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ACHIEVEMENTS OF FACULTY MEMBERS

1. NUMBER OF RESEARCH PAPERS PUBLISHED IN JOURNAL (2020-2021)

S. No	Year	Name of the Faculty Member	Department	Title of the Research papers	Name of the Journal	Month & Year	Vol. & Issue No.	P.No.	ISSN. No.	Impact Factor	UGC / Scopus/ SCI/SCIE/ Peer reviewed/
1.	2020-2021	Periyasamy Thiagarajan, Kandasamy Selvam, Chinnappan Sudhakar, Thangaswamy Selvankumar	Biotechnology	Enhancement of Adsorption of Magenta Dye by Immobilized Laccase on Functionalized Biosynthesized Activated Carbon Nanotubes	Water Air Soil Pollution	July-20	231	364	0049-6979	3	Scopus, SCIE
2.	2020-2021	T.Selvankumar, K.Selvam	Biotechnology	Chlorpyrifos degradation efficiency of Bacillus sp. laccase immobilized on iron magnetic nanoparticles	<u>3 Biotech</u>	August 2020	10	366	2190-5738	2.9	Scopus, SCIE
3.	2020-2021	Thangasamy Selvankumar, Chinnappan Sudhakar, Kandasamy Selvam	Biotechnology	Green biomimetic silver nanoparticles utilizing the red algae Amphiroa rigida and its potent antibacterial, cytotoxicity and larvicidal efficiency	<u>Bioprocess and Biosystems Engineering</u>	August-20	44	217-223	1615-7605	3.6	Scopus, SCIE
4.	2020-2021	T.Selvankumar, C.Sudhakar	Biotechnology	Synthesis and development of novel sensitizer from spirulina pigment with silver doped TiO2 nano particles for bio-sensitized solar cells	Biomass and Bioenergy	October-20	141	105733	0961-9534	5.8	Scopus, SCIE
5.	2020-2021	K.Selvam, T.Selvankumar	Biotechnology	Optimization of low-cost biosurfactant produced by Bacillus subtilis SASCBT01 and their environmental remediation potential	Letters in Applied Microbiology	January-21	72 (1)	74-81	1472-765X	2.1	Scopus, SCIE



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6.	2020-2021	Thangaswamy Selvankumar	Biotechnology	Virtual screening of COVID-19 drug from three Indian traditional medicinal plants through in silico approach	Research Journal of Biotechnology	October-20	15(10)	124-140	2278-4535		Scopus
7.	2020-2021	Selvankumar Thangaswamy, Yuvarajan Rangunathan,	Biotechnology	Potential COVID-19 Drug from Natural Phenolic Compounds through In Silico Virtual Screening Approach	Biointerface Research in Applied Chemistry	October-20	11 (3)	10161 - 10173	2069-5837		Scopus, SCIE
8.	2020-2021	R.Rathika, T.Selvankumar	Biotechnology	Influence of biochar and EDTA on enhanced phytoremediation of lead contaminated soil by Brassica juncea	Chemosphere	May-21	271	129513	0045-6535		Scopus
9.	2020-2021	T.Selvankumar	Biotechnology	In-silico molecular docking analysis of some plant derived molecules for anti-inflammatory inhibitory activity	Current Botany	March-21	12	22-27	2220-4822		UGC
10.	2020-2021	Thangaswamy Selvankumar	Biotechnology	Microwave-assisted green synthesis of fluorescent carbon quantum dots from Mexican Mint extract for Fe ³⁺ detection and bio-imaging applications	Environmental Research	May-21	199	111263	0013-9351	7.7	Scopus, SCIE
11.	2020-2021	B.Jayanthi, S.Arjunan, T.Selvankumar	Biotechnology	Influence of freeze-drying and fresh cooking on starch morphology and physicochemical and thermal properties of various tropical tubers	International Journal of Biological Macromolecules	May 2021	183	1794-1806	0141-8130	8.5	Scopus, SCIE
12.	2020-21	Dr.A.Jayakumar	Tamil	Silambil Marutha Nilam	Arima Nokku	April - 2021	15:1	18	2320-4842		Peer reviewed
13.	2020-21	P. GOPALAKRISHNAN	MATHEMATICS	A comprehensive review on elliptic differential equation and its characterization	International Journal of Research and Analytical Reviews	APR-2021	8 & 2	607-621	23495138	7.17	UGC
14.	2020-21	S.SAKTHIVEL	MATHEMATICS	A review on fuzzy differential equation and its characterization	International Journal	APR-2021	8 & 2	622-635	23495138	7.17	UGC



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					of Research and Analytical Reviews						
15.	2020-21	M. Gomathi S.Mohanapriya	Computer Science and Applications	An Artificial Immune Recognition System (AIRS) for Credit Card Fraud Detection Using AdaBoost and Majority Voting	International Journal of Contemporary Research in Computer Science & Technology	JUNE-2020	6 & 1	20-24	2395 - 5325	1.3	Peer reviewed
16.	2020-21	G. Vidhya, M. Gomathi	Computer Science and Applications	An Artificial Immune Recognition System (AIRS) for Credit Card Fraud Detection Using AdaBoost and Majority Voting	International Journal of Contemporary Research in Computer Science & Technology	JUNE-2020	6 & 1	20-24	2395 - 5325	1.3	Peer reviewed
17.	2020-21	J. Josephine Daisy	Commerce CA	A Study on Consumer Satisfaction towards Online shopping with special reference to Namakkal District	Solid State Technology	2020	63 (6)		0038-111X	-	Scopus
18.	2020-21	L.Rajendran J. Josephine Daisy	Commerce CA	A Study on Consumer Satisfaction towards Online shopping with special reference to Namakkal District	Journal of Natural Remedies	2020	21 (3) (S1)	71	2320-3358	-	Peer reviewed
19.	2020-21	J. Josephine Daisy	Commerce CA	A Study on Issues of Migrant Women Workers in India	Journal of XI th an university of Architecture & Technology	December 2020	XII (IV)	419-426	1006-7930	6.1	UGC CARE
20.	2020-21	Dr. B. Jayalakshmi	BBA	Customers Cognizance Factors Influencing Purchasing Decision Of Designated Dairy Products	International Journal Of Mechanical And Production Engineering Research And Development	July-2020	10 & 3		2249 - 8001	8.874 6	Peer reviewed



Enhancement of Adsorption of Magenta Dye by Immobilized Laccase on Functionalized Biosynthesized Activated Carbon Nanotubes

Periyasamy Thiyagarajan · Kandasamy Selvam ·
Chinnappan Sudhakar · Thangaswamy Selvankumar

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Abstract In the present study, laccase was immobilized over on activated carbon nanotubes (ACNTs) prepared from *Prosopis juliflora* bark (PJB) to improve good stability, reusability, and its adsorption performance of magenta dye. The immobilized laccase-ACNTs were characterized by scanning electron microscopy (SEM) and Fourier-transform infrared spectroscopy (FT-IR). The efficiency of magenta dye (MD) adsorption process was investigated in batch adsorption experiments. Response surface methodology (RSM)-based Box-Behnken design (BBD) was used to optimize the parameters, and the maximum MD adsorption was achieved around 95% at 120 min. The obtained results revealed that the immobilized laccase-ACNTs are a promising composite for degradation of textile dyes.

Keywords Activated carbon nanotubes · Adsorption · Immobilization · Magenta dye · *Prosopis juliflora* bark · Wastewater

1 Introduction

In the last three decades, dye effluents are released from various industries such as textile, cosmetic, food,

pharmaceutical, paper, and pulp industries and have become one of the major environmental concerns which meet outstanding to their carcinogenic, mutagenic/genotoxic, or nature (Bilal et al. 2017; Lark et al. 2019). It has been reported that many types of dyes, pesticides, and antibiotics were discharged into the aquatic environment (Tkaczyk et al. 2020), which are visible pollutants in the effluents at very small concentration, and it may affect water quality; also, dyestuff contains large chemical substance, and it is very difficult to degrade naturally (Shao et al. 2016). In this scenario, it is a challenge to biotechnologist to develop an efficient, economic, and eco-friendly bioremediation technique to provide unique remediation technology for the treatment of wastewater (Barrios-Estrada et al. 2018; Bayramoglu et al. 2018; Bilal et al. 2019).

