permeation path on *f*-MWCNT surface provides the membrane with high-efficiency toluene permeation. Ionic liquid on MWCNT surface confer aromatic pi-pi interaction with toluene molecules leading to greater toluene affinity and higher repellency against methanol. Pervaporation characteristics of the membranes were also strongly influenced by the feed mixture composition. The study confirmed that increasing toluene concentration improved the toluene flux but reduced the separation factor. The experimental pervaporation fluxes were compared with the calculations based on modified Maxwell–Stefan equation. The model allows a good quantitative prediction of experimental flux values.

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1. Introduction

Pervaporation (PV), the membrane based technique for the separation of azeotropes and close boiling mixtures of aromatic–aliphatic hydrocarbons is a potential and preferential technique due to the benefits of energy efficacy, environmental friendly nature and easiness in procedure than distillation and extraction [1]. Relative permeability of components as well as relative chemical potential across the membrane is the two critical parameters which determine the passage of components in the solvent mixture. Applications of pervaporation include azeotropic mixtures, organic–organic mixtures and close boiling liquids separation,

extraction of aromatic compounds from dilute solutions, retrieval of dissolved constituents. High permeability, good selectivity and stability are the vital factors which regulate the performance of a pervaporation membrane [2]. The major difference between pervaporation and other separation technique is that former comprises a phase alteration of permeating species to the vapour state from liquid state. Amount of components transferred through PV membrane is based on a solution-diffusion mechanism, which contains three stages: (1) entry of permeating molecules from the feed solution to the membrane; (2) transport of the permeating molecule through the membrane; and (3) desorption of the permeating molecule to the vapor phase on the downstream side of the membrane. The first two steps *i.e.* sorption and diffusion are identified as the rate-determining step of the mass transfer [3].

Since the mechanism behind the pervaporation process is sorption and diffusion, the relative solvent–membrane interaction

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Title: Selective sensing of curcumin using L-cysteine derived blue luminescent graphene quantum dots

Authors: C. Sudarsanakumar, Subin Thomas, Smitha Mathew, S. Arundhathi, D Rithesh Raj, S. Prasanth, Riju K. Thomas

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Recent Advances and Perspectives in the Synthesis of Heterocycles via Zinc Catalysis

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Abstract. Among the various metal catalysts, zinc salts have enormous potential due to their availability, low toxicity, eco-friendliness and inexpensive nature. Biologically Zn is an essential element in our daily lives and it possesses a wide range of applications in pharmaceutical as well as material sciences. In synthetic organic chemistry, the main role of zinc salts is as a Lewis acid catalyst. The importance of synthesis of heterocycles is attested by the vast number of applications of these compounds in chemical and pharmaceutical industries. The environmentally benign nature of Zn, its abundance and the Lewis acid character of most of its compounds make it a suitable catalyst for heterocycle synthesis. This isthe first review exclusively on Zn-catalyzed heterocycle synthesis and deals with the recent applications, especially using tandem/domino or one pot reaction strategies and covers the literature from 2008-2018.

Keywords: Zn, Catalysis, Heterocycles, Synthesis

1. Introduction

Heterocycles have broad applications in pharmaceuticals, agrochemicals, dyes and many other areas.[1] Until today, even in industry the traditional and conventional transformations for the synthesis of heterocycles prevail, presumably due to reliability, robust nature and low cost of these reactions. However, it is also true that some of these reactions are accompanied with large amounts of by-products as waste. Organic chemists have shown much interest in this area and invested a great deal of efforts to produce these compounds more efficiently by developing new and cost effective synthetic procedures. Among the various synthetic procedures, in recent years a large emphasis was on transition-metal-catalyzed reactions, which minimize waste production and can be more eco-friendly. Indeed, heterocycles having complicated structures with many labile functional groups can be synthesized often from rather simple starting materials through the sequential catalytic processes.

Most of the catalytic reactions have been preceded by the use of palladium catalysts. In 2010, the Nobel Prize in chemistry was awarded jointly to Richard F. Heck, Ei-ichi Negishi and Akira Suzuki for their contributions in palladium-catalyzed cross-coupling reactions in organic synthesis.[2] However, the high cost and toxicology issues of palladium have limited its application in industrial organic synthesis. After the discovery of Pd in catalysis, other metals such as Zn, Fe, Cu, Co, Mn and Ni received much attention in the synthetic community as they are inexpensive, less

1

Enhancement in the Physico-Mechanical Functions of Seaweed Biopolymer Film via Embedding Fillers for Plasticulture Application—A Comparison with Conventional Biodegradable Mulch Film

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Abstract: This study aimed to compare the performance of fabricated microbially induced precipitated calcium carbonate– (MB–$CaCO_3$) based red seaweed (*Kappaphycus alvarezii*) bio-polymer film and commercial calcium carbonate– (C–$CaCO_3$) based red seaweed bio-film with the conventional biodegradable mulch film. To the best of our knowledge, there has been limited research on the application of commercial $CaCO_3$ (C–$CaCO_3$) and microbially induced $CaCO_3$ (MB–$CaCO_3$) as fillers for the preparation of films from seaweed bio-polymer and comparison with biodegradable commercial plasticulture packaging. The results revealed that the mechanical, contact angle, and biodegradability properties of the polymer composite films incorporated with C–$CaCO_3$ and MB–$CaCO_3$ fillers were comparable or even superior than the conventional biodegradable mulch film. The seaweed polymer film incorporated with MB–$CaCO_3$ showed the highest contact angle of 100.94°, whereas conventional biodegradable mulch film showed a contact angle of 90.25°. The enhanced contact angle of MB–$CaCO_3$ resulted in high barrier properties, which is highly desired in the current scenario for plasticulture packaging application. The water vapor permeability of MB–$CaCO_3$ based seaweed films was low (2.05 ± 1.06 g·m/m^2·s·Pa) when compared to conventional mulch film (2.68 ± 0.35 g·m/m^2·s·Pa), which makes the fabricated film an ideal candidate for plasticulture application. The highest tensile strength (TS) was achieved by seaweed-based film filled with commercial $CaCO_3$ (84.92% higher than conventional mulch film). SEM images of the fractured surfaces of the fabricated films revealed the strong interaction between seaweed and fillers. Furthermore, composite films incorporated with MB–$CaCO_3$ promote brighter film, better water barrier, hydrophobicity, and biodegradability compared to C–$CaCO_3$ based seaweed polymer film and conventional mulch film. From this demonstrated work, it can be concluded that the fabricated MB–$CaCO_3$ based seaweed biopolymer film will be a promising candidate for plasticulture and agricultural application.

