ਮਹਾਰਾਜਾ ਰਣਜੀਤ ਸਿੰਘ ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ, ਬਠਿੰਡਾ
MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
(A State Univ. Estd. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)
Bathinda-151001 (Punjab), India

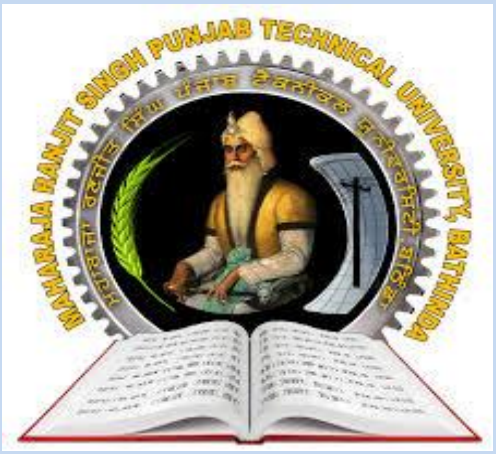
ANNUAL REPORT

2020

RESEARCH PUBLICATIONS

MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
Bathinda-151001 (Punjab), India

ANNUAL REPORT- RESEARCH PUBLICATIONS



2020

INTERNAL QUALITY ASSURANCE CELL
MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
BATHINDA 151001

ANNUAL REPORT- RESEARCH PUBLICATIONS [2020]

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Year 2021

INTERNAL QUALITY ASSURANCE CELL

ANNUAL REPORT- RESEARCH PUBLICATIONS

2020

	Research Publications [2020]	
Sr.No.	**Department of Pharmaceutical Sciences &Technology**	**Impact factor**
1	Bin LK, Helaluddin ABM, Sarker MZI, Mandal UK, Gaurav A. (2020) Effect of processing methods on xylitol-starch base co-processed adjuvant for orally disintegrating tablet application. *Pakistan Journal of Pharmaceutical sciences, 33*, 551-559	0.684
2	Singh A, Singh G, Bhattacharya S, Mishra N, Thakur A, Mandal UK, Narang RK. (2020) Probiotics and Herbals as a Boom in Treatment of Ulcerative Colitis *Asian Journal ofPharmaceutics*, 14, 301-307	UGC listed
3	Kaur P, Kumar M, Mandal UK. (2020) Development and validation of a simple HPLC method for estimation of mycophenolate mofetil in microemulsion formulation *International Journal of Pharmacy and Pharmaceutical Sciences 1*, 16-20.	UGC listed
4	Devi A, Kumar M, Kumar M, Mandal UK (2020) Review on disease, dose, destination and delivery aspects of simvastatin. *Drug Delivery Letters, 10*, 278-287.	UGC listed
5	Mahmood S, Phey TC, Kheng LS, Chen KP, Mandal UK (2020) Formulation, characterisation and comparison of different raloxifene hydrochloride loaded lipid-polymer hybrid nanoparticles. *International Journal of Nano and Biomaterials, 9,* 123-141.	UGC listed
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71	Sharma M (2020) Categorization of self-care problem for children with disabilities using partial swarm optimization approach *International Journal of Information Technology* 14, 1835–1843	2.22
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83	Singh D, Singh R, Boparai KS (2020) Investigations for surface roughness and dimensional accuracy of biomedical implants prepared by combining fused deposition modelling, vapour smoothing and investment casting. *Advances in Materials and Processing Technologies*,8,1-20.	UGC Care
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DEPARTMENT OF PHARMACEUTICAL SCIENCE AND TECHNOLOGY

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Effect of processing methods on xylitol-starch base co-processed adjuvant for orally disintegrating tablet application

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Abstract: Orally disintegrating tablet (ODT) is a friendly dosage form that requires no access to water and serves as a solution to non-compliance. There are many co-processed adjuvants available in the market. However, there is no single product possesses all the ideal characteristics such as good compressibility, fast disintegration and good palatability for ODT application. The aim of this research was to produce a xylitol-starch base co-processed adjuvant which is suitable for ODT application. Two processing methods namely wet granulation and freeze drying were used to compare the characteristics of co-processed adjuvant comprising of xylitol, starch and crospovidone XL-10 mixed at various ratios. The co-processed excipients were compressed into ODT and physically characterized for powder flow, particle size, hardness, thickness, weight, friability, *in-vitro* disintegration time and *in-situ* disintegration time, lubricant sensitivity, dilution potential, Fourier transform infrared spectroscopy, scanning electronic microscopy and x-ray diffraction analysis. Formulation F6 was selected as the optimum formulation due to the fastest *in-vitro* (135.33±11.52 s) and *in-situ* disintegration time (88.67±13.56s) among all the formulations ($p<0.05$). Increase in starch component decreases disintegration time of ODT. The powder flow fell under the category of fair flow. Generally, it was observed that freeze drying method produced smaller particle size granules compared to wet granulation method. ODT produced from freeze drying method had shorter disintegration time compared to ODT from wet granulation batch. In conclusion, a novel co-processed excipient comprised of xylitol, starch and crospovidone XL-10, produced using freeze drying method with fast disintegration time, good compressibility and palatability was developed and characterized. The co-processed excipient is suitable for ODT application.

Keywords: Co-processed adjuvant, xylitol, starch, crospovidone, freeze drying.

INTRODUCTION

Orally disintegrating tablets (ODT) are also called as orodispersible tablet, mouth dissolving tablets, fast melt tablets, rapid dissolving tablets and quick dissolving (Hirani *et al.*, 2009). It was first invented in 1970 to solve the issue of non-compliance. The ideal characteristics of an ODT are (a) fast disintegration time, (b) require no access to water, (c) good palatability and mouth feel, (d) robust and less friable, (e) stable, (f) simple manufacturing method such as direct compression, (g) consists of highly compressible excipients which allow high drug loading and (h) cost effective (Badgujar and Mundada, 2011).

One of the simplest methods to produce ODT is through direct compression (Akram *et al.*, 2011). However, there is no single pharmaceutical excipient possesses all the properties for direct compression. Co-processing is a technique to mix two or more excipients to produce an end product with functionality improvement and masking the undesirable properties of individual (Ambore *et al.*, 2014). A successful co-processing excipient has superior properties compared with physical mixtures of components or individual components in terms of flow properties, compressibility, dilution potential, fill weight uniformity, and reduced lubricant sensitivity (Nachaegari and Bansal, 2004).

Although there is a number of commercial co-processed adjuvants in the market now, but not all are suitable for ODT application. Moreover, the available co-processed adjuvants have certain limitations. To summarize, the co-processed adjuvant for ODT application must have good compressibility, achieving fast disintegration, good palatability and economical.