Laccases (benzenediol: oxygen oxidoreductase, EC 1.10.32) are copper-containing oxidases, which indicate the major group of multicopper oxidases used for biodegradation of various hazardous materials like phenol and its derivatives and natural and synthetic dyes (Bilal et al. 2016; Bronikowski et al. 2017). Nevertheless, naturally extracted enzymes have poor stability, reusability, and high production cost for large-scale production. Therefore, immobilization approach was used; laccase can immobilize various material such as metal nanoparticles (Shi et al. 2014; Xia et al. 2016), nanofiber membrane (Taheran et al. 2017), carbon nanotubes (Kadam et al. 2017), and mesoporous materials (Yuan et al. 2012) to improve the thermal stability, pH, storage, reusability, shelf life, and dye degradation (Rodrigues et al. 2013; Zdarta et al. 2018; Henrikki et al. 2018;

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Chlorpyrifos degradation efficiency of *Bacillus* sp. laccase immobilized on iron magnetic nanoparticles

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Abstract

The present study explored the immobilization of laccase onto iron magnetic nanoparticles (MNPs) to enhance its enzymatic properties and applications. The immobilization process was optimized using Box–Behnken design (BBD). BBD showed significance towards the quadratic model with experimental data. Maximum laccase activity recovery (99%) of the predicted model was observed at 0.75 mg/mL of laccase concentration, 200 mg/mL of MNPs, 0.3% cross linking with carbodiimide, and 3 h of cross-linking time. The magnetization activity of MNPs (8 emu/g) and the immobilized laccase with MNPs (4 emu/g) was analyzed using vibrating sample magnetometer (VSM). Maximum activity of immobilized laccase was observed at pH 7.0 and 55 °C. The immobilized laccase has greater stability (100 h) and significant chlorpyrifos (pesticide) degradation activity. High-performance liquid chromatography (HPLC) results confirmed the degraded metabolic products of chlorpyrifos. In all, the immobilized laccase was superior to free laccase, showing promising structural and application characteristics.

Keywords Immobilization · Laccase · Magnetic nanoparticles · Optimization · Pesticides

Introduction

Synthetic pesticides have become an inevitable part of modern agriculture, which contributes to their extensive distribution throughout the ecosystem (Kumar et al. 2018).

Although the use of pesticides has contributed to better crop yields, the dispersion of their residues in the environment is disastrous to aquatic as well as to terrestrial eco systems (Li 2018; Villarreal-Chiu et al. 2017). Exposure to pesticides causes serious health problems, such as neurotoxic disorders, and can lead to death (Pereira et al. 2015; Simonelli et al. 2007). Researchers have developed a wide range of physico-chemical methods to overcome the adverse effects of pesticides on the ecosystem (Mir-Tutusaus et al. 2018; Maqbool et al. 2016). However, these physico-chemical methods are inefficient, expensive, and time consuming (Zeng et al. 2017). Thus, there is a need to develop simple, highly efficient, and environmentally sustainable processes for the removal of pesticides from the environment.

Enzymatic catalysis is considered as a simple, eco-friendly, green bioremediation method for the degradation and/or detoxification of pesticides from soil and water (Ahmed et al. 2017; Bilal et al. 2017a, b). Several studies reported that enzyme-based degradation methods have maximum degradation efficiency and stability against pH, temperature, and salinity (Kupski et al. 2019). Thus, enzyme-mediated green remediation method have found attention as an attractive alternative to the physico-chemical methods. Among the microbial enzymes, lignolytic laccases have gained much popularity due to their

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Green biomimetic silver nanoparticles utilizing the red algae *Amphiroa rigida* and its potent antibacterial, cytotoxicity and larvicidal efficiency

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Abstract

The present investigation reports a simple, rapid, inexpensive, and eco-friendly approach for synthesizing *Amphiroa rigida*-mediated silver nanoparticles (AR-AgNPs) for the first time. The biomimetic synthesized AR-AgNPs were characterized by both spectral and microscopic analysis. The UV–visible spectrum showed the surface plasmon peak at 420 nm, which indicated the formation of AR-AgNPs. X-ray diffraction characterization of AR-AgNPs showed a face-centered cubic crystal (25 nm) and the transmission electron microscope micrograph showed spherical shape. The functional group of polysaccharide that plays a major role as a stabilizing and reducing agent is confirmed by Fourier-transform infrared spectroscopy. The biomimetic synthesized AR-AgNPs showed antibacterial activity against *Staphylococcus aureus* (21 ± 0.2 mm) and *Pseudomonas aeruginosa* (15 ± 0.2 mm). Further, the cytotoxic effects of AR-AgNPs against MCF-7 human breast cancer cells were observed through acridine orange-ethidium bromide and Hoechst staining. Besides, AR-AgNPs are found to be inhibit the growth of 3rd and 4th instar larvae of *Aedes aegypti* in a dose-dependent manner.

Keywords Red algae · *Amphiroa rigida* · Silver nanoparticles · Antibacterial activity · Cytotoxicity

Introduction

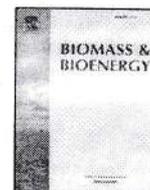
In current trends, green nano-biotechnology has emerged as a promising area with widespread applications in the field of medicine, material science, agriculture revolution, and

environmental remediation [1, 2]. In this context, nanomaterials synthesized via natural sources are eco-friendly, low cost, effectiveness, and non-toxic [3]. In particular, silver nanoparticles (AgNPs) have been extensively used in the biomedical and environmental sectors due to their large surface area and high adsorption potential. Recently, biomimetic synthesis of nanoparticles using marine red algae has become considerable attention due to their bioactive compounds (polysaccharides, amino acids, lipids, proteins, carotenoids, and vitamins) and easy to access. A few marine algae-like *Botryococcus braunii* [4], *Caulerpa scalpelliformis* [5], *Corallina elongate* [6], *Gelidium amansii* [7], *Ulva armoricana* [8], *Neochloris oleoabundans* [9] has been used for the biogenic synthesis of AgNPs.

Amphiroa rigida, marine red algae (Rhodophyta) belonging to the family corallinaceae is widely found in the southern coastal region of Tamil Nadu, India. To the fine of our knowledge, this is the first study describing novel biomimetic synthesis of AgNPs using marine red seaweed *A. rigida* extract. Besides, the biomimetic synthesized AgNPs using *A. rigida* (AR-AgNPs) were investigated for their

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Synthesis and development of novel sensitizer from spirulina pigment with silver doped TiO₂ nano particles for bio-sensitized solar cells

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ARTICLE INFO

Keywords:

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Solar cell
X-ray diffraction
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Pycocyanin

ABSTRACT

Pycocyanin pigment of spirulina (blue green algae) was used as photosensitizer for the fabrication of Bio sensitized solar cells (BSSC). The pigment was extracted in different solvents such as water, Ethanol and Acetone and pure and "Ag (3 and 5 wt%)" doped TiO₂ nanoparticles were prepared by facile sol-gel technique in order to fabricate BSSC. The structural, morphological, optical properties and Electrochemical impedance analysis of the prepared thin films were studied by powder X-ray diffraction, Field Emission Scanning Electron Microscopic (FE-SEM), Transmission Electron Microscopic technique (TEM), UV-Vis spectroscopy and current voltage characteristics respectively. The main observation from this research work is reduction of energy band gap values due to doped "Ag" ion which may allow the delayed recombination rate and enhance the photovoltaic conversion efficiency of around 1.2% when compared to that of pure TiO₂ nanoparticles (0.74%) with N719 dye as 6.15. The photo-current density - photo voltage (J-V) characteristics of fabricated BSSC via Pycocyanine pigments under various solvents adsorbed condition on nanocrystalline pure TiO₂ and Ag doped TiO₂ film electrodes were carried out. The pigments in association with water solution shows the short-circuit photocurrent density J(sc) of around 3.0 mA/cm² and the open-circuit photo voltage (V_{oc}) 0.75 V, under an illumination intensity of 40 mW/cm² respectively. With the above observations, the research work claims that "Ag" doped TiO₂ nanoparticles may be a promising candidate for future BSSC applications.