Keywords: bio-degradable polymer film; seaweed polymer; plasticulture application; conventional film; calcium carbonate
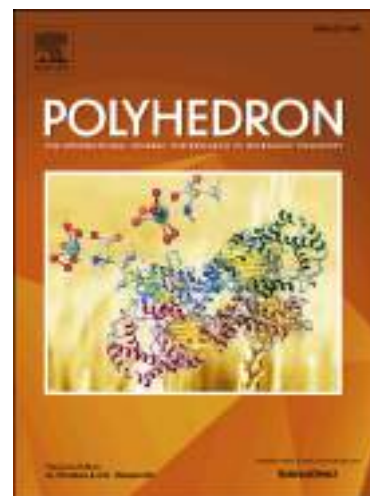
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An Efficient Protocol For The Synthesis Of Thioethers Via Iron-Catalyzed Cross-Coupling Reaction And Its Mechanistic Investigation

K.S. Sindhu, T.G. Abi, George Mathai, Gopinathan Anilkumar

AN EFFICIENT PROTOCOL FOR THE SYNTHESIS OF THIOETHERS VIA IRON-CATALYZED CROSS-COUPLING REACTION AND ITS MECHANISTIC INVESTIGATION

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Supporting Information Placeholder

ABSTRACT: One of the most straightforward methods for the synthesis of diaryl sulfides is the transition metal catalyzed C-S coupling reaction. Herein we report a study on the iron-catalyzed protocol for cross-coupling reaction of aryl halides with thiols. Structurally diverse diaryl sulfides were prepared efficiently by using a catalyst system involving cheap and environment-friendly FeCl$_3$ and non-toxic universal ligand L-Proline. The reaction mechanism for the iron-catalyzed C-S coupling reaction was investigated by means of density functional theory (DFT) methods on a model system. The calculations were performed using hybrid PBE1PBE functional in conjugation with the LANL-2DZ basis set. The key step involved in the mechanism is the formation of a reactant complex in which both reactants are electrostatically bound to Fe(III) proline complex catalyst. The elimination of HI occurs with a much lower TS energy (20.0 kcal/mol) than the uncatalyzed reaction (44.7 kcal/mol).

Transition metal catalyzed carbon-heteroatom cross-coupling reactions are very important in organic synthesis, as the products of these reactions serve as building blocks for various biologically active compounds.[1-11] Over the years, many protocols have been developed for the C-N and C-O linkages, but C-S bond formation leading to substituted thioethers is less studied, despite the fact that these bonds are prevalent in many naturally occurring molecules, drugs and polymeric materials.[12-22] This may be due to the undesired formation of disulfides and catalyst deactivation by binding with metals.[23]

The classical methods for the synthesis of thioethers involve some non-metal mediated routes such as anti-Markovnikov addition of aryl thiols on alkenes, nucleophilic aromatic substitutions of activated aromatic halides, Leuckert thiophenol reaction of a potassium alkyl xanthate with aryl diazonium salt, Sandmeyer-type reaction of diazonium salts with thiolsand the reduction of sulfones or sulfoxides by DIBAL-H or LiAlH$_4$ etc.[24-26] However, these methods suffer from some limitations such as the use of polar solvents like HMPA at high temperature (> 200ºC) and the lack of obtaining high regioselectivity and functional group tolerance.[27]

The use of transition metal complexes as catalysts has brought a dramatic revolution in this field and nowadays transition metal-catalyzed cross-coupling reactions between thiols or disulfides and aryl halides are widely used for the rapid and efficient synthesis of aryl sulfides. In 1978, Migita and co-workers reported the first Pd-catalyzed coupling reaction of aryl halides with thiols.[28] The high cost, low turnover numbers, and sensitivity to air are the limitations of Pd catalysts which restrict the application of these catalysts in large scale preparations. Thus considerable attention has been focused on exploring new
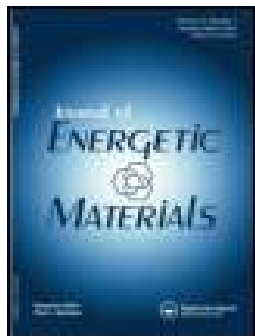
Silicone bridged iron metallocene butadiene composite solid propellant binder: aspects of thermal decomposition kinetics, pyrolysis and propellant burning rate

S. Reshmi, M. Ganesan, P.B Soumyamol, Deepthi Thomas & D.V Athmaja

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Twitter Data Sentiment Analysis on a Malayalam Dataset Using Rule-Based Approach

Deepa Mary Mathews and Sajimon Abraham

Abstract Opinion characterization is nowadays a potential and intense research focus because of the hasty growth of social media such as blogs and social networking sites, where individuals put in freely their perspectives on different themes. Researches prove that people find it comfortable to opinionate in their mother tongue, be it verbal or written. Given that now almost all social platforms support most of the popular languages, the requirement to mine the sentiments in various dialects is on the rise. However, not all data may be relevant; some may not have any impact on the end result and some may have similar meanings. A preprocessing phase is hence required to help make the dataset concise. In this paper, the authors focus on finding out the polarity of the words input by various users through their reviews exhibited using the South Indian language, Malayalam. Malayalam like the other languages in the Dravidian family exhibits the characteristics of an agglutinative language. The preprocessing process consists of cleaning the data, tokenization, stopword removal, etc. In this paper, authors are focusing on the document-based polarity calculation of the Malayalam reviews. The overall polarity of the corpus is calculated based on the positivity and negativity values of individual documents. It is found that negativity value is higher for the user reviews in our corpus which shows their negative attitude toward the news thread with the classifier accuracy of 89.33%.

Keywords Opinion mining · Sentiment analysis · Stopword removal · Malayalam · Lexicon based · Naïve Bayes · Machine learning

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Novel Quality Metric for Image Super Resolution Algorithms - Super Resolution Entropy Metric (SREM)

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Abstract. Even with the topical developments of numerous image Super Resolution (SR) algorithms, how to quantify the visual quality scores of a super resolved image is still an open research problem. Majority of SR images are evaluated by full-reference metric with the support of a reference image. There are some circumstances when a reference image is unavailable or is with degraded quality. We propose a super resolution benchmark Super Resolution Entropy Metric (SREM) which can be used to evaluate the effectiveness of pixel reconstruction and quality of the image in the absence of reference image automatically. SREM measures the experimental quality of an SR image based on the perceptions of acutance and spatial discontinuity features in the gradient domain and wavelet domain. Experimental scores illustrate that the SREM metric is competent for assessing the visual quality of super-resolved images.