Xylitol has excellent compressibility (Olinger and Karhunen, 1991). Moreover, it has intense sweet taste which will improve the palatability of ODT products (Lyn, 2012). Starch, apart from its low cost, is also an excellent disintegrant for which the disintegration mechanism depends majorly on swelling (Desai *et al.*, 2016). Crospovidone XL-10 is a super disintegrant which is effective at very small percentage to promote disintegration of ODT through wicking process (Desai *et al.*, 2016). The aim of this research was to produce and characterize a co-processed adjuvant comprising of

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Sr. No. 2

SHORT COMMUNICATION

Probiotics and Herbals as a Boom in Treatment of Ulcerative Colitis

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Abstract

Ulcerative colitis (UC) is an inflammatory chronic disease primarily affecting the colonic mucosa; the extent and severity of colon involvement are variable. In its most limited form, it may be restricted to the distal rectum, while in its most extended form, the entire colon is involved. UC is identified by mucus diarrhea, tenesmus, bowel distension, and anemia. 5-aminosalicylic acid drugs, steroids, and immunosuppressant are used for therapy of UC. The annual occurrence of disease in Asia, America, and Europe was estimated to be 6.3, 19.2, and 24.3/100,000 people years. The main challenges in the management of the disease are drug-related side effects and local targeting. To overcome these challenges, probiotics overcome drug-related adverse side effects and local targeting. On ingestion, the probiotics can result in health beneficial effects. Probiotics are mainly used as gut modulators but are also nowadays explored for their use in UC.

Key words: 5-amino salicylic acid, Crohn's disease, cytokines, *Mycobacterium avium*, probiotics, ulcerative colitis

INTRODUCTION

Ulcerative colitis (UC) and Crohn's disease are chronic inflammatory disease leads to alteration of the bowel wall.[1] UC is characterized [Table 1] by abdominal pain, inflammation at colon region, bloody stool, discomfort feel and apart from this, various extra intestinal manifestations are available (Pyoderma gangrenosum, erythema nodosum, primary sclerosing cholangitis, immune mediated disease rheumatoid arthritis, asthma, and psoriasis) which are related with inflammatory bowel diseases (IBD),[2] assuredly there is a high degree risk of neoplasia associated with colitis. Especially in patient suffered from colonic Crohn's disease and ulcerative panocolitis, as the UC formed in large intestine and last part of rectum, but in Crohn's disease it is distinguished by inflammation at any region of gastrointestinal tract (GIT) as per the reviewers suggestion UC and Crohn's disease have almost same pathophysiology and genetic pathway by which they are causing illness.[3] When we talk about GIT problem, irritable bowel syndrome is also a frequent issue. It is described by abdominal pain or discomfort during the passage of gas and defecation, associated with a change in consistency and frequency of stool.[4]

INTESTINAL MICROBIOTA: AN IMPORTANT CORE

Gut flora another name of intestinal microbiota is the name given today to the microbe population living in our intestine. Gut flora consists of ten to trillions of microorganisms having more than 500 types of bacterial species.[5] Interaction between the host and gut microbiota results in the variation of intestinal and systemic immunity against pathogens, secretion, sensation, intestinal motility, xenobiotics, growth, and development.[6] Apart from this, microbiota have effect on the host, which are further responsible for immunological, gene expression, psychological, and psychological

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Sr.No.3

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Original Article

DEVELOPMENT AND VALIDATION OF A SIMPLE HPLC METHOD FOR ESTIMATION OF MYCOPHENOLATE MOFETIL IN MICROEMULSION FORMULATION

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ABSTRACT

Objective: The present study deals with the development, validation and application of a simple, precise and accurate HPLC method for the determination of mycophenolate mofetil in pharmaceutical formulations and microemulsions.

Methods: In this method, a simple isocratic mobile phase composition of methanol and water (75:25 v/v) pumped at 1 ml/minute flow rate through Phenomenex C18 column (dimension: 250×4.6 mm and 5 µm particle size) was used. Injection volume was 20 µl and analysis of mycophenolate mofetil was carried out at 250 nm.

Results: The coefficient of regression was found to be 0.9996, indicating the linearity of the developed method within a range of 0.1 to 10 µg/ml. The limit of detection (LOD) and the limit of quantization (LOQ) were found to be 3.660ng/ml and 11.091ng/ml, respectively. The results showed that % deviation for change in compositions of the mobile phase, flow rate and temperature was within a range of-5.51 to 10.99%,-3.70 to 8.80% and-5.29 to 10.90%, respectively. The method seemed sensitive to change of temperature (±5 °C) and methanol composition (±2%) as the results were at the boundary limit of 10% deviation.

Conclusion: A simple, precise and accurate HPLC method for the determination of drug content from microemulsion has been developed and validated in accordance with ICH guidelines.

Keywords: Mycophenolate Mofetil, High-performance liquid chromatography (HPLC), Validation, Psoriasis, Microemulsion

DOI: http://dx.doi.org/10.22159/ijpps.2020v12i4.36750. Journal homepage: https://innovareacademics.in/journals/index.php/ijpps

INTRODUCTION

Mycophenolate Mofetil (MMF) is 2-(morpholin-4-yl) ethyl (4E)-6-(4hydroxy-6-methoxy-7-methyl-3-oxo l, 3 dihydroisobenzofuran-5-yl)-4-methylhex-4-enoate (fig. 1). It belongs to BCS Class II of drugs characterized by a strongly pH-dependent solubility profile [1]. It is an immune-suppressant and prodrug of Mycophenolic Acid (MPA), extensively used to prevent rejection in organ transplantation [2]. MPA, a product of a Penicillium fungus, was originally isolated in 1896. The immunological activity of the drug is accomplished through rapid hydrolysis (*in vivo*) of the morpholino-ethyl ester, MMF, to the active acid form, MPA [3, 4]. It is a reversible inhibitor of inosine monophosphate dehydrogenase (IMPDH) in purine biosynthesis, which is necessary for the growth of T cells and B cells. MPA has anti-neoplastic, anti-viral, anti-fungal and immunosuppressive activity [5]. MMF has recently been added to therapeutic regimens for skin disorders and it is being actively researched for the treatment of psoriasis [6, 7]. There are few reports of dermal formulations in the form of the microemulsion, where MMF should be estimated accurately during the formulation development stage. Instead of UV method, a validated HPLC method for the estimation of MMF is very much essential as it gives accurate and precise results.