1. Introduction

The solar irradiation from the sun is considered as an infinite energy source to human beings. This source is available at any place on the plane, free of cost. Over the past four decades, a wide range of solar cells have been developed for energy conversions, and their efficiency was seen constantly increasing [1]. Although several technologies have been implemented as the commercial solar panels, the efficiency and high cost are the major limitations [2]. Thus the demands for the fabrication for novel PV technologies with improved solar energy conversion efficiency are in need to meet the increasing demands of green and renewable energies [3,4]. One of the photovoltaic devices, namely Bio Sensitized Solar Cells (BSSC) has attracted considerable attention in recent years because of its ideal nature which could replace the existing organic solar cells [4–7]. The BSSC is a device based on the sensitization of biomaterials with suitable energy band gap values as semiconductors

and it acts as photo-electrodes in association with electrolytes. In the present study, the bio-pigments phycocyanin extracted from *Spirulina platensis*, belongs to cyanobacterium that habitat in the brackish and marine water confluent with green scum on the water bodies [8]. The phycocyanin pigment exhibits a high molar extinction coefficient and fluorescence because of its high absorption coefficient value in the visible region. It also contains high level of blue biliprotein phycocyanin and its solubility in water is high, stable to the exposure of light with maximum absorption region around 618 nm [9]. Moreover, Phycocyanin contains a chromophore with carboxylic moieties, easily that establish bonds with Ag-doped TiO₂ nano particles due to adsorption on the conductive transport electrode. Recently, Liqiu Wang [10] reported the usefulness of spirulina as a novel photosensitizer to construct spirulina biosolar cell and investigated the electrical properties of the cell. The action of carbohydrates such as sucrose, glucose, chitosan in the spirulina anode changer was also studied and reported the maximum

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ORIGINAL ARTICLE

Optimization of low-cost biosurfactant produced by *Bacillus subtilis* SASCBT01 and their environmental remediation potentialK. Selvam¹ , B. Senthilkumar²  and T. Selvankumar¹¹ PG & Research Department of Biotechnology, Mahendra Arts and Science College (Autonomous), Kalippatti, Namakkal, Tamil Nadu, India² Department of Medical Microbiology, College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia

Significance and impact of the study: *Bacillus subtilis* SASCBT01, an indigenous isolate, was employed for the production of promising biosurfactant using agricultural by-products as the substrate. Biosurfactant production was optimized through response surface methodology–Box–Behnken design (RSM–BBD). This study report that the biosurfactants produced are promising eco-friendly and economical agents for metal degradation and oil-recovery applications.

Keywords

agro-industrial waste, *Bacillus subtilis*, bioremediation, biosurfactant, response surface methodology.

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doi:10.1111/lam.13394

Abstract

The present research aims to enhance the biosurfactant (BS) production using agricultural by-products as a low-cost substrate with the statistical approach. BS production from *Bacillus subtilis* SASCBT01 was carried out with four different variables such as pH, incubation time, cassava peel waste (CPW) and palmira sprout (PS). The model expected the highest emulsification activity of $65 \pm 1.2\%$ after 96-h incubation with 3.0 g l^{-1} of CPW and PS at pH 7.0. The SASCBT01 strain-based BS was successful at retrieving up to 18% and the highest Pb removal rates were found at 65%. These BS have considered high quality in bioremediation applications.

Introduction

Surface active molecules (surfactants) show a broad range of industrial applications such as the formulation of cosmetics, detergents, bioremediation, agriculture, food, paper, textile, oil recovery and antimicrobial agents (Dhasayan *et al.* 2015; Sharma *et al.* 2018). In addition, they have been potentially used in the elimination of heavy metal from polluted soil (Govarathanan *et al.* 2017). The synthetic surfactants normally utilized have acquired from petrochemical assets and show low biodegradability and high poisonous quality. The natural hazard of chemical surfactants leads to the development of alternative surfactant that is of ecologically well disposable, low toxic and large flexibility in operations; thus, the production of

bacterial surfactants through agricultural by-products gains remarkable interest in the recent years (Claus and Van Bogaert 2017).

Biosurfactants (BS) have been produced by a wide variety of bacteria (Sharma *et al.* 2018; Sharma *et al.* 2019), fungi (Qazi *et al.* 2014) and yeast (Teixeira Souza *et al.* 2018; Marcelino *et al.* 2019). Numerous bacterial strains belonging to the genera *Acinetobacter*, *Bacillus*, *Pseudomonas*, *Rahnella* and *Arthrobacter* have been reported as capable BS producers (Govarathanan *et al.* 2017; He *et al.* 2020; Sharma and Pandey 2020). BS is biodegradable and non-toxic in addition to a specific action at tremendous pH, temperature and salinity compared to conventional surfactants. As such, BS offers a more nature-friendly option to conventional surfactants (Mani *et al.* 2016).

Review Paper:

Virtual screening of COVID-19 drug from three Indian traditional medicinal plants through *in silico* approach

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Abstract

Novel Corona Virus (2019 nCoV/COVID-19) emerged from Wuhan city of Hubei Province China in November 2019. Now it causes pandemic disease COVID-19 across the globe in 2020. There is no proper medication and vaccine treatment option available for novel corona virus. There is a global urge set to prepare effective drug and vaccines from various possible routes against SARS-CoV-2. In the present study, four ligand groups (I - IV) were made comprising of one commercial anti-viral drug group (14 Nos) and three ligands group (84 Nos) constituted from phytochemicals of three anti-viral Indian Traditional Medicinal plants (ITMP) such as *Azadirachta indica*, *Phyllanthus niruri* and *andrographis paniculata* to search effective drug candidate for treating novel coronavirus. Four levels of *in silico* virtual screening procedures (molecular docking, Lipinski rule, ADME, DFT analysis) were employed to sort out and choose potential drug candidate for COVID-19.

Virtual screening of 98 ligands from four ligands group was done against six corona viral protein targets (SARS-CoV-1 and 2) through *in silico* approach. Preliminary molecular docking analysis revealed that twenty high scored ligands against viral target proteins were subject to Lipinski rule of drug likeliness screening. Based on Lipinski rule and some consideration of best docking score, eight ligands were chosen out of twenty ligands. Eight ligands chosen from Lipinski rule were subjected to final *in silico* virtual screening steps such as ADME and DFT analysis. Finally *in silico* virtual screening analysis showed four best ligands Baloxavir marboxil (CID124081896), Limocinin (CID 14845550), Formononetin 7 O Glucuronide (CID 71316927) and Bisandrographolide A (CID12000062). One from each ligands group was considered as best drug candidate for SARS CoV-2.

Keywords: *Andrographis paniculata*, *Azadirachta indica*, Corona Virus, COVID-19, SARS-CoV-1, SARS-CoV-2, *Phyllanthus niruri*.