Keywords: Super resolution · Image quality metric ·
No-reference metric · Spatial discontinuity · Acutance

1 Introduction

Image Super-Resolution (SR) mechanism is a cost-effective and feature preserving image resolution augmentation approach. It is a stimulating research area of image science to accomplish enhanced spatial resolution and quality of images. As SR technology has been advanced for more than three decades, both multi-frame and single-frame SR have key applications in our day-to-day life. SR applications comprises Generic Image Enhancement, Medical Imaging, Infrared and Ultrasonic Imaging, Satellite and Aerial Imaging, Face Hallucination, Text Image Restoration, Transforming NTSC video content to HD television, Criminal Investigation etc. A wide range of super-resolution algorithms have been introduced focused on edges [1], gradient directions [2,3], neighboring interpolation [4,5], learning-based [6], image patches [7–9] and CNN based [10]. Most of the aforementioned SR approaches emphasize on generating high quality HR image with

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Recent advances and applications of
p-toluenesulfonylmethyl isocyanide (TosMIC)

Arun Divakar Mathiyazhagan [ID] [a] and Gopinathan Anilkumar [ID] *[a,b]

Since its introduction in 1972, TosMIC (*p*-toluenesulfonylmethyl isocyanide) has been recognised as an important building block in organic synthesis and a wide range of reaction strategies have been reported. This review article encompasses literature starting from 2011 and highlights the uniqueness of the TosMIC reagent in an assortment of synthetic methodologies. The advances in classical methodologies involving *p*-toluenesulfonylmethyl isocyanide which allow for the effortless synthesis of many simple/fused hetero-cycles *via* cycloaddition, regio- and stereo-selective, cascade/domino/tandem multicomponent, and metal catalyzed reactions and some natural products are presented in this review. This concise review provides a brief introduction about the reagent and its synthetic importance and flexibility in various reactions.

1. Introduction

Isocyanides (R–N≡C) have been crowned as versatile reagents by organic chemists because of their wide range of synthetic utilities and applications.[1] The current findings add to the

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growing body of literature on convertible isocyanides. In a nut-shell, isocyanides could be called universally convertible fragments owing to their application in more than one reaction category. Among the aryl and alkyl isocyanides, *p*-toluenesulfonylmethyl isocyanide, generally abbreviated as TosMIC, has attracted researchers due to its impressive structural features, stability and reactivity.[2] Unlike other isocyanides, TosMIC is odourless. The structural features of this versatile synthon are of greater utility in synthesizing organic compounds and show comprehensive chemistry with different functionalities. It contains three different groups, namely the isocyanide functional-

Arun Divakar Mathiyazhagan

Arun Divakar was born in Madurai, Tamil Nadu, India, in 1984. He obtained his Bachelor's degree from The American College and his Master's degree in Chemistry from SVN College, Madurai. He has worked in two R&D centers in Chennai and then joined as a project fellow in an UGC-MRP project (2011) at the School of Chemistry, Madurai Kamaraj University. He completed his Ph.D. (2017) under the guidance of Dr S. Sivakumar. Currently he is working as a post-doctoral fellow (SERB-NPDF) at Mahatma Gandhi University under the mentorship of Dr G. Anilkumar. His field of interest is synthesizing novel hetero-cyclic compounds via metal-catalyzed reactions.

Gopinathan Anilkumar

Gopinathan Anilkumar was born in Kerala, India, and received his Ph.D. in 1996 from the Regional Research Laboratory-CSIR, Trivandrum, under the guidance of Dr Vijay Nair. He did his post-doctoral studies at the University of Nijmegen, The Netherlands (Professor Binne Zwanenburg), Osaka University, Japan (Professor Yasuyuki Kita), Temple University, USA (Professor Franklin Davis) and Leibniz-Institut fur Katalyse (LIKAT), Rostock, Germany (Professor Matthias Beller). Currently he is a professor in Organic Chemistry at the School of Chemical Sciences, Mahatma Gandhi University, Kerala, India. His research interests are in the areas of organic synthesis, medicinal chemistry, heterocycles and catalysis. He has received the Dr S. Vasudev Award from the Govt of Kerala, India. His h-index is 25.

Minimum Bend Shortest Rectilinear Route Discovery for a Moving Sink in a Grid Based Wireless Sensor Network

Sanu Thomas, and Thomaskutty Mathew

Abstract—In a rectilinear route, a moving sink is restricted to travel either horizontally or vertically along the connecting edges. We present a new algorithm that finds the shortest round trip rectilinear route covering the specified nodes in a grid based Wireless Sensor Network. The proposed algorithm determines the shortest round trip travelling salesman path in a two-dimensional grid graph. A special additional feature of the new path discovery technique is that it selects that path which has the least number of corners (bends) when more than one equal length shortest round trip paths are available. This feature makes the path more suitable for moving objects like Robots, drones and other types of vehicles which carry the moving sink. In the prosed scheme, the grid points are the vertices of the graph and the lines joining the grid points are the edges of the graph. The optimal edge set that forms the target path is determined using the binary integer programming.

Keywords—Minimum bend Shortest Paths, Travelling salesman problem, Binary integer programming, Edge orientation index, Vertex Bend Index, Vertex-Edge Incident Matrix

I. INTRODUCTION

A TRADITIONAL Wireless Sensor Network uses static sensor nodes and a static sink that collects data from the sensors over multi-hop transmission. But, when the sensors are sparsely distributed in a large geographic area, the network may not be fully connected because of the limited communication range of the sensor nodes. Then the sensors far away from the static sink may not be able to send their data to the sink. In such a scenario, a mobile sink is used to collect data from the sensors [1-5] by physically moving around the WSN. Here, it is assumed that the geographical region occupied by the sensors is suitable for the physical travel of the mobile sink and it can physically approach the area formed by the communication range of the individual sensors. In general the mobility and the scheduling of a mobile sink are deterministically controlled. The mobile sink provides a higher degree of flexibility for the efficient functioning of the WSN.