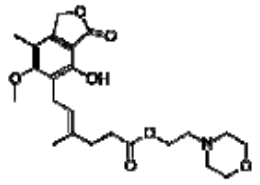

Fig. 1: Structure of mycophenolate mofetil

According to the guideline Q2 (R1) of ICH, "quantitative tests of the active moiety in samples of the drug substance or drug product or other selected component(s) in the drug product" is one of the types of analytical procedures to be validated [8]. The validation of an analytical procedure ensures that the applied analytical technique, such as HPLC, shall give reliable and reproducible results. This process is very important because it provides information about the linearity, accuracy, precision, robustness and sensitivity of the method, proving its suitability to the intended application.

There are few published HPLC methods for the estimation of MMF in bulk and plasma samples. Reddy *et al.* [9] and Rao *et al.* [10] reported such methods for the determination of MMF in tablet dosage forms in which mobile phase consisted of acetonitrile and phosphate buffer. Tsina *et al.* [11] reported manual and automated HPLC methods for the determination of MMF in human plasma in which mobile phase consisted of 0.05M acetonitrile, citrate-phosphate buffer (pH 3.6) and 0.02M heptane sulfonic acid. All these published methods have some significant shortcomings. Their mobile phases have buffers as aqueous composition as compared to only pure water used for our method. Buffer system creates problems as it chokes the analytical column if it is not washed thoroughly after the analysis is over. This buffer system is highly susceptible to bacterial growth when it is stored. As compared to that, our developed HPLC method has a simple mobile phase composition of water and methanol only. Moreover, the sensitivity of the developed method is quite high as compared to earlier published methods. Also, there is no reported HPLC method, which was solely developed for the estimation of MMF in micro emulsion formulation.

So, the objective of the present study was to develop and validate a simple HPLC method useful for the estimation of MMF in microemulsion formulation. Various analytical parameters such as linearity, precision, accuracy, robustness, the limit of detection

Sr. No. 4

Review Article

Review on Disease, Dose, Destination and Delivery Aspects of Simvastatin

Author(s): Arpna Devi, Manjinder Kumar, Mohit Kumar, Uttam K. Mandal* (http://orcid.org/0000-0002-4489-1138)

Journal Name: Drug Delivery Letters

Volume 10 , Issue 4 , 2020

DOI : 10.2174/2210303110999200730215812 (https://doi.org/10.2174/2210303110999200730215812)

Journal Home (/node/696)

Sr.No. 5

Formulation, characterisation and comparison of different raloxifene hydrochloride loaded lipid-polymer hybrid nanoparticles

Syed Mahmood , Tan Cheh Phey , Lee Seow Kheng , Kee Poh Chen , Uttam Kumar Mandal

Abstract

This study aims to formulate raloxifene loaded lipid-polymeric hybrid nanoparticles (LPHNPs) and the comparison of their properties. Three LPHNPs, each with phosphatidylcholine-lipid (PCL) as bilayer-forming-membrane with three different polymers like sodium alginate, chitosan and poly(lactic-co-glycolic-acid) were prepared by nanoprecipitation, solvent injection and emulsion solvent evaporation, respectively. Results showed that the prepared formulations were spherical-shaped with a heterogeneity. Surface morphology was viewed using a scanning electron microscopy (SEM). A high entrapment efficiency (>70%) with a sustained and pH dependent drug release profile for 24 h was observed and evaluated using mathematical kinetic modelling. Fourier transform infrared spectroscopy was used to confirm successful entrapment of raloxifene after evaluating the interaction and compatibility of the excipients used. Whereas, differential scanning calorimetry and X-ray diffraction revealed the transformation of raloxifene into an amorphous form. In conclusion, these hybrid nanoparticles provide a promising approach for oral delivery of raloxifene.

Keywords: raloxifene, lipid-polymeric hybrid nanoparticle, LPHNP, release study, pharmacokinetic release modelling

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Sr. No. 6

Transdermal drug delivery system through polymeric microneedle: A recent update

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S.No.-7

Evaluation of efficacy and safety of a novel lipogel containing diclofenac: A randomized, placebo controlled, double-blind clinical trial in patients with signs and symptoms of osteoarthritis

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Sr.No. 8

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IN-VITRO POTENTIAL OF *SPHATIKA* TABLET IN THE MANAGEMENT OF UROLITHIASIS (*MUTRAKRICHRA*)

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[2]Department of Rasa Shastra and Bhaishjya Kalpana (Ayurvedic Pharmaceutics), Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Uttar Pradesh, India.

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Abstract

The urinary system is mainly embedded of kidneys, ureters, urinary bladder, and urethra. Less water intake, electrolyte imbalance, some bacterial i.e. *Escherichia coli* & *streptococci*, viral and parasitic (*Dirofilaria immitis*) infections, autoimmune diseases might be act as causative factor which finally lead to the development of renal calculi. *Sphatika* (potash alum) is consider as *mutrakrichraghan dravya* which helps to break down the calculi and remove them through the urine. In the present work tablets of *Sphatika* were prepared by using direct compression technique. Crystal growth inhibition started at a concentration of 50 µg/ml but 650 µg/ml of drug showed maximum inhibition of 53.89%. The microbial load and presence of heavy metal in prepared *Sphatika* tablets was under the limits prescribed by The Ayurvedic Pharmacopoeia of India.

Keywords: *Mutravaha srotas*; Urinary disorders; Urinary system; *Sphatika*; *Fitkari*; *Mutrakrichra*; Urolithiasis.

Introduction

Water is an essential component liable for digestion, circulation, elimination, body temperature regulation (Brunton, Chabner, & Knollmann, 2011; Nilore, 1984). The urinary system pivotal function is to maintain the normal composition and volume of body fluid that can be executed by glomerular filtration, tubular reabsorption, tubular secretion of soluble and filterable components present in plasma (Satoskar, Rege, & Bhandarkar, 2015). The urinary system, the bowels, the skin and the lungs are four excretory system of the human body (Brunton *et al.*, 2011).

Urolithiasis is defined as the aggregation of urinary crystalloids (Balaji & Menon, 1997; Shanmugapriya & Kumar, 2017). It is concerned with a number of abnormalities associated with composition of urine which might be occur due to dietary indiscretions, physiological and metabolic disorders, or both (Baghel, Chopra, Bhatia, & Tamilvanan, 2018; Jung *et al.*, 2017; Vermeulen, Lyon, & Fried, 1965). The exact cause and mechanism of the stone formation in urinary system is still obscure. As far as the treatment is concerned the surgical and medical management of the disease which are in practice able to treat only some extent but they are imitated and associated with various complications (Pak *et al.*, 2004; Pearle, 2004; Taylor & Curhan, 2004).