Introduction

Corona virus is derived from Greek word "korone" means crown shape which refers to the characteristic appearance of virus particle with spike protein in their enveloped surface. Corona viruses are group of viruses causing diseases in birds and mammals including human. Corona virus is divided into four main types they are alpha, beta, gamma and delta belonging to the family of *Coronaviridae*. Human corona viruses cause infection in respiratory tract which ranges from mild common cold like rhino virus to lethal severe acute respiratory syndrome like SAR, MERS and COVID-19 belonging to the Beta Corona virus. Basically, Corona viruses possess positive sense single stranded RNA as a genetic material with bound nucleocapsid, which is further enveloped by glycoprotein. The genome size of corona viruses ranges from 26 to 32 KB in size.³²

In 2019 December, several mysterious pneumonic cases were reported in Wuhan city of China. Later it was identified and related to Corona virus family named as SARS-CoV-2 or 2019 novel Corona virus. WHO officially named the SARS-CoV-2 viral disease as COVID-19. Phylogenetic analysis of SARS-CoV-2 is a new type of beta corona virus family and it closely resembles Bat SARS corona virus (96% similarity) than the SARS-CoV (79.5% similarity)^{32,35} which indicate it may originate from bat. So far there are no antiviral drugs and vaccine identified for SARS-CoV-2. It infect humans through its spike (S) protein with human ACE2 receptor.

Sequence similarity and binding domain analysis of SARS-CoV and SARS-COV-2 reveal that SARS-CoV-2 has strong binding affinity towards ACE2 with similar spike protein receptor binding domain. Hence the epitope of two corona viruses drug and antibodies targeting will provide insight into the novel drug identification in future.^{3,8,34,27}

Most of the people in developing countries rely upon complementary and alternative medicinal practices to treat various diseases, even though a complementary medicine has modest proof towards their safety and effectiveness. People have more faith on evidence-based research in traditional medicine system and it gains larger acceptance of peoples in the countries like India.^{7,16,18} *Azadirachta indica* is a Indian Traditional Medicinal plant belonging to the family of Meliaceae. *Azadirachta indica* plant parts (leaves, bark, flower and fruit) are used traditionally for treating many illness and disease from ancient times itself in India.

Potential COVID-19 Drug from Natural Phenolic Compounds through *In Silico* Virtual Screening Approach

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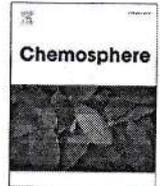
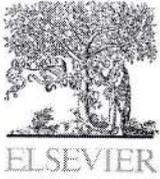
Abstract: SARS CoV-2 causes a world pandemic disease called COVID-19. In the present study, natural phenol and flavonoid compounds from food sources are used to search for effective drug candidates for treating novel coronavirus 2019. Thirty-five natural phenolic compounds were taken for our study. Four levels of *in silico* virtual screening (Drug likeliness, Docking study, ADME, and DFT analysis) was carried out to find effective drug candidate against SAR-CoV-2. 23 Compounds were shortlisted from 35 compounds by preliminary Drug likeliness screening carried out according to five different drug rules. A docking study of 23 compounds against three viral protein targets of SAR-CoV-2 reveals four best-docked compounds, such as Quercetin (CID 5280343), Rosmarinic acid (CID 5281792), Hesperidin (CID 72281), and Naringenin (CID 932). Finally, these four phenolic compounds were subjected to final *in silico* screening steps such as ADME and DFT analysis. These compounds were considered as the best drug candidate for SARS CoV- 2. These four selected phenolic compounds show better binding affinity with SARS-CoV-2 viral protein targets, which also possess excellent physicochemical and pharmacokinetic properties. Moreover, these compounds virtually present in every food substance, so nutritional supplements of these fruits and vegetables with these compounds act as best warriors to combat COVID-19. Further, *in vivo* analysis is needed to explore the molecular mechanism behind the inhibition of SAR-CoV-2 viral proteins with these compounds.

Keywords: COVID-19; Hesperitin; Naringenin; Rosmarinic acid; SARS CoV-2; Quercetin.

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1. Introduction

Severe Acute Respiratory Syndrome Corona Virus -2 (SARS CoV-2) emerged from Wuhan city, Hubei Province, China, as an unidentified pneumonia disease in December 2019. Afterward, it is confirmed as a novel coronavirus (nCoV-2019) that causes a world pandemic disease called COVID-19 through international air passengers. Coronavirus is one of the largest families of the virus, SARS CoV-2 belongs to the beta coronavirus type, and it possesses a crown-like spike structure in its surface. It can spread the COVID-19 disease to more than two hundred countries, and last, it lasts more than the past six months. The higher mutation rate of SARS CoV-2 may be the reason behind it that can survive the spread and cause diseases in all races of the human population. There is no proper medication and treatment for COVID-19.



Influence of biochar and EDTA on enhanced phytoremediation of lead contaminated soil by *Brassica juncea*



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HIGHLIGHTS

- Synergistic effect of biochar (BC) and EDTA to enhance phytoextraction of lead (Pb) contaminated soil investigated.
- Combined use of EDTA and biochar showed enhanced Pb uptake (60.2 mg/g).
- Pb uptake was found to be BC+EDTA (60.2 mg/g) > EDTA (23.5 mg/g) > BC (22.0 mg/g) > control (10.0 mg/g).

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ABSTRACT

Phytoremediation technology is an eco-friendly technology for the treatment of the polluted environment. Conversely, the natural and synthetic amendments have been revealed to improve the heavy metal phytoextraction from polluted soils with hyperaccumulation and/or non-hyper accumulating plants. This study evaluated the synergistic effect of biochar (BC) and EDTA to enhance phytoextraction of heavy metal lead (Pb) from artificially polluted soil by *Brassica juncea*. The BC and EDTA amendment enhanced the growth and survival of *B. juncea* under Pb stress environment. BC and EDTA significantly increased the biomass of *B. juncea* and significantly increased the total chlorophyll content in the combined amendment of BC and EDTA (22.2 mg/g) compared to the individual amendment of BC (12.8 mg/g) and EDTA (12.2 mg/g) respectively. The combined use of EDTA and biochar showed enhanced Pb uptake (60.2 mg/g) compared to control (10.0 mg/g). The order of Pb uptake was found to be BC + EDTA (60.2 mg/g) > EDTA (23.5 mg/g) > BC (22.0 mg/g) > control (10.0 mg/g). The maximum activity of SOD (35.2 ± 1.2 U/mg), POD (47.0 ± 1.8 U/mg) and CAT (28.0 ± 1.0 U/mg) was obtained in the mixed application of EDTA and BC. The obtained results revealed that the combined use of BC and EDTA was the most advantageous option for the treatment of Pb contaminated soil as compared to individual amendments. © 2020 Elsevier Ltd. All rights reserved.

1. Introduction

Heavy metals (HM) are trace elements, essentially required in very minute quantities for plants and animals which includes the micronutrients like cobalt (Co), copper (Cu), chromium (Cr), manganese (Mn), and Zinc (Zn); while some are non-essential and broadly cause several pollutions of soils with heavy metals (HM) due to anthropogenic activities is nowadays given a great deal of

interest among scientific communities as a consequence of the harmful effects of HMs by reaching humans from plants and animals via food chain (Rinklebe et al., 2019; Ali et al., 2020). HM are exist permanent and not degradable like organic materials, hence persistent in nature (Shi et al., 2009). The sources of HM in food and associated health risks are well established (Azeh Engwa et al., 2019; Boudebbouz et al., 2020; Afonne and Ifediba, 2020). This, therefore, necessitates the remediation of soils highly polluted with HM in the view of their hazardous effects on the eco-system.

The remediation of HM in soils is a naturally occurring phenomenon where soil microorganisms and plants modify the ecological effect of HM (Park et al., 2011). However, two major scientific approaches have been employed for the removal or

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In-silico molecular docking analysis of some plant derived molecules for anti-inflammatory inhibitory activity

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ABSTRACT

Herbs are essential resources for drug discovery. However, numerous challenges stand in front of the scientific community to discover novel drugs from herbs. To explore the validation behind the precious knowledge of traditional medicine, we focused on achieving virtual screening to detect the potential medicines from the herbs. Five bioactive compounds from known anti-inflammatory medicinal plants were examined through molecular docking against cyclooxygenase-2 (COX-2) and inducible Nitric Oxide Synthase (iNOS), using AutoDock 4.2. The docking of selected ligands with COX-2 showed the binding energy varying from -6.15 Kcal/mol to 11.24 Kcal/mol. The docking energies of identified ligands with iNOS were generated ranging from -3.85 kcal/mol to -6.99 kcal/mol. Among the tested ligands, it was noted that 6-urs-12-en-24-oic acid showed the best binding energy than other compounds with the lowest binding energy and highest binding affinity with both anti-inflammatory target proteins COX-2 and iNOS. The *in silico* study validates the potential phytochemical compound of the medicinal herb that contributes to anti-inflammatory activity with low toxicity and minimal side effects.