A. Moving Sink Closed Path

In general, the Mobile Sink (MS) starts from a home station, say, Base Station (BS), travels around the WSN visiting the sensors nodes, collects data and returns back to the home station. This forms a round trip tour. This process is repeated periodically depending on the nature of the application. The travel of the MS that visits different sensor nodes is similar to that of a travelling Salesman visiting the specified cities. Therefore the round trip path of the MS should be the shortest one that covers all the specified sensors.

Thus the determination of the Moving Sink Closed Path (MSCP) is same as solving the Travelling Salesman Problem (TSP). The TSP applied to the MS is called the Moving Sink Problem (MSP).

B. Rectilinear Route

In this paper, we consider a grid based WSN where the sensor nodes are placed at selected grid points. The main constraint for the MS is that it has to travel along the horizontal and vertical grid lines only and thus the MS path is a rectilinear route. More detailed descriptions are given later.

C. Minimum bend paths

Bends or corners are unavoidable along the travel path due to the topological constraints. The presence of bends or corners along the path reduces the velocity of MS and increases the energy consumed by the MS. Therefore, the number of bends has to be minimized for efficient travel of the MS.

D. Objective and methodology

The objective is to solve the MSP with minimum number of bends along the rectilinear path as the additional constraint. We use the **Binary Integer Programming** to solve this bi-objective optimization problem.

E. Organization of the paper

Section II gives a brief discussion about the related work by other authors. Section III describes the system model and the deployment of sensor nodes on the grid graph. Section IV contains the details about the MS path selection problem. Section V describes the associated constraints and their algebraic formats. Section VI formulates the binary integer program to solve the MS optimal path problem. Section VII gives the simulation results. Section VIII gives comparison with other methods. Section IX contains the conclusion.

II. RELATED WORK

V. G. Deineko , B. Klinz , A. Tiskin , G. J. Woeginger [6] have solved the Travelling salesman problems by dynamic programming. It is a modified and improved version of exhaustive search. It's time complexity is approximately

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Endophytic diversity of hanging velamen roots in the epiphytic orchid *Acampe praemorsa*

Azhanthanilkunnathil S. Deepthi & Joseph G. Ray

An Image Encryption Method Using Henon Map and Josephus Traversal

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Abstract. Image security is a vital issue in multimedia communications. Chaos based image encryption has become very popular now a days due to the properties of chaotic systems such as unpredictability, ergodicity and sensitivity to initial conditions. This paper proposes a chaos based image encryption technique for gray scale images. Image pixels are scrambled using Josephus permutation sequence and Henon map is used in diffusion process. Encrypted image is obtained through permutation and diffusion process. Security analysis shows that the proposed encryption scheme can accomplish good encryption results.

Keywords: Henon map · Josephus permutation sequence · Image encryption · Security analysis

1 Introduction

With the rapid development of communication technology a large amount of digital image is transmitted over the network. These images can be accessed and modified by unauthorized users. So it is necessary to protect them from unauthorized access to ensure image security. Conventional encryption techniques are not suitable for digital image encryption because of the large size of image and high correlation among the pixels. Recently, image encryption algorithms using chaos theory has become an active research area as the chaotic system offers an excellent combination of speed and security. They also provide better properties in security and complexity. Chaos based cryptosystem can be implemented either using one-dimensional or higher dimensional chaotic maps. In each of the encryption schemes diverse chaotic maps are used. Recently a lot of image encryption techniques applied one or two dimensional chaotic map [1–11] to ensure confusion and diffusion in image encryption. However, most of them are proved to be insecure. Some other encryption techniques utilize hyper chaotic systems [12–14] for encrypting images. Hyper chaotic systems possess more complex structure and better chaotic performance. Novel image encryption techniques are also implemented on multiple one-dimensional or higher-dimensional chaotic systems based on the fact that applying more than one chaotic map can achieve better key space and higher security.

The concept of Josephus permutation sequence has been used in several image encryption techniques [15–18]. In [15, 16] Josephus traversal is used only for pixel

An Effective Approach for Party Recommendation in Voting Advice Application

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Abstract. When it comes to the current political scenario the large number of political parties put voters, especially first time voters, women, youngsters etc., in confusing state regarding whom to vote for. To solve this issue of, Voting Advice Applications (VAAs) which are questionnaire based recommender systems are used. VAAs are online tools that suggest the user with the most suitable party based on answers to the policy based questions. Even though this is an active area of research in the western political scenario, the performance of the existing algorithms are not very appreciable. Also the existing works have not imparted the human decision making behavior in developing algorithms. This research work aims in proposing novel approaches based on the human decision making which can efficiently suggest suitable parties for the voters. Soft set and Fuzzy Soft Set are techniques that are found to be good in modeling human decision making as it supports parameterization and vagueness. The proposed work uses these techniques to develop algorithms that can effectively suggest the voter with a suitable party. The research is carried out in the domain of political scenario in Kerala, where this is the first research in the area of VAAs. The developed algorithms were evaluated on a data set collected from various parts of the state and found promising.

Keywords: Voting Advice Application · Soft set · Fuzzy soft set

1 Introduction

The exponential growth of digital information in the World Wide Web and the number of visitors to the Internet has made a dramatic increase in the size and complexity of websites, which made searching for information cumbersome and time consuming [1]. Researchers are nowadays keen on developing techniques that brings to the user the information that is in accordance with the user's interest and preference. Thus Recommender systems were developed in order to suggest the users with items of their interest. Recommender system can simply be defined as software tools and techniques providing suggestions for user in the Internet. They ensure that the websites are more personalized with service and content of his preference and choice.

In the current political scenario, many developed nations are being threatened by the reduced voter turnout [2]. Also the increasing number of political parties along with massive amount of online information puts people in dilemma on whom to vote for.