The stone formation procedure relies upon urine volume, comprise calcium, phosphate, oxalate and sodium ions concentration (Mandel & Mandel, 1989). High ion levels, low urine volume, low pH, and low citrate level might be act as a precursor for the formation of kidney stone (Brunton *et al.*, 2011; Satoskar *et al.*, 2015).

Sphatika or Phitkari or *Kankshi* or Alum or Potash alum is a mineral origin drug of *Ayurvedic* medicine which have astringent, analgesic, haemostatic, desiccative, expulsive for foetus and placenta, antipyretic, detergent, corrosive, expectorant, emetic and irritant property (Chunekar & Pandey, 2004; Sharma, 2004; Sivananda, 2006; Tripathi, 1994; Vagbhata, 1961). It is a colourless, white transparent, odourless crystalline masses or a granular powder with a sweetish astringent taste contains Potassium, Aluminium, Hydrogen, Sulphur and Oxygen ($K_2SO_4Al_2(SO_4)_3.24H_2O$) (Roqaiya & Begum, 2015). When heated it melts and at about 200^{0}C and loses its water of crystallisation with the formation of the anhydrous salt. It is soluble as 1 part in 7.5 parts of water, 1 in 0.3 of boiling water, and 1 in 3 of glycerol (ALtaei & Al-Jubouri, 2005). Two types of *Sphatika* has been explained in the classics i.e. *Phatak*i and *Phullika*. It is described under *Uparasa varga* in *Rasa ratna samuchaya* (Vagbhata, 1961), *Rasa Hridaya Tantra* (Govinda, 1998), *Rasendra Chudamani* (Vidhyalankar, 1932), *Rasa Prakasha sudhakara* (Siddhinandan, 2004).

Materials and Method

The *Sphatika* was collected from the local market of Jalandhar and its authentication was carried out by Herbal Health Research Consortium Pvt. Ltd., Amritsar.

PHYSICOCHEMICAL PARAMETERS

Determination of Foreign Matter (Lohar, 2007)

Drug sample (500 g) was taken and spread into tray. The unwanted material was separated out by visual inspection, using a magnifying lens. It was weighed and percentage of foreign matter was calculated.

Determination of Moisture Content (Loss on Drying at 105^{0}C) (Lohar, 2007)

Ten gm of the drug sample was taken and dried it at 105^{0}C for 5 hours in hot air oven and weighed after cooling in desiccator. It was then dried until the difference between two progressive readings was not more than 0.25 percent and computed the percentage of LOD.

Determination of Total Ash (Lohar, 2007)

Powdered 2 gm drug sample was incinerated in tarred silica crucible at 450^{0}C for 5 hrs in a muffle furnace until it turned white, indicating the absence of carbon. This was

Sr.No.-9

Article Text

Case report

Levofloxacin induced bullous fixed drug case report

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Correspondence to Dr Amit Sharma, Department of Pharma
142001, Punjab, India, Dr Ashish B
Technology, Maharaja Ranjit Singh Punjab Technical Univer

Abstract

A 42-year-old male patient visited the outpatient depart
tract infection and diabetes mellitus. His main symptom
bullous fixed drug eruption on the lower and upper limbs
assessment, the patient was prescribed levothyroxine, h
combination of sulfamethoxazole-trimethoprim. On asse
(ADR), different ADR assessment scales such as the WHO
Severity Assessment Scale were used, and the ADR was
and 'probable', respectively. It was found that ADRs such
can cause patient anxiety and a reduced quality of life. T
clinicians to become aware and vigilant about the ADR c
detection and management.

S.NO. 10

Impact of Physical Activity and Type of Cooking Oil Amongst Diabetes With Co-existing Hypertension Patients on Length of Stay and Cost: General Linear Model

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Indo Soviet Friendship College of Pharmacy https://orcid.org/0000-0001-5037-1043
Ashish Baldi
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Roorkee College of Pharmacy

Research

Keywords: General Linear Model, Physical Activity, Length of Stay, Cost of Treatment, Diabetes, Hypertension

DOI: https://doi.org/10.21203/rs.3.rs-112180/v1

S.NO. 11

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A Review on Robust Computational Approache Based Identification and Authentication of Herbal Raw Drugs

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Authors:
Source: Volume 17, Number 9, 2020, pp. 1066 1083(18)
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Abstract | References | Citations | Supplementary Data | Article Media | Metrics

Background: Over the last decade, there has been a sudden rise in the demand for herbal as well as Information and Technology (IT) industry around the world. Identification of plant species has become useful and relevant to all the members of the society including farmers, traders, hikers, etc. Conventional authentication techniques such as morphological characterization, histological methods, and optical microscopy require multiple skills which are tedious, timeconsuming and difficult to learn for non-experts This creates a hurdle for individuals interested in acquiring knowledge of species. Relying on rapid, economical and computerized approaches to identify and authenticate medicinal plants has become a recent development.

Objective: The purpose of this review is to summarize artificial intelligence-based technologies for wider dissemination of common plant-based knowledge such as identification and authentication to common people earlier limited to only experts.

Methods: A robust plant identification design enabling automated plant organ and feature based identification utilizing pattern recognition and image processing techniques resulting in image retrieval a recognition has been highlighted in this review for all the concerned stakeholders. Attempts have been made to compare conventional authentication methods with advanced computerized techniques to emphasize the advantages and future applications of an automated identification system in countering adulteration and providing fair trade opportunities to farmers.

Results: Major findings suggested that microscopical features such as shape and size of calcium oxalate crystals, trichomes, sclerids, stone cells, fibers, etc. are the essential descriptors for identification and authentication of herbal raw drugs using computational approaches.

Conclusion: This computational design can be successfully employed to address quality issues of medicin plants. Therefore, computational techniques proved as a milestone in the growth of agriculture and medicinal plant industries.