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INTRODUCTION

A significant challenge of contemporary medicine is to make substances that regulate certain enzymes while leaving related isozymes unaffected. The two essential proteins, namely Cyclooxygenase-2 (COX-2) and inducible Nitric Oxide Synthase (iNOS) are essential mediators of an inflammatory process. Nonsteroidal Anti-inflammatory Drugs (NSAIDs) like Indomethacin act via inhibition of COX enzyme, COX catalyzes the first step of the biosynthesis of prostaglandins (Dannhardt and Kiefer, 2001). Prostaglandins (PGs), found in most of the tissues and organs, are the arachidonic acid metabolites of the Cyclooxygenase (COX) pathway and are significant mediators in the regulation of the inflammation and immune function (Smith *et al.*, 2000). It has been shown that COX enzyme exists in two isoforms COX-1 and COX-2 (Marnett *et al.*, 1999). In regards to amino acid composition, these enzymes are about 60% identical, and their catalytic areas are commonly conserved (Picot *et al.*, 1994). The COX-1 enzyme is responsible for maintaining gastric and renal integrity, and COX-2 is an inducible enzyme responsible for the production of proinflammatory PGs, causing inflammation and pain (Seibert *et al.*, 1994). The COX-2 inhibitors are useful for the relief of chronic pain in elderly

patients with osteoarthritis and rheumatoid arthritis (Savage, 2005).

Inducible Nitric Oxide Synthase (iNOS), is another inducible enzyme, that plays a significant role in the overproduction of nitric oxide (NO) and has been implicated in several pathophysiological states, for example; various inflammation, septic shock, vascular dysfunction in diabetes and cancer patients (Halliwell, 1994). Three homologous NOS isozymes [inducible NOS (iNOS), endothelial NOS (eNOS), and neuronal NOS (nNOS)] catalyze the five-electron, two-step oxidation of L-arginine (L-Arg) to form a nitric oxide which is an important biological signalling molecule and cellular cytotoxic (Griffith and Stuehr, 1995). The constitutive isozymes, eNOS and nNOS, function to produce low levels of NO predominantly for blood pressure regulation and nerve function, respectively. In contrast, iNOS is induced by microbial products, such as lipopolysaccharide (LPS) and inflammatory cytokines such as interleukin-1 (IL-1), tumour necrosis factor- α (TNF- α) and interferon- γ (INF- γ) in macrophages and some other cells (Hämäläinen *et al.*, 2007). COX-2 and iNOS overexpression have been observed in many human invasive malignant tumours, e.g. breast, lung, prostate, bladder, colorectal cancer and malignant melanoma (Erment

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Microwave-assisted green synthesis of fluorescent carbon quantum dots from *Mexican Mint* extract for Fe³⁺ detection and bio-imaging applications

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ABSTRACT

Biomass-derived carbon quantum dots have drawn special interest owing to their admirable photostability, biocompatibility, fluorescence, high solubility, sensitivity and environmentally friendly properties. In the present work, the Carbon Quantum Dots (CQDs) was synthesized from the *Plectranthus amboinicus* (Mexican Mint) leaves via the microwave-assisted reflux method. The strong absorption peaks observed from UV-vis spectra at 291 and 330 nm corresponds to the $\pi-\pi^*$ and $n-\pi^*$ transitions, respectively, reveal the formation of CQDs. The synthesized CQDs showed bright blue fluorescence under UV irradiation with a fluorescence quantum yield of 17% and a maximum emission of 436 nm in the blue region at an excitation wavelength of 340 nm. The HRTEM analysis elucidates that the synthesized CQDs were crystalline and spherical in shape with a particle size of 2.43 ± 0.02 nm. The FT-IR spectroscopy confirms the presence of the different functional groups such as -OH, -CH, C=O and C-O. The chemical composition of CQD was revealed through XPS analysis. The synthesized CQDs were used as a fluorescent probe to detect different metal ions, where high selectivity was obtained for Fe³⁺ ions through quenching phenomenon. The emission intensity of CQD showed a good linear relationship with $R^2 = 0.9111$ with the concentration of Fe³⁺ ions in the range of 0–15 μ M. The fluorescence emission of CQD was turned OFF upon the binding of Fe³⁺ ions and turned ON with the addition of ascorbic acid. With this fluorescent turn ON-OFF behaviour of CQD, the NOT and IMPLICATION logic gates were constructed and studied for different input conditions. The biocompatibility of CQD was tested via MTT assay using MCF7 breast cancer cell line, which revealed that CQD synthesized from the Mexican Mint leaves possess less cytotoxicity. Further, the prepared CQD was applied effectively as fluorescent probes in a cell imaging application.

1. Introduction

Heavy metals create a serious threat to the environment including plants, animals and human beings due to the overexploitation in various industrial and household applications. Hence it is more essential to monitor the concentration of such toxic heavy metal ions in the environment. Among the various metals ions, ferric ion (Fe³⁺) is one of the most important transition metal ions that play a crucial role in environmental as well as biological systems. Especially, iron is the

fundamental structure of haemoglobin, myoglobin and is involved in many enzyme activities. As well as, it plays a prominent role in the chemical and physiological processes of organisms, such as electron transport, nucleic acid synthesis, enzymatic catalysis, and cellular metabolism. Fe³⁺ ions mainly accumulate within liver, spleen and bone marrow cells, bound to ferritin (Murugan et al., 2018). The excess or any insufficiency of Fe³⁺ ions may cause several disorders and diseases, where excess Fe³⁺ ions can cause various types of cancers and decline the functions of organs such as the heart, lungs and pancreas and

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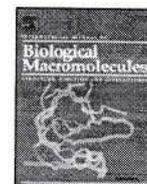
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Influence of freeze-drying and fresh cooking on starch morphology and physicochemical and thermal properties of various tropical tubers

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ABSTRACT

Flours and starches extracted from the tropical tubers underwent freeze-drying and cooking in comparison with fresh cooking. Freeze-dried and cooked starch (FDS) granules were found to have different shapes and collapsed arrangement whereas freshly cooked starch (FCS) granules had the least varied structures. The freeze-dried flours had larger structures compared to freshly cooked flours. The physicochemical parameters were high in *Dioscorea esculenta* (DE)-FDS, followed by *Amorphophallus paeoniifolius* (AP)-FDS and other samples whereas *D. alata* (DA)-FCS had the lowest, whereas flours followed similar trend. FDS (42.1%) had the highest solubility index and swelling power whereas FCS (11.1%) showed the lowest. The syneresis and light transmittance levels were higher in FDS and FDF. The freeze dried flour and starch showed higher onset (T_0), peak (T_P), and conclusion (T_C) temperature than fresh cooked samples. The variations in IR spectra, thermal properties, and crystalline index were termed as differential function of physicochemical characteristics, structural changes that resulted from freeze drying, and cooking treatment employed.

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1. Introduction

Starch has a portion of carbohydrate molecules and commonly used biopolymer obtained from a variety of cereals (rice, corn, maize) and tuberous vegetables such as potato, sweet potato, and yam tubers such as elephant foot yam (*Amorphophallus paeoniifolius*), greater yam (*Dioscorea alata*), and lesser yam (*Dioscorea esculenta*). The starch produced from these tubers has a wide range of applications. Amylose and amylopectin are the two polymers that constitute the structure of starch. Amylose is a linear polysaccharide consisting of D-glucose chains joined by α -1, 4-glycosidic linkage forming a helical structure, and α -1,4 links branched connected to α -1,6-glycosidic after every 20–21 units. These three economically important tuber crops are of Asian origin that bears edible starchy tubers. These tubers have been a part

in various cuisines worldwide for centuries, and the popularity of yam tubers is increasing due to their starch content (85%). Starch has a crucial role in various food-based and other industries. It has been used as a thickener, emulsifier, and binding, clouding, and gelling agent, and in cookeries. Besides high starch content, these tubers also possess a substantial amount of proteins, fibers, minerals, and many phytochemicals (alkaloids, flavonoids, phenols, saponins, tannins, steroids) that have antioxidant properties [1].