Structure, diversity and utilization of plant species in tribal homegardens of Kerala, India

M. Veena George [ID] · **G. Christopher**

Abstract Homegardens in traditional agroforestry systems are considered as sustainable production system with multiple functions. Indigenous knowledge of tribal communities associated with their homegardens always contributes in food security and biodiversity conservation. The present study aims at understanding the structural and floristic diversity of the homegardens, and utilization of plant species by the tribal communities in the Attappady valley of Kerala, India. Overall 104 homegardens were sampled randomly for assessing the diversity and the usage of various plant species. Data on indigenous knowledge was collected from tribal owners. Structurally, two types of homegardens were identified from the study area, which characterized by two and four layered vertical canopy strata. A total of 182 plant species belonging to 160 genera and 67 families were recorded from the sample homegardens. Comparing the diversity and distribution of plant species among the three communities, highest was found in the homegardens of Mudugas who are inhabiting the high and medium rainfall zones (Shannon diversity index 2.18) and observed its lowest value in the low rainfall zone where Irula communities live (Shannon diversity index 1.45). The homegardens of the study area has rich diversity and home for many useful plants. Considering the usage, 39% were edible, 24% were ornamental and 25% were medicinal. Hence the study indicates that the tribal homegardens are contributing considerably to food security and livelihoods of tribal communities in the Attappady valley.

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Introduction

Homegardens are a typical type of traditional agroecosystems, being intensively managed lands situated close to human dwellings (Ninez 1987; Hamilton and Hamilton 2006; Peyre et al. 2006a). Homegardens can be defined as an assemblage of plants, which may include trees, shrubs and herbaceous plants, growing in or adjacent to a homestead or home compound, planted and maintained by members of the household, and the products and services are intended primarily for household consumption and ornamental value

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Review Article

Strategically Placed Trifluoromethyl Substituent in the Realm of Antitubercular Drug Design

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Abstract:

Background: Fluorinated substituents have played, and continue to play an important role in antitubercular drug design. Nonetheless, previous works have indicated that organofluorines like $-F$, CF3, -OCF3, and CHF2 etc have been used to modulate the pharmacodynamic and pharmacokinetic behaviour of antitubercular agents. Among the fluorinated groups, trifluoromethyl (-CF3) substituent is a very familiar pharmacophore used widely in antitubercular research.

Objective: This review assesses the development of selected trifluoromethyl group bearing antitubercular agents that are either in treatment or considered to be potential. The prime objective of the present investigation was to provide initial evidences for the hypothesis that addition of trifluoromethyl group to antiTB agents could improve their potency. We also aimed to contribute to a better understanding of the role of trifluoromethyl group on drug-likeness antitubercular activity.

Methods: In this review, we first brief out the possible effect of $-CF3$ substituent on pharmacodynamic and pharmacokinetic properties of drugs. Next, we turn to emphasize on the effect of trifluoromethyl substituent on different antitubercular scaffolds. Finally, we open the topic for the researchers to design potential antitubercular agents suitably substituted with fluorinated groups.

Results: This review suggests that the replacement of $-CF3$ group in heterocyclic as well as phenyl ring led to the improvement in

Semantic Web Query Join Optimization Using Modified Grey Wolf Optimization Algorithm

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Abstract: Presently, the distributed Resource Description Framework (RDF) partition the data across several computer nodes. In that, many existing RDF systems results in expensive query evaluation and high start-up cost. To address these issues, a new optimization algorithm: modified Grey Wolf Optimization (GWO) has been developed in this research paper. In conventional GWO algorithm, after finding the best values of G_α, G_β and G_δ, stopping criteria is accomplished. In modified GWO algorithm, after finding the best values of G_α, G_β and G_δ, the alpha α value once again encircles the possible solutions for obtaining an optimal solution. In RDF data, query optimization is a challenging task, which has been effectively handled by modified GWO algorithm. In the experimental phase, modified GWO showed good performance in terms of execution time and memory usage as compared to the existing methodologies: Partial Evaluation and Centralized Assembly (PECA), Partial Evaluation and Distributed Assembly (PEDA), RDF-3X, Graph-Based SPARQL Query Engine (gStore), and Legato on Lehigh University Benchmark (LUBM) 10000 and DOREMUS 2017 datasets. Compared to these existing systems, the proposed system reduced the execution time around 2-5 minutes, and improves the precision, recall, and f-measure around 2-7%.

Keywords: Grey wolf optimization, Lehigh university benchmark dataset, resource description framework, structural query language, web query optimization.

1. Introduction

In recent decades, the large quantity of available data sources makes the data representation and classification as a complex process, so it is essential to represent the data in a semantically structured way that mainly relied on the RDF data model [1]. Presently, the data representation in RDF data model constantly growing in size, so querying and storing the RDF graphs becomes a very challenging task [2, 3]. Several approaches developed for increasing the efficiency of query retrieval. Most of the present approaches use map SPARQL queries and database management systems to structural query language for query retrieval [4, 5]. In addition, a few more approaches like RDF-3x, Jena, sesame, etc. developed for single node machines in the distributed environment [6]. These existing methods increase the storage space and delivers parallel query execution capabilities for managing the huge datasets [7]. The distributed environmental system utilizes a few Hadoop techniques: S2RDF, sempala on top of impala, rya on top of apache accumulo, SPARQLGX on top of apache spark, etc. [8]. These existing Hadoop systems optimized for a specific query pattern that may marginally improve the query performance.

So, there is a need for distributed RDF store with better performance on an extensive range of query types without renouncing a rapid loading phase. Generally, the computational time of the query depends on the optimization algorithm and query path. The size of the query path increases with the size of queries, so it consumes less time to optimize the query path [9, 10]. Presently, numerous soft computing methodologies utilized to reduce the time consumption and query path optimization. In this research study, an effective methodology developed

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Synthesis of Superparamagnetic Iron Oxide Nanoparticles Stabilized by Biocompatible Supramolecular β-Cyclodextrin for Biomedical Applications

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Abstract

Superparamagnetic iron oxide nanoparticles have always been a topic of significance in biomedical research due to their tremendous range of applications. The present study reports the synthesis of superparamagnetic Fe_2O_3 nanoparticles by a simple $NaBH_4$-reduction, stabilised by supramolecular inclusion host β-cyclodextrin. The crystallite size was calculated from X-ray diffraction studies using Debye Scherrer equation and found to be in the range 14-23 nm. The antibacterial activity of the sample was studied against *Vibrio cholerae* and *Clostridium botulinum* using disc diffusion method. Antifungal activity was monitored against three fungal strains *Candida auris, Trichophyton rubrum* and *Cryptococcus gatti* using well diffusion method.

Keywords: Fe_2O_3; β-Cyclodextrin; Superparamagnetic; Antibacterial; Antifungal.