Keywords:

Document Type: Review Article

S.NO. 12

Research Articles

Chloro and bromo-pyrazole curcumin Knoevenagel condensates augmented anticancer activity against human cervical cancer cells: design, synthesis, *in silico* docking and *in vitro* cytotoxicity analysis

Monika Chaudhary Neeraj Kumar Ashish Baldi Ramesh Chandra M. Arockia Babu & Jitender Madan

Pages 200-218 | Received 05 Dec 2018, Accepted 09 Jan 2019, Accepted author version posted online: 20 Feb 2019, Published online: 27 Feb 2019

https://doi.org/10.1080/07391102.2019.1578264

Abstract

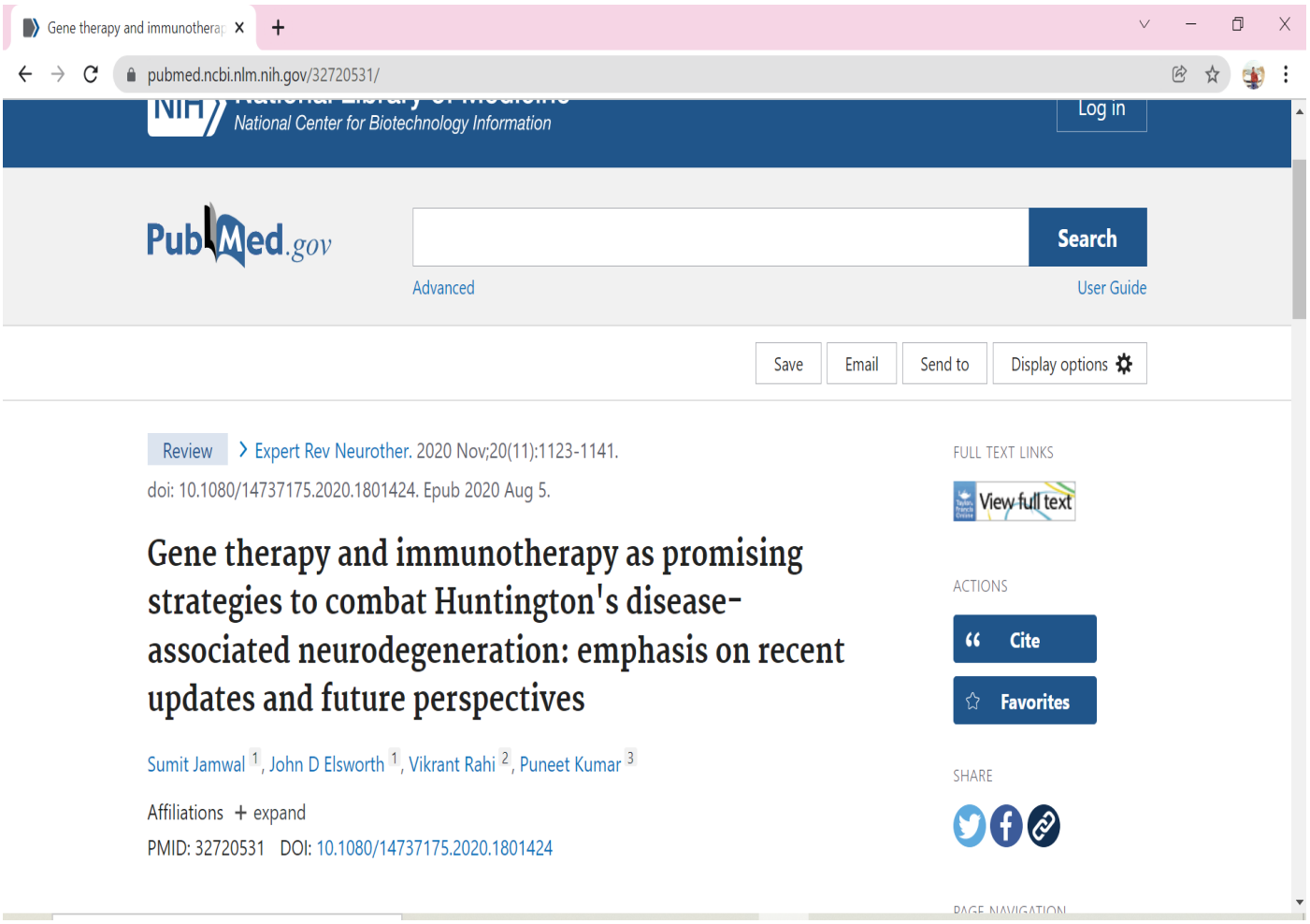
With an endeavor to develop novel curcumin analogs as potential anti-cancer agents, we designed and synthesized a series of Knoevenagel condensates by clubbing pyrazole carbaldehydes at the active methylene carbon atom of the curcumin backbone. Molecular docking studies were carried out to target the proposed derivatives on human kinase β (IKKβ), a potential anti-cancer target. The chloro derivative displayed five hydrogen bond interactions with a docking score of −11.874 kcal/mol higher than curcumin (docking score = −7.434 kcal/mol). This was supported by the fact that the propellant shaped derivatives fitted aptly into the binding pocket. Molecular simulations studies were also conducted on the lead molecule and the results figured out that the stable complexes were developed as the minimal deviations per residue of protein within the range of 0.11–0.92 Å. The screened compounds were synthesized, characterized and evaluated *in vitro* for cytotoxicity against cervical cancer cell line, HeLa using standard cell proliferation assay. Chloro derivative and bromo analog demonstrated IC_{50} (half maximal inhibitory concentration) value of 14.2 and 18.6 µg/ml, respectively, significantly lower than 42.4 µg/ml of curcumin and higher than 0.008 µg/ml of paclitaxel. Induction of apoptosis was evaluated in the terms of cleavage of caspase-3 enzyme and they also exhibited 69.6 and 65.4% of apoptosis significantly higher than 19.9% induced by curcumin. In conclusion, chloro and bromo derivatives must be evaluated under a set of stringent *in vitro* and *in vivo* parameters for translating in to a clinically viable product.

Communicated by Ramaswamy H. Sarma

Keywords:

Curcumin docking Knoevenagel condensate anticancer apoptosis

S.NO. 13


Gene therapy and immunotherap
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User Guide
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Email
Send to
Display options
Review
Expert Rev Neurother. 2020 Nov;20(11):1123-1141.
doi: 10.1080/14737175.2020.1801424. Epub 2020 Aug 5.
Gene therapy and immunotherapy as promising strategies to combat Huntington's disease-associated neurodegeneration: emphasis on recent updates and future perspectives
Sumit Jamwal [1], John D Elsworth [1], Vikrant Rahi [2], Puneet Kumar [3]
Affiliations + expand
PMID: 32720531 DOI: 10.1080/14737175.2020.1801424
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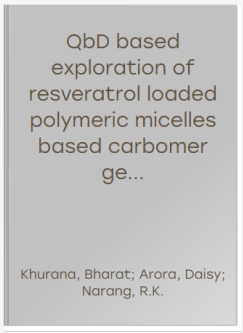
S.NO. 14

Journal of Drug Delivery Science and Technology 2020 / 7



QbD based exploration of resveratrol loaded polymeric micelles based carbomer gel for topical treatment of plaque psoriasis: In vitro, ex vivo and in vivo studies