Tropical tubers such as elephant foot yam, greater yam, lesser yam contain large amounts of starch (over 60% of dry weight) and their flours have a high nutritional value and antioxidative properties due to flavonoids. Thus, underutilized tropical tubers can be used as resources of flours and starches. Their economic importance can be enhanced through research. Numerous natural starches and flours with diverse functional qualities are available on the market, but the demand for specific starch and flour properties is increasing nowadays; thus, innovative strategies with specific treatments are needed [8]. The quality characteristics of the yam flours and starches are adversely influenced by the process variables and techniques used for tuber processing. Drying can be done via different techniques such as freeze

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சிலம்பில் மருத நிலம்

அ. ஜெயக்குமார்

பழந்தமிழர்கள் நிலத்தை ஐந்தாகப் பகுத்துக் கொண்டு அதற்கேற்றாற் போன்று தங்கள் வாழ்க்கையை அமைத்துக் கொண்டனர். நிலத்தின் அடிப்படையில் அவர்களின் பழக்கவழக்கம், உணவு, தொழில், கலை, வீடு போன்ற அனைத்தும் அமைந்திருந்தன. ஆனால் தமிழர்களின் பொதுவான பண்புகள் மட்டும் மாறவில்லை. அதாவது, விருந்தோம்பல், உதவி, காதல் போன்றன எல்லா நிலங்களிலும் காணப்பட்டன. அத்தகைய ஐந்திணை பகுப்பு அடிப்படையிலான வாழ்க்கை முறையில் மருதநிலம் செழித்துக் காணப்பட்டது எனலாம். மருத நில மக்களே அனைத்து நிலையிலும் சிறந்து வாழ்ந்து வாழ்ந்தனர். மருத நிலம் வயலும் வயல் சார்ந்த நிலத்தையும் நில அமைப்பாகக் கொண்டது. நீர் வளம், நில வளம், உணவு வளம் என அனைத்திலும் தன்னிறைவு பெற்று விளங்கியது. அத்தகைய மருத நிலத்தின் சிறப்பைச் சிலப்பதிகார வழி இக்கட்டுரை ஆராய்கிறது.

நாடுகாண் காதை

மருதத்திணையின் முதற்பொருள், கருப்பொருள், உரிப்பொருள் முதலியன சிலப்பதிகாரம் முழுவதும் விரிவிக்கிடந்தாலும், நாடுகாண் காதையில் 76 ஆவது அடியிலிருந்து 155 ஆவது அடிவரை மருதத்திணைக் காட்சிகள் விவரிக்கப்படுவதால் நாடுகாண் காதையில் உள்ள அடிகள் மட்டும்; ஆராயப்படுகின்றன.

கோவலன், கண்ணகியிடம் மதுரை செல்லும் வழியைக் கவுந்தியடிகள் விவரிப்பதாக இப்பகுதி அமைந்துள்ளது. கோவலனே நாம் செல்லும் வழியில் என்னென்ன துன்பங்கள் ஏற்படும் என்பதை அறிவாய். வெயிலின் தன்மையைப் பொறுக்காத மெல்லிய இயல்பினை உடையவள் கண்ணகி. இவளுடன் மலர்களையுடைய சோலை வழியே செல்வோம் என்றால், வள்ளிக்கிழங்கு எடுத்த குழிகளில், சண்பக மரங்களின் பி0க்களும் தாதுகளும் நிரம்பி இருக்கும். அக்குழிகள் துன்பம் தரும் என்று கூறுகிறார். இதனை,

பயில்பூந் தண்டலைப் படர்குவம் எனினே
மண்பக வழிந்த கிழங்குழ் குழியைச்
சண்பக நிறைந்த தாதுசோர் பொங்கர்
பொய்யறைப் படுத்துப் போற்றா மாக்கட்குக்
கையறு துன்பங் காட்டிலுங் காட்டும் (நாடுகாண் காதை, 66-70)

என்ற அடிகள் உணர்த்துகின்றன.

அக்குழிகளை விட்டு ஒதுங்கிச்செல்லலாம் என்றால் பலா, தென்னை போன்றவற்றின் பழங்கள் முட்டும். அதை விடுத்து மஞ்சளும் இஞ்சியும் விளையும் பகுதிகளில் நடந்து செல்லலாம் என்றால், பலாவின் விதைகள் பரல்கற்கள் போல் இருக்கும் என்று கூறும் கவுந்தியடிகள் அடுத்து மருத நிலமான வயலைப் பற்றிக் கூறுகிறார்.

ஆற்று நீர் வயல் வழியாகச் செல்லலாம் என்றால் குளங்களில் உள்ள நீர்நாய்கள் வாளை மீன்களைத் துரத்துவதால் அம்மீன்கள் வயலில் குறுக்காகப் பாயும் அதைக்கண்டு கண்ணகி அஞ்சுவாள் என்று கூறுவதை,

வயலுழைப் படர்குவம் எனினே யாங்குப்
பி0நா நிலஞ்சிப் பொருகய லோட்டி
நீர்நாய் கெளவிய நெடும்புற வாளை

A COMPREHENSIVE REVIEW ON ELLIPTIC DIFFERENTIAL EQUATION AND ITS CHARACTERIZATION

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Abstract:

We look at elliptic partial differential equations in the same spirit as our approach to the Laplace equation. Instead of specifying a discretization scheme, This will enable us to get some general results about convergence of discrete schemes.

Key words: Partial Differential Equation, Elliptic condition, Dirichlet condition.

1 INTRODUCTION

A study of elliptic differential equations is carried out, from the point of view of interconnecting the discrete with the analytical. This dissertation is roughly divided into two parts. The first part introduces approximate maximum principles and barrier postulates, acting on functions with hyper finite domains and includes sections 2 and 3. The methods are specially adapted for proofs of convergence of discretizations for linear elliptic PDE's.

As an elementary example, consider the Dirichlet problem for the Laplace equation in the unit square, $\Omega = (0,1)^2$,

$$\begin{aligned} \Delta u(x) &= 0 & \text{if } x \in \Omega, \\ u(x) &= 0 & \text{if } x \in \partial\Omega, \end{aligned} \quad (1.1)$$

Where $f \in C(\partial\Omega, \mathbb{R})$. If we divide the unit square using equally spaced gridlines, with the distance from each other equal to $h = \frac{1}{n}$, $n \in \mathbb{N} - \{0\}$, then we obtain the following discretization of $\bar{\Omega}$,

$$\bar{\Omega}_h = \{0, h, 2h, \dots, (n-1)h, 1\}^2$$

The discrete analogue of the boundary and interior of Ω is given by:

$$\begin{aligned} \partial\Omega_h &= \bar{\Omega}_h \cap \partial\Omega, \\ \Omega_h &= \bar{\Omega}_h - \partial\Omega_h. \end{aligned}$$


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A REVIEW ON FUZZY DIFFERENTIAL EQUATION AND ITS CHARACTERIZATION

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Abstract:

This paper deals with fuzzy-set-valued mappings of a real variable whose values are normal, convex, upper semi continuous and compactly supported fuzzy sets in \mathbb{R}^n . We study differentiability analytical methods of fuzzy differential equations for a solution to a fuzzy differential equation.

Key words: Fuzzy sets, Fuzzy Differentiation, Euler's Method.