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RESEARCH ARTICLE

Biofilm Changes of Clinically Isolated Coagulase Negative Staphylococci

K. R. Soumya[1] · P. Jishma[1] · Sheela Sugathan[2] · Jyothis Mathew[1] · E. K. Radhakrishnan[1]

Abstract Coagulase Negative Staphylococci (CoNS) are remarkable for the heterogeneity in the chemical composition and structural architecture of its biofilm. The present study was aimed to investigate the impact of various factors on biofilm structure and composition of clinically isolated CoNS. Here, comparative microscopic analysis on CoNS biofilm was carried out under various physiological conditions. Quantitative and electron microscopic analysis of biofilm was conducted in the presence of different concentrations of glucose, NaCl, plasma and serum. From this, different CoNS strains were found to form its own pattern of biofilm in the presence of glucose or NaCl and also with respect to the biofilm-associated genes present. The growth conditions used in the study for the CoNS were shown to induce biofilm formation with the structural features designed by its genotype. The study gave insight into the fine modulation of CoNS biofilm structure in accordance with species, genetic basis and environmental conditions. Hence, the results can have clinical significance.

Keywords Biofilm · PIA · *ica* independent · SEM · TEM

Significance Statement Biofilm architecture of clinically isolated Coagulase Negative Staphylococci was found to get modulated by various factors.

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Introduction

High-frequency isolation of Coagulase Negative Staphylococci (CoNS) from clinical samples has identified their role in various biomedical related infections like vascular graft infection, neurosurgical shunt infection and infection of prosthetic and orthopedic devices [1]. The clinical significance of CoNS has been identified to be enhanced with the increased use of advanced invasive procedures and also with frequent use of medical implants and catheters [2]. Due to the presence of an array of highly specialized attachment factors, CoNS are able to form biofilm possibly on any surface. Their seeding and colonization on medical devices during the surgical procedures have been reported to favor biofilm formation with subsequent device failure [3]. As the biofilm is also associated with multidrug resistance, even the antimicrobial therapy has limited application to control CoNS infection [4].

Biofilm provides an ideal environment for the intercellular communication, creation of nutrient gradient, and exchange of genes and resistance plasmids to protect the cells from environmental threat [5]. In the biofilm mode of life, CoNS have been suggested to form highly ordered and multilayered sessile bacterial aggregates which are less accessible to the host defense system and antimicrobial agents [6]. Variety of protein and non-protein factors are identified to be involved in the adherence, accumulation, maturation and dissemination stages of CoNS biofilm. Initial bacterial attachment and intercellular adhesion are mediated through cell-wall-anchored proteins like Bhp, AtlE and Fbe [7]. CoNS have also been reported to use staphylococcal surface proteins 1 and 2 (Ssp 1 and Ssp 2 lipase GehD) and collagen binding factor (SdrF) for primary attachment [8]. The accumulative and maturation stages of biofilm formation involve the production of

A Novel Video Genre Classification Algorithm by Keyframe Relevance

Jina Varghese and K. N. Ramachandran Nair

Abstract Video classification is one of the challenging areas in the current world. It is a necessary tool for systematic organization and efficient retrieval of videos from repositories. Generally, video classification is a complex operation since video is a composite media with different components. Here, we propose a novel and simple probabilistic approach to classify the videos, broadly into three major domains *news*, *sports*, and *entertainment*. The existence measures of respective scene types in video genres are the prominent factor used in the proposed approach for video classification. We have tested our work on some test videos like football, wedding, and news discussion videos and results sound well ….

Keywords SBD (shot boundary detection) · Key frame extraction · Scene classification · Video classification

1 Introduction

Multimedia has been a recent field of communication and several tools have emerged to process it in the last decade. Videos are the most popular and useful type of multimedia. Repositories in online and off-line media hold massive amount of videos through archives; and the growth rate of the digital video is increasing exponentially. These repositories are struggling to manage the huge amount of data. The difficulty in managing video repository is due to the presence of composite types of events/videos present in any videos. An authentic rule about the event types for a specific video category is not at hand. The broad categories of events and their

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Cost Evaluation of Virtual Machine Live Migration Through Bandwidth Analysis

V. R. Anu and Elizabeth Sherly

Abstract Live migration permits to transfer constantly running Virtual Machine from source host to destination host. This is an unavoidable process in data centre in various scenarios such as load balancing, server maintenance and power management. Now, live migration performance optimization is an active area of research since performance degradation and energy overhead caused by live migration cannot be neglected in modern data centres; particularly if critical business goals and plans are to be satisfied. This work analyses the effect of proper bandwidth allocation during cost-aware live migration. Here, we design a cost function model based on network bandwidth between live migration process and service based on queuing theory. From experimental analysis, we infer that link bandwidth is a critical parameter in determining VM live migration cost.

Keywords Bandwidth · Cloud computing · Downtime · Live migration Virtualization

1 Introduction

Virtual machines are widely used in data centres with the evolution of virtualization technology. It furnishes a steady isolation and remarkably increases the physical resources utilization. Live migration is a process of copying VM operating system from source machine to destination machine, while the OS in running mode. It is an inevitable process across physical servers and is a great help for administrators of data centres. It provides power management, fault tolerance, load balancing, server consolidation and low-level system maintenance. But live migration can result in VM

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An innovative and efficient method for Twitter sentiment analysis

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Abstract: The research in sentiment analysis is one of the most accomplished fields in data mining area. Specifically, sentiment analysis centres on analysing attitudes and opinions relating a particular topic of interest using machine learning approaches, lexicon-based approaches or hybrid approaches. Users are purposive to develop an automated system that could identify and classify sentiments in the related text. An efficient approach for predicting sentiments would allow us to bring out opinions from the web contents and to predict online public choices, which could prove valuable for ameliorating changes in the sentiment of Twitter users. This paper presents a proposed model to analyse the brand impact using the real data gathered from the micro blog, Twitter collected over a period of 14 months and also discusses the review covering the existing methods and approaches in sentiment analysis. Twitter-based information gathering techniques enable collecting direct responses from the target audience; it provides valuable understanding into public sentiments in the prediction of an opinion of a particular product. The experimental result shows that the proposed method for Twitter sentiment analysis is the best, with an unrivalled accuracy of 86.8%.

Keywords: sentiment analysis; machine learning approach; lexicon-based approach; supervised learning.