Khurana, Bharat, *Arora, Daisy*, *Narang, R.K.*

पत्रिका: Journal of Drug Delivery Science and Technology
DOI: 10.1016/j.jddst.2020.101901
Date: July, 2020
फ़ाइल: PDF, 1.85 MB

S.NO. 15

Protective Effect of Hemin Against Experimental Chronic Fatigue Syndrome in Mice: Possible Role of Neurotransmitters

Vandana Thakur[1] · Sumit Jamwal[1] · Mandeep Kumar[1] · Vikrant Rahi[2] · Puneet Kumar[1,3]

Received: 16 March 2020 /Revised: 25 May 2020 /Accepted: 28 May 2020

Abstract

Chronic fatigue syndrome (CFS) is a disorder characterized by persistent and relapsing fatigue along with long-lasting and debilitating fatigue, myalgia, cognitive impairment, and many other common symptoms. The present study was conducted to explore the protective effect of hemin on CFS in experimental mice. Male albino mice were subjected to stress-induced CFS in a forced swimming test apparatus for 21 days. After animals had been subjected to the forced swimming test, hemin (5 and 10 mg/kg; *i.p.*) and hemin (10 mg/kg) + tin(IV) protoporphyrin (SnPP), a hemeoxygenase-1 (HO-1) enzyme inhibitor, were administered daily for 21 days. Various behavioral tests (immobility period, locomotor activity, grip strength, and anxiety) and estimations of biochemical parameters (lipid peroxidation, nitrite, and GSH), mitochondrial complex dysfunctions (complexes I and II), and neurotransmitters (dopamine, serotonin, and norepinephrine and their metabolites) were subsequently assessed. Animals exposed to 10 min of forced swimming session for 21 days showed a fatigue-like behavior (as increase in immobility period, decreased grip strength, and anxiety) and biochemical alteration observed by increased oxidative stress, mitochondrial dysfunction, and neurotransmitter level alteration. Treatment with hemin (5 and 10 mg/kg) for 21 days significantly improved the decreased immobility period, increased locomotor activity, and improved anxiety-like behavior, oxidative defense, mitochondrial complex dysfunction, and neurotransmitter level in the brain. Further, these observations were reversed by SnPP, suggesting that the antifatigue effect of hemin is HO-1 dependent. The present study highlights the protective role of hemin against experimental CFS-induced behavioral, biochemical, and neurotransmitter alterations.

Keywords Forced swimming · Chronic fatigue syndrome · Anxiety · Hemin · Oxidative stress · Neurotransmitters

Introduction

S.NO. 16

› J Microencapsul. 2020 Aug;37(5):341-354. doi: 10.1080/02652048.2020.1756970. Epub 2020 Apr 23.

Development and characterisation of clobetasol propionate loaded Squarticles as a lipid nanocarrier for treatment of plaque psoriasis

Ankita Dadwal [1 2], Neeraj Mishra [1 3], Ravindra K Rawal [4], Raj Kumar Narang [1]

Affiliations + expand

PMID: 32293928 DOI: 10.1080/02652048.2020.1756970

Abstract

Aim: The aim of this project is to improve the therapeutic effectiveness, permeation and retention of clobetasol propionate in sebaceous glands by reporting the use of Squarticles as lipidic nanosystem.**Methods:** Homogenisation method is used for the formulation of Squarticles (nanoemulgel) which was characterised on the basis of size, polydispersity index (PDI), viscosity, spreadability, DSC, % *in vitro* release, *in vitro* skin permeation deposition studies, and *in vivo* studies, scanning electron microscopic (SEM) and physical storage stability studies were done at different temperature conditions, i.e. 4 ± 2 °C, 25 ± 2 °C and 45 ± 2 °C for a period of 6 months for drug and formulation.**Result:** The morphological characterisation of prepared nanoemulsion shows small spherical shape and uniform size distribution as observed in the Scanning electron microscopic (SEM), having mean size (240.5 ± 9.2) and mean size distribution (0.282 ± 0.03) and zeta potential (-51.21).

S. NO. 17

Brain Inj. 2020 Jul 2;34(8):1039-1050. doi: 10.1080/02699052.2020.1772508. Epub 2020 Jun 4.

Pharmacological potential of tocopherol and doxycycline against traumatic brain injury-induced cognitive/motor impairment in rats

Arti Rana [1], Shamsher Singh [1], Rahul Deshmukh [2], Anoop Kumar [1 3]

Affiliations + expand

PMID: 32493074 DOI: 10.1080/02699052.2020.1772508

Abstract

Primary Objective The primary objective of this study was to explore the pharmacological potential of tocopherol and doxycycline against traumatic brain injury-induced cognitive/motor impairment in rats. Research Design Weight drop model of traumatic brain injury. Methods and Procedures After TBI, the animals were treated with doxycycline (50 and 100 mg/kg; p.o), tocopherol (5 and 10 mg/kg; p.o) alone and in combination as doxycycline and tocopherol (50 and 10 mg/kg; p.o) from 1st day to 28th day. The behavioral parameters were performed on a weekly basis from 1st day to 28th day. On 29th day, animals were sacrificed and striatum and cortex were homogenized for the estimation of biochemical (LPO, nitrite, and GSH), neuroinflammatory (IL-6, IL-1β, and TNF-α), and neurotransmitters (dopamine, norepinephrine, serotonin, GABA, and glutamate) analysis. Main Outcomes and Results Induction of TBI had significantly reduced locomotor activity, recognition memory, increased neuroinflammatory markers, and imbalance neurotransmitter levels. The treatment

S.NO. 18

Green synthetic strategies toward thiazoles: a sustainable approach.

Authors: Shelly Pathania and Ravindra K. Rawal
Date: Apr. 2020

From: Chemistry of Heterocyclic Compounds (Vol. 56, Issue 4)
Publisher: Springer

Document Type: Article
Length: 5,735 words
Lexile Measure: 1820L

Abstract :

In current era of environmental crisis, green chemistry has regained a significant role in overcoming the harmful consequences of conventional chemistry in every aspect. Green chemistry approaches like use of green solvents, green catalysts, green reagents, phasetransfer catalysts, solid support synthesis, and microwave irradiation-based synthesis provide an environmentally friendly and safe platform for the pilot and bulk synthesis of various heterocyclic compounds. Many pharmaceutical companies and researchers have showed their interest toward greener approaches for the development of medicinal products, as they minimize the production of waste and costs of the synthetic process. Accordingly, researchers continuously make attempts to incorporate these strategies for the synthesis of sulfur-containing heterocyclic compounds such as thiazoles, thiazolidines, and benzothiazoles, etc. The present review compiles various green synthetic approaches including use of green solvents, catalysts, solid support synthesis, microwave irradiation- and ultrasonication-mediated processes, for the synthesis of thiazoles and their derivatives.