1 INTRODUCTION

We start this section with defining the notation, it will use in this paper and then we notify the type of elementary fuzzy differential equation we wish to solve

Definition 1.1: Interval

An interval \tilde{x} is denoted by $[\underline{x}, \bar{x}]$ on the set of real number \mathbb{R} given by

$$\tilde{x} = [\underline{x}, \bar{x}] = \{x \in \mathbb{R} : \underline{x} \leq x \leq \bar{x}\} \tag{1.1}$$

we have only considered closed intervals throughtout this project , although there are various other types of intervals such as open and half -open intervals. \underline{x} and \bar{x} are known as the left and right end points ,respectively , of the interval \tilde{x} in the above expression (1.1) .

Let us now consider two arbitrary intervals $\tilde{x} = [\underline{x}, \bar{x}]$ and $\tilde{y} = [\underline{y}, \bar{y}]$ these two intervals are said to be equal if they are in the same set. Mathematically, it happens only when corresponding end points are equal .Hence , one may write

$$\tilde{x} = \tilde{y} \text{ if and only if } \underline{x} = \underline{y} \text{ and } \bar{x} = \bar{y}. \tag{1.2}$$

For the above two arbitrary intervals $\tilde{x} = [\underline{x}, \bar{x}]$ and $\tilde{y} = [\underline{y}, \bar{y}]$, interval arithmetic operations such as addition(+), subtraction(-), multiplication(\times) and division(/) are defined as follows:

$$\tilde{x} + \tilde{y} = [\underline{x} + \underline{y}, \bar{x} + \bar{y}], \tag{1.3}$$

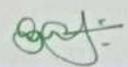
$$\tilde{x} - \tilde{y} = [\underline{x} - \bar{y}, \bar{x} - \underline{y}], \tag{1.4}$$

$$\tilde{x} \times \tilde{y} = [\min S, \max S], \text{ where } S = \{\underline{x} \times \underline{y}, \underline{x} \times \bar{y}, \bar{x} \times \underline{y}, \bar{x} \times \bar{y}\}, \tag{1.5}$$

$$\text{and } \tilde{x} / \tilde{y} = [\underline{x}, \bar{x}] \times [1/\bar{y}, 1/\underline{y}] \text{ if } 0 \notin \tilde{y} \tag{1.6}$$

Now if k is a real number and $\tilde{x} = [\underline{x}, \bar{x}]$ is an interval , then the multiplication of them is given by

$$k \tilde{x} = \begin{cases} [k\bar{x}, k\underline{x}], & k < 0, \\ [k\underline{x}, k\bar{x}], & k \geq 0 \end{cases} \tag{1.7}$$


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AN ARTIFICIAL IMMUNE RECOGNITION SYSTEM (AIRS) FOR CREDIT CARD FRAUD DETECTION USING ADABOOST AND MAJORITY VOTING

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Abstract: Credit card fraud is a serious problem in financial services. Billions of dollars are lost due to credit card fraud every year. There is a lack of research studies on analyzing real-world credit card data owing to confidentiality issues. In this paper, machine learning algorithms are used to detect credit card fraud. Standard models are firstly used. Then, hybrid methods which use AdaBoost and majority voting methods are applied. To evaluate the model efficacy, a publicly available credit card data set is used. Then, a real-world credit card data set from a financial institution is analyzed. In addition, noise is added to the data samples to further assess the robustness of the algorithms. The experimental results positively indicate that the majority voting method achieves good accuracy rates in detecting fraud cases in credit cards.

Keywords: Credit card fraud, Random Forest, Support Vector Machine, Logistic Regression (LOR)

I. INTRODUCTION

Fraud is a wrongful or criminal deception aimed to bring financial or personal gain. In avoiding loss from fraud, two mechanisms can be used: fraud prevention and fraud detection. Fraud prevention is a proactive method, where it stops fraud from happening in the first place. On the other hand, fraud detection is needed when a fraudulent transaction is attempted by a fraudster.

Credit card fraud is concerned with the illegal use of credit card information for purchases. Credit card transactions can be accomplished either physically or digitally. In physical transactions, the credit card is involved during the transactions. In digital transactions, this can happen over the telephone or the internet. Cardholders typically provide the card number, expiry date, and card verification number through telephone or website. With the rise of e-commerce in the past decade, the use of credit cards has increased dramatically. The number of credit card transactions in 2011 in Malaysia were at about 320 million, and increased in 2015 to about 360 million. Along with the rise of credit card usage, the number of fraud cases have been constantly increased. While numerous authorization techniques have been in place, credit card fraud cases have not hindered effectively. Fraudsters favour the internet as their identity and location are hidden. The rise in credit card fraud has a big impact on the financial industry. The global credit card fraud in 2015 reached to a staggering USD \$21.84 billion.

Loss from credit card fraud affects the merchants, where they bear all costs, including card issuer fees, charges, and administrative charges. Since the merchants need to bear the loss, some goods are priced higher, or discounts and incentives are reduced. Therefore, it is imperative to reduce the loss, and an effective fraud detection system to reduce or eliminate fraud cases is important. There have been various studies on credit card fraud detection. Machine learning and related methods are most commonly used, which include

artificial neural networks, rule-induction techniques, decision trees, logistic regression, and support vector machines [1]. These methods are used either standalone or by combining several methods together to form hybrid models. In this paper, a total of twelve machine learning algorithms are used for detecting credit card fraud. The algorithms range from standard neural networks to deep learning models. They are evaluated using both benchmark and realworld credit card data sets. In addition, the AdaBoost and majority voting methods are applied for forming hybrid models. To further evaluate the robustness and reliability of the models, noise is added to the real-world data set. The key contribution of this paper is the evaluation of a variety of machine learning models with a real-world credit card data set for fraud detection. While other researchers have used various methods on publicly available data sets, the data set used in this paper are extracted from actual credit card transaction information over three months. The organization of this paper is as follows. In Section II, related studies on single and hybrid machine learning algorithms for financial applications is given. The machine learning algorithms used in this study are presented in Section III. The experiments with both benchmark and realworld credit card data sets are presented in Section IV. Concluding remarks and recommendations for further work are given in Section V.

II. RELATED WORK

In this section, single and hybrid machine learning algorithms for financial applications are reviewed. Various financial applications from credit card fraud to financial statement fraud are reviewed.

A. SINGLE MODELS

For credit card fraud detection, Random Forest (RF), Support Vector Machine, (SVM) and Logistic Regression (LOR) were examined in. The data set consisted of one-year

PHYSICAL PROXIMITY UNSTRUCTURED P2P FILE SHARING SYSTEM IN WIRELESS SENSOR NETWORKS

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Abstract: Efficient file query is important to the overall performance of peer-to-peer (P2P) file sharing systems. Clustering peers by their common interests can significantly enhance the efficiency of file query. Clustering peers by their physical proximity can also improve file query performance. However, few current works are able to cluster peers based on both peer interest and physical proximity. Although structured P2Ps provide higher file query efficiency than unstructured P2Ps, it is difficult to realize it due to their strictly defined topologies. In this work, we introduce a Proximity-Aware and Interest-clustered P2P file sharing System (PAIS) based on a structured P2P, which forms physically-close nodes into a cluster and further groups physically-close and common-interest nodes into a sub-cluster based on a hierarchical topology. PAIS uses an intelligent file replication algorithm to further enhance file query efficiency. creates replicas of files that are frequently requested by a group of physically close nodes in their location. Moreover, PAIS enhances the intra-sub-cluster file searching through several approaches. First, it further classifies the interest of a sub-cluster to a number of sub-interests, and clusters common-sub-interest nodes into a group for file sharing. Second, PAIS builds an overlay for each group that connects lower capacity nodes to higher capacity nodes for distributed file querying while avoiding node overload. Third, to reduce file searching delay, PAIS uses proactive file information collection so that a file requester can know if its requested file is in its nearby nodes. Fourth, to reduce the overhead of the file information collection, PAIS uses bloom filter based file information collection and corresponding distributed file searching. Fifth, to improve the file sharing efficiency, PAIS ranks the bloom filter results in order. Sixth, considering that a recently visited file tends to be visited again, the bloom filter based approach is enhanced by only checking the newly added bloom filter information to reduce file searching delay. Trace-driven experimental results from the real-world PlanetLab testbed demonstrate that PAIS dramatically reduces overhead and enhances the efficiency of file sharing with and without churn.