Biographical notes: Hima Suresh is a Research Scholar from the School of Computer Sciences, Mahatma Gandhi University, Kottayam, Kerala, India. She received her MTech in Software Engineering from the Karunya University, Coimbatore, India. Her research interest includes data mining, machine learning and pattern recognition.

IALM: Interference Aware Live Migration Strategy for Virtual Machines in Cloud Data Centres

V. R. Anu and Sherly Elizabeth

Abstract In IT industry most of the real-time online services are cloud based. Large data centres have been widely used to allocate and establish these services through virtual machines (VM) in physical servers. Live migration is a mandatory feature of all modern hypervisors in these cloud data centres for implementing key services like load balancing, server consolidation, high availability, etc. without much delay. Performance optimization of live migration is an active are of research now. But there has been little attention given by research community on the area named VM migration interference or resource contention among co-located VMs as a by-product of live migration, which cause performance degradation and may lead to SLA violation. Here we present an interference aware VM live migration strategy IALM which manages effectively the issue generated by VM interference while live migration. Extensive experiments and large scale simulation are done with CPU intensive and network intensive workloads on Xen platform to feature out performance gain in terms of network throughput and CPU consumption. VM migration interference like nature of workloads, system properties, characteristics including intensity and length of interference are also analysed in this work.

Keywords Cloud computing · Live migration · Performance interference Virtualization

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RESEARCH ARTICLE

Role of Nanocurcumin as a Surface Modifying Agent with Excellent Preventive Effect on Device-Related CoNS Infections

K. R. Soumya[1] · P. Jishma[1] · R. Dhivya[2] · Jamespandi Annaraj[2] · Sheela Sugathan[3] · Jyothis Mathew[1] · E. K. Radhakrishnan[1]

Abstract The study focused on the analysis of efficiency of curcumin and nanocurcumin (NC) against biofilm-forming methicillin-resistant clinical isolates of *Staphylococcus epidermidis* and *Staphylococcus haemolyticus*. Antibacterial, minimum inhibitory concentration and anti-biofilm activities of both curcumin and NC were carried out, and the specific changes were analyzed by transmission electron microscopy (TEM). Surface modifying effect of NC was further analyzed by coating it onto nasogastric polyvinyl chloride (PVC) tubes followed by challenging it with selected pathogens, and the results were visualized by scanning electron microscopy. Curcumin and NC were found to have antibacterial effects at a concentration of 100 and 10 μg mL^{-1}, respectively. Also 250 and 500 μg mL^{-1} concentrations of NC were found to have 99% inhibition on biofilm formation of *S. epidermidis* and *S. haemolyticus*. TEM analysis of NC-treated coagulase-negative staphylococci (CoNS) samples showed remarkable inhibition of biofilm formation with the complete lysis of bacterial cell. NC functionalization showed excellent preventive effect on bacterial adhesion and biofilm formation on nasogastric PVC catheters and hence has the promises to be used as alternative chemotherapeutic agents. The current study forms the first report on detailed investigation on potential of NC as an effective agent against CoNS, which is well known for biomedical infection.

Keywords Antibiofilm · MRCoNS · Nanocurcumin · Ryle's tube · Surface modification

Significance statement Nanocurumin functionalization on nasogastric catheter prevented adhesion and biofilm formation by coagulase-negative staphylococci.

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Introduction

Curcumin is a natural polyphenolic flavonoid present in the rhizome of *Curcuma longa* L. This has been used from ancient times in Ayurvedic medicines due to its antioxidant and free radical scavenging properties [1, 2]. Curcumin has wide range of applications as anti-inflammatory, antioxidant, anticarcinogenic, antimutagenic, antidiabetic, antibacterial, antifungal, antiprotozoal, antifibrotic, antiulcer and hypocholesterolemic agent [3]. Antibacterial effects of curcumin on both Gram-positive and Gram-negative bacteria of clinical significance have already been demonstrated in various studies [4]. Also many reports are there on its antibiofilm activity against *S. aureus*, *E. coli*, *Pseudomonas* spp., *S. mutans* and *H. pylori* [5]. Apart from all these multidisciplinary beneficial effects, therapeutic use of curcumin is limited due to its poor solubility, metabolism, rapid elimination and less bioavailability [6].

Nanomised curcumin particles called nanocurcumin have been suggested to have enhanced bioactivity due to its high surface area-to-volume ratio [7]. The excellent physicochemical features of nanocurcumin have also resulted in its improved solubility, bioavailability, enhanced absorbance and reduced medicinal doses with an

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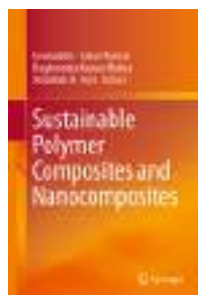
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Sustainable Polymer Composites and Nanocomposites

Editors: **Inamuddin**, I., **Thomas**, S., **Kumar Mishra**, R., **Asiri**, A.M. (Eds.)

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About this book

This book presents emerging economical and environmentally friendly polymer composites that are free of the side effects observed in traditional composites. It focuses on eco-friendly composite materials using granulated cork, a by-product of the cork industry; cellulose pulp from the recycling of paper residues; hemp fibers; and a range of other environmentally friendly materials procured from various sources.

The book presents the manufacturing methods, properties and characterization techniques of these eco-friendly composites. The respective chapters address classical and recent aspects of eco-friendly polymer composites and their chemistry, along with practical applications in the biomedical, pharmaceutical, automotive and other sectors. Topics addressed include the fundamentals, processing, properties, practicality, drawbacks and advantages of eco-friendly polymer composites.

ICNAN 2016

Molecular transport of aromatic solvents through oil palm micro fiber filled nitrile rubber composites

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Abstract

The cellulose micro fiber reinforced nitrile rubber biocomposites were prepared. The effect of chemical treatment on the fiber surface morphology and fiber–rubber interface was investigated using scanning electron microscopy. The transport property through the bio-composites was investigated using aromatic solvents. The effect of chemical treatments on fiber, influence on fiber loading, penetrant size and temperature on the solvent uptake through bio-composites was analyzed. The transport coefficients such as diffusion, permeation and sorption coefficients were estimated by using the van't Hoff relationship and hence the thermodynamic parameters was determined. The first order kinetic rate constant was evaluated and finally the experimental results of diffusion properties were compared with theoretical predictions.