EXPLORE

Related Subjects

- Bulk drugs
- Green technology
- Sulfur compounds
- Green chemistry
- Heterocyclic compounds
- Reagents
- Sulphur compounds

FUTURE MEDICINAL CHEMISTRY, VOL. 12, NO. 7 | REVIEW

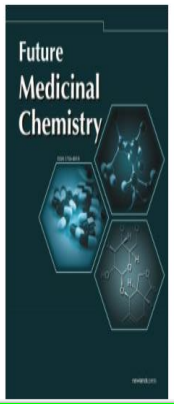
An update on chemical classes targeting ERK1/2 for the management of cancer

Shelly Pathania & Ravindra K Rawal

Published Online: 19 Mar 2020 | https://doi.org/10.4155/fmc-2019-0339

Cancer, still in the limelight due to its dreadful nature, shows overexpression of multiple signaling macromolecules leading to failure of many chemotherapeutic agents and acquired resistance to chemotherapy. These factors highlight the significance of shifting toward targeted therapy in cancer research. Recently, ERKs (ERK1 and 2) have been established as a promising target for the management of various types of solid tumors, due to their aberrant involvement in cell growth and progression. Several ERKs inhibitors have reached clinical trials for the management of cancer and their derivatives are being continuously reported with noteworthy anticancer effect. This review highlights the recent reports on various chemical classes involved in the development of ERKs inhibitors along with their *in vitro* and *in vivo* activity and structure–activity relationship profile.

Keywords: **cancer** • **ERK1/ERK2** • **ERK inhibitors** • **heterocycles**



S.NO-20

J Biomol Struct Dyn. 2020 Mar;38(5):1335-1353. doi: 10.1080/07391102.2019.1604266. Epub 2019 Apr 17.

4-Bromo-4'-chloro pyrazoline analog of curcumin augmented anticancer activity against human cervical cancer, HeLa cells: *in silico*-guided analysis, synthesis, and *in vitro* cytotoxicity

Monika Chaudhary [1 2], Neeraj Kumar [3], Ashish Baldi [4], Ramesh Chandra [3 5], M Arockia Babu [6], Jitender Madan [6]

Affiliations + expand

PMID: 30957694 DOI: 10.1080/07391102.2019.1604266

Abstract

Inspired by the synergistic effects of hetero-aromatic scaffolds on curcumin, a novel array of pyrazoline substituted curcumin analogs was designed. Multi-scale computational studies were carried out to target the proposed analogs on human kinase β (IKK-β), a potential anti-cancer target. In molecular docking analysis, all the eleven molecules were observed to bind the target site and 4-bromo-4'-chloro analog displayed three hydrogen bond interactions with a docking score of -11.534 kcal/mol higher than parent molecule, curcumin (docking score = -7.12 kcal/mol) as the propellant shaped of analogs aided in proper binding with Kinase Domain binding pocket. The molecular

S.NO 21

Editorial

Traditional and Herbal Medicines: Understanding & Exploration (Part II)

Author(s): Ashish Baldi, Puneet Kumar Bansal

Journal Name: Current Traditional Medicine

Volume 6 , Issue 4 , 2020

DOI : 10.2174/2215083806042005181132 20

Journal Home

S. NO 22

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REVIEW ARTICLE

Nipah Virus and its Outbreaks in Tropical Areas

Shiv Kumar Kushawaha[1], Neelam Raj[1], Mahendra Singh Ashawat[1], Manish Sinha[1]*, Puneet Kumar[2]

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[2]Department of Pharmaceutical Sciences & Technology, Maharaja Ranjit Singh Punjab Technical University, Bathinda (India), 151001
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ABSTRACT:
Nipah virus is an emerging zoonosis with the potential to cause significant morbidity and mortality in humans. This virus escaped obscurity as a nameless animal virus and assured a place for itself in the annals of history as most fatal virus by killing a large number of people and bringing down billion dollar swine industry in Malaysia within shorts span of time. Nipah virus is an enveloped negative-strand RNA paramyxovirus. The natural reservoir for this virus is 'flying fox' fruit bats. The virus caused an outbreak of severe febrile encephalitis in humans with a high mortality rate. Nipah virus provides one of the most striking examples of an emerging virus and illustrates many of the pathways leading from a wildlife reservoir to human infections. This review will provides the background of the emergence of Nipah virus, symptoms, pathogenesis &pathology, prevention, control, and treatment.

KEYWORDS: Nipah, Zoonosis, Flying Fox', Encephalitis, Mortality Rate.

INTRODUCTION:

Nipah is a viral zoonotic disease of wide occurrence. The name Nipah virus was proposed because the first isolate was made from clinical material from a fatal human case from Kampung Sungai Nipah, a village in Negeri Sembilan.[1] Today, the mortality rate of Nipah lies in

India has a fast-growing human population which causing increased animal-human interactions, combined with changing environmental conditions and inadequate sanitation have made India one of the world's top hotspots for livestock diseases. Due to loss of habitat and food availability, bats have driven toward human-

S.NO 23

DOI: 10.2174/2215083805666190619095933 • Corpus ID: 196648316

Genus Calotropis: A Hub of Medicinally Active Phytoconstituents

S. Pathania, P. Bansal, +1 author R. Rawal • Published 30 July 2020 • Biology

Traditional medicines derived from plant and other natural sources have several advantages over synthetic drugs when used for the management of pathological conditions. Natural product based therapies are safer than synthetic drugs-based chemotherapies. One of such sources of bioactive molecules includes C. procera and C. gigantea, flowering herbal plants, belonging to the genus Calotropis, family Apocynaceae, which, due to their diverse pharmacological profile, have been widely employed in Ayurveda, Unani, Siddha and other traditional systems for the treatment of various diseases. The various parts of this plant are rich in phytoconstituents such as cardiac glycosides, flavonoids, terpenoids, steroids, phenolic compounds, proteins etc. Due to the presence of multiple constituents, this plant possess diverse biological activities such as analgesic, antitumor, antihelmintic, antioxidant, hepatoprotective, antidiarrhoeal, anticonvulsant, antimicrobial, oestrogenic, antinociceptive, antimalarial activity etc. The present review provides comprehensive information about various phytochemical constituents of the plant along with their medicinal importance.