Keywords: P2P file sharing System, Distributed Hash Tables, PlanetLab

I. INTRODUCTION

OVER the past few years, the immense popularity of the Internet has produced a significant stimulus to P2P file sharing systems. For example, BitTorrent constitutes roughly 35 percent of all traffic on the Internet. There are two classes of P2P systems: unstructured and structured. Unstructured P2P networks such as Gnutella and Freenet do not assign responsibility for data to specific nodes. Nodes join and leave the network according to some loose rules. Currently, unstructured P2P networks' file query method is based on either flooding where the query is propagated to all the node's neighbors, or random-walkers where the query is forwarded to randomly chosen neighbors until the file is found.

However, flooding and random walkers cannot guarantee data location. Structured P2P networks, i.e., Distributed Hash Tables (DHTs), can overcome the drawbacks with their features of higher efficiency, scalability, and deterministic data location. They have strictly controlled

topologies, and their data placement and lookup algorithms are precisely defined based on a DHT

data structure and consistent hashing function. The node responsible for a key can always be found even if the system is in a continuous state of change. Most of the DHTs require $O(\log n)$ hops per lookup request with $O(\log n)$ neighbors per node, where n is the number of nodes in the system. A key criterion to judge a P2P file sharing system is its file location efficiency. To improve this efficiency, numerous methods have been proposed. One method uses a super-peer topology, which consists of super nodes with fast connections and regular nodes with slower connections. super node connects with other super nodes and some regular nodes, and a regular node connects with a super node. In this super-peer topology, the nodes at the center of the network are faster and therefore produce a more reliable and stable backbone.

This allows more messages to be routed than a slower backbone and, therefore, allows greater scalability. Super-peer networks occupy the middle-ground between centralized and entirely symmetric P2P networks, and have

A Study On Consumer Satisfaction Towards Online Shopping With Special Reference To Namakkal District

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Abstract - The study aims to determine the socio-economic details of consumers and their satisfaction with online shopping in the Namakkal District. The study was conducted in the Namakkal District. Only primary data are used in the study. Data were collected from 120 consumers who have purchased products online over the past six months using a convenient sampling technique. The study concluded that online consumers are satisfied. This study directly indicates that the Internet marketer should attach more importance to the price factor and the after-sales factor. In this competitive era, all internet marketers need to focus on consumer satisfaction to retain existing consumers, and offer to offer a new scheme every day to attract new consumers.

Key words: *Online shopping, Websites, Consumer Satisfaction, Namakkal district*

1. Introduction

In the age of globalization and with the great expansion of the Internet, various companies have globalized their efforts to sell and sell their goods and services through the network. For decades, leading business organizations have offered their consumers a variety of products over the Internet, such as books, hardware, software, toys, appliances, and more. Online shopping is the process of buying and selling goods and services over the Internet. It includes online money transfer, supply chain management and internet marketing. This is the use of technology for better marketing performance. Through online stores, different types of businesses and organizations have a great opportunity to increase sales and maintain direct relationships with their consumers. India's growing use of India's younger generation provides new prospects for online shopping. Unlike traditional marketing, internet marketing has many advantages, such as global reach, availability of a wide range and cheaper products, 24X7 terms and more. If online retailers are aware of the factors that influence Indian consumer behavior, they can further develop their marketing strategies to turn potential consumers into active ones. Consumer satisfaction is a key factor in supporting and attracting consumers to the online store system. Consumer satisfaction with online stores is the degree to which a consumer's perception of the online experience confirms his expectations.

2. Literature Review

Arthi.D and M.G.Jeyalakshmi (2018) concluded that respondents were very interested in expressing their opinion, believing that online shopping is more convenient and easier than in the past, as the Internet, e-commerce and e-banking are improvised on a daily basis. . Respondents did not agree



A STUDY ON CONSUMER SATISFACTION TOWARDS ONLINE SHOPPING WITH SPECIAL REFERENCE TO NAMAKKAL DISTRICT

L.Rajendran¹, Dr.J.Josephine Daisy²

ABSTRACT

The objectives of the research are to identify consumer profile and the factors that influence consumer satisfaction in the research area. The present study was conducted in Namakkal district to collect data from 150 consumers by using questionnaire. The simple percentage and regression models are used to find the results. The study concludes that consumer satisfaction is very important in attracting the use of online stores. Overall results show that respondents took a positive step towards online shopping.

Keywords: Online, Consumer, Shopping, Satisfaction, Regression

1. INTRODUCTION

Online shopping is a direct distribution of products, services and technologies from a retailer to a consumer through the internet without intermediate services in an interactive, real-time environment. Online shopping is the method of purchasing goods and services from online traders. With the introduction of World Wide Web, merchants have tried to market their goods to people with internet access. Consumers are required to go to online shop and leave home and shop on their phone. Consumers buy online stores a variety of products.

Online shopping is an emerging trend today. More and more customers are shopping online to collect products and services, collect information and products, or search for products. Therefore, the online shopping environment plays an important function in general relationship among consumers and merchants (Look et al., 2008). In other words, consumer shopping has become a truly global phenomenon, mainly cyberspace, product photography, premium news, by 2010. According to clickz data, Internet users reached 1.8 billion, this is a growing and diverse domestic population. People have different interests and goals.

The rapid development of technology and use of internet have created new markets for producers and consumers. It is now not only another way of interacting with the internet users of the day, but also an important channel for finding potential users and maintaining relationships with existing users. In particular, idea behind online shopping is to make purchases in a consumer-friendly way. In addition, the purchase can be made anywhere and anytime according to your preference.

2. REVIEW OF LITERATURE

Alshamleh et al., (2015) studied the following aspects of electronic services to determine their impact on student satisfaction: website design, reliability, efficiency, responsiveness, ease of use, accessibility, and confidentiality. Results showed that all aspects, except ease of use, affect the satisfaction of Jordanian students.

Dias et al., (2015) found that the main factors that satisfy consumers with their electronic purchases/online purchases were: quality of information, usability and variety of products, products price, payment systems and consumer service end to sales, high response times, security, confidentiality, transaction capabilities, speed of delivery, and after-sales consumer service were factors that caused consumer dissatisfaction.

Achla Gakkhar et al., (2017) concluded that the majority of boys and girls [74% of boys and 80% of girls] always used websites to shop online, which only 14% of boys sometimes used websites to shop online with 2% of girls. Both boys and girls were very pleased with the payment and delivery. The

A Study on the Issues of Migrant Women Workers in India



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Abstract

The migrant women workers face several problems such as low wages, health hazards, sexual exploitation and denial of their fundamental rights. Through this study the researcher aims to analyze the life of these migrant women workers. The specific objectives of the study are to identify the economic status, child care services available, health problems and exploitation faced by the women migrant workers and the expectations of the migrant women workers. The research design used for this study is descriptive. The sampling strategy used is simple random through lottery method. Data was collected from 50 respondents using an interview schedule by directly interviewing the respondents. The study reveals that Fifty eight percent of the respondents belonged to the age group of 20-40 years; Sixty five percent of the respondents are married. Perhaps their family commitments after marriage forced the married persons to work. Majority Ninety eight percent migrated within the state of Tamil Nadu, Seventy six percent of the migrated from rural to urban area because of poverty, unemployment, less wages in their native place. Eighty seven percent say that safety programmes are conducted to ensure the safety of the workers.

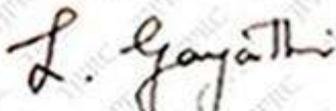
Key Words; Female workers, wages, poverty and employment

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Certificate of Publication

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