Keywords: Biocomposites; Diffusion; Cellulose microfiber; Sorption studies

1. Introduction

The natural fiber reinforced composites have an important position among the conventional composite materials because of its simplicity of processing, fast production cycle and economic value. Nowadays, the biocomposites get enough space to use this material for automobile and electrical applications [1]. The development of biodegradable materials in the composite industry is very significant during last few years because of the strong environmental regulations and increased interest in the proper utilization of renewable natural resources [2]. The compatibility of the fibers with polymeric matrices and resistance to moisture plays an important role in the selection of fibers. The interfacial bond strength between the fibers and matrix is the important factor that determines the material performance [3]. The matrix layer near to the fiber surface has different properties from the bulk polymer matrix because of fiber/polymer interactions. This mainly happen due to the immobilization of polymer chains, electrostatic forces or chemical bonds, voids or micro cranks formed in the interlayer [4].

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Pilgrim Satisfaction in a Mass Religious Gathering: Study from Sabarimala Destination, Kerala State of India

Joice K. Joseph[1] · K. G. Ambady[2] · Karunakaran Akhil Dev[1] · Edbert B. Hsu[3] · A. P. Pradeepkumar[4]

Abstract

Identification of basic factors of pilgrim satisfaction is essential to responsive authorities for effective implementation of devotee welfare programmes. The determinants of satisfaction in a particular location are comprised of environmental, economic and sociocultural activities. The Sabarimala hill temple is one of the major Sastha temples in India. Every year, about 25 million pilgrims visit the temple from all parts of the country and abroad. The present study analyzes devotee satisfaction according to their demographic profile and identifies key factors that affect the overall satisfaction of pilgrims visiting the temple at the Sabarimala mass gathering destination. A total of 526 visitors were contacted with a prestructured, field tested questionnaire. This was analyzed using the Statistical Package for Social Sciences. Factor analysis, regression analysis and two-step cluster analysis were used to elucidate satisfaction parameters. The identified factor groupings for pilgrim satisfaction at Sabarimala destination are food and accommodation, safety and security, health and sanitation, ecology and environment and and communication and transportation. From the analysis of various results of the present study, it is evident that the mass pilgrimage of Sabarimala destination exhibits the signs of a secular experience and its visitors are mainly motivated by spiritual aspects.

Keywords Pilgrim satisfaction · Sabarimala · Factor analysis · Mass gathering · Religiosity

Introduction

Pilgrimages are the basic forms of human movement and can be found in all major world religions (Collins 2010) with millions across the globe taking part (Blackwell 2007; Swatos and Tomasi 2002). Those who visit sacred places are referred to

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An objective function based technique for devignetting fundus imagery using MST

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ARTICLE INFO

ABSTRACT

Fundus photography is a powerful imaging modality that is utilized for detecting macular degeneration, retinal neoplasms, choroid disturbances, glaucoma and diabetic retinopathy. As the illumination source in fundus imaging is situated at the center of the fundus camera, the illumination at the peripheral regions of the images would be relatively less than the center, which is termed vignetting. Vignetting adversely affects the performance of computerized methods for analyzing fundus imagery. A devignetting method for fundus imagery based on the Modified Sigmoid Transform (MST) is proposed in this paper. Gain (A) and centering parameter (α) of MST have a crucial influence on its performance. For low values of the gain, local contrast is penalized, and the overall dynamic range is compressed. When the value of gain is very high, the images after the illumination correction will have a washed out appearance. The optimum value of gain is determined in this paper from an objective method based on two statistical indices, Average Gradient of Illumination Component (AGIC) and Error of Enhancement (EME). MST with gain value defined via objective methods is able to correct the uneven illumination in fundus images without penalizing the local contrast. The proposed method is compared with illumination equalization model, homomorphic filtering and Adaptive Gamma Correction (AGC) and was found to be superior in terms of 'naturality', uniformity of background illumination, and computational speed.

1. Introduction

Fundus photography is a powerful imaging modality used for detecting macular degeneration [1], retinal neoplasms [2], choroid disturbances, glaucoma [3] and diabetic retinopathy (DR) [4,5]. The structures being visualized by this modality include the central as well as peripheral retina, optic disc and macula. In the fundus camera, the illumination source is situated at the center. Obviously, in fundus imagery, the illumination at the peripheral regions of the field of vision would be comparatively less than that of the central portion. The central portion appears to be bright or enhanced. This uneven illumination along the image plane is usually referred to as vignetting [6]. Two fundus images exhibiting vignetting are shown in Fig. 1.

Vignetting adversely affects the performance of computerized methods for analyzing fundus imagery. This adverse influence is critical in contexts such as localization of optical disc [7–11] which is the primary step in the automated diagnosis of glaucoma. Sometimes, the middle region of the fundus image may appear equally enhanced as the optical disc. Hence, correction of the uneven illumination is one of the most important preprocessing steps in the computerized analysis of fundus imagery.

The methods available in the literature meant for the correction of uneven illumination in fundus imagery basically consist of a simple illumination equalization model, and is extensively used in much of the literature [12,13]. In this equalization model, the difference between the mean of an arbitrarily defined block around the contextual pixel, with an expected value of mean added to it, brings the local illumination to the expected level. This equalization model compresses the dynamic range of the image. The selection of expected mean is a difficult procedure. Moreover, the performance of this model also depends upon the selection of block size. Apart from the equalization model, the techniques commonly used for correcting uneven illumination in other classes of images other than the fundus imagery include homomorphic filtering [14–17] and Adaptive Gamma Correction (AGC) [18–20].

Homomorphic filtering can suppress low illumination variations between pixels lying in close proximity but cannot correct uneven illumination between different regions of the image which are lying spatially apart. Gamma correction is a technique introduced to linearize

Self-adaptive Frequent Pattern Growth-Based Dynamic Fuzzy Particle Swarm Optimization for Web Document Clustering

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Abstract Web documents being dynamic and vague, any system to cluster these documents needs to be self-adaptive to these dynamic situations. For this, the system requires the capability of capturing dynamicity. Dynamicity takes into account any updates happening in the search space. If any new potential solution arises, the system needs to identify and reinitialize the particle lists to the newly updated potential solutions. The traditional particle swarm optimization fails in accounts of convergence speed and maintaining diversity. The experimental results for the proposed algorithm show that frequent pattern growth-based dynamic fuzzy particle swarm optimization algorithm performs better than existing conventional approaches in matters of convergence speed and in maintaining diversity.

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