S.NO 24

Nanoparticles as Budding Trends in Colon Drug Delivery for the Management of Ulcerative Colitis

[Vol. 10 , Issue. 3]

Author(s):

Amandeep Singh*, Kirandeep Kaur, Uttam Kumar Mandal and Raj Kumar Narang Pages 225 - 247 (23)

Abstract:

Inflammatory Bowel Disease (IBD) is a disorder of the gastrointestinal tract, which is characterized by Crohn's disease and Ulcerative colitis. Ulcerative colitis (UC) is a chronic idiopathic relapsing colon disease distinguishes by the interference of epithelial wall and colonic site tenderness. For the treatment of ulcerative colitis, various side effects have been reported, due to the non-specific delivery of the targeted drug of the conventional system. This review will explain the reader about various considerations for the preparation of orally administered NPs drug delivery systems for the treatment of ulcerative colitis. Moreover, principles and novel strategies for colon targeting based on the physiology of colon so that the tract of gastro intestine can be used as the identification marker for a target site for drugs. Besides this, the role of phytomedicines in controlling and managing the ulcerative colitis has been discussed. Additionally, the major problem for the smart delivery of NPs in clinical applications with their difficulties in Intellectual Property Rights (IPR) was also discussed. Finally, this review provides various potential approaches to NPs for the treatment of UC.

S.NO 25

Pharm Nanotechnol. 2020;8(2):91-107. doi: 10.2174/2211738508666200129160027.

FbD Supported Development and In Vitro Evaluation of Carbomer based Resveratrol Loaded Topical Antipsoriatic Nanoemulgel for its Targeted Skin Delivery

Bharat Khurana [1 2], Daisy Arora [2], Raj K Narang [2]

Affiliations + expand

PMID: 31995028 DOI: 10.2174/2211738508666200129160027

Abstract

Background: Resveratrol is a wonder therapy for the treatment of several skin disorders, including psoriasis, but its skin permeation limits its applications.

Objective: The present work dealt with optimizing and formulating resveratrol loaded vitamin E based nanoemulsion and carbomer based nanoemulgel intended for topical application in the treatment of plaque psoriasis. The major objective of this study was to achieve the quality target product profile with respect to enhanced skin permeation and superior skin deposition of the formulated nanoemulgel to achieve the superlative therapeutic advantages.

Methods: Formulation by design (FbD) approach was employed to optimize varied critical material

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

S. No. 26

Journal of Food Measurement and Characterization
https://doi.org/10.1007/s11694-019-00277-3

ORIGINAL PAPER

Solid-state fermentation of pearl millet with *Aspergillus oryzae* and *Rhizopus azygosporus*: effects on bioactive profile and DNA damage protection activity

Sukhvinder Singh Purewal[1] · Raj Kumar Salar[2] · Manpreet Singh Bhatti[3] · Kawaljit Singh Sandhu[1] · Surender Kumar Singh[4] · Pinderpal Kaur[1]

Received: 12 June 2019 / Accepted: 23 September 2019

Abstract

The present scientific work envisaged the effect of fermentation, starter culture, solvent type, concentration of solvent and extraction conditions on pearl millet phenolics. Fermentation of pearl millet grains was performed using two filamentous fungal strains (*Aspergillus oryzae* and *Rhizopus azygosporus*) for a specific period (336 h). Pearl millet koji was extracted under optimized conditions and studied for the presence of specific bioactive compounds using high performance liquid chromatography (HPLC). Results confirmed the presence of ascorbic acid (1.55 mg g^{-1}), p-coumaric acid (1.04 mg g^{-1}) and cinnamic acid (0.71 mg g^{-1} as major compounds in unfermented pearl millet and ascorbic acid (10.23 mg g^{-1}), gallic acid (8.95 mg g^{-1}), resorcinol (2.90 mg g^{-1}, catechol (7.60 mg g^{-1}), vanillin (4.58 mg g^{-1}), p-coumaric acid (3.96 mg g^{-1}), quercetin (2.74 mg g^{-1}), benzoic acid (5.10 mg g^{-1}) and cinnamic acid (5.14 mg g^{-1}) in *A. oryzae* fermented millet (AoFM). Specific phenolics in *R. azygosporus* fermented millet (RaFM) were ascorbic acid (8.80 mg g^{-1}), gallic acid (4.70 mg g^{-1}) and p-coumaric acid (1.27 mg g^{-1}) along with other minor phenolics. DNA damage protection activity was observed maximum till 288 h of fermentation for AoFM and 240 h of fermentation for RaFM.

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Food Research International 133 (2020) 109136

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Review

Chemistry and microbial sources of curdlan with potential application and safety regulations as prebiotic in food and health

Deepak Kumar Verma[a,*], Alaa Kareem Niamah[b], Ami R. Patel[c], Mamta Thakur[d], Kawaljit Singh Sandhu[e], Mónica L. Chávez-González[f], Nihir Shah[c], Cristobal Noe Aguilar[f]

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ARTICLE INFO

Keywords:
Exopolysaccharides
Curdlan
Prebiotic
Stabilizer
Fat substitute
Gelling agent
Anti-malarial activity
Therapeutic effects

ABSTRACT

Curdlan – a homopolysaccharide is comprised of glucose using β-1,3-glycosidic bond and produced by different types of microorganisms as exopolysaccharide. Curdlan gel is stable during freezing and thawing processes which find several applications in food and pharmaceutical industries. It acts as a prebiotic, stabilizer and water-holding, viscosifying and texturing agent. Additionally, curdlan gel is used as a food factor to develop the new products e.g. milk fat substitute, non-fat whipped cream, retorting (freeze-drying) process of Tofu, low-fat sausage, and low-fat hamburger. However, a great variation exists among different countries regarding the regulatory aspects of curdlan as food additives, dietary components or prebiotic substances. Therefore, the present review paper aims to discuss safety issues and the establishment of common guidelines and legislation globally, focusing on the use the applications of curdlan in the food sector including the development of noodles, meat-based products, and fat-free dairy products. This review analyzes and describes in detail the potential of curdlan as a sustainable alternative additive in health and food industries, emphasizing on the chemical composition, production, properties, and potential applications.

1. Introduction

Polysaccharides play crucial roles in the vast life processes and have enormous significance in health care, food, as well as cosmetic industries, owing to the therapeutic potential with fairly less toxicity (Pereira, Gheda, & Ribeiro-Claro, 2013; Pereira, 2018). Microbial exopolysaccharides are earning importance on account of a number of applications in food industries and pharmaceutical products (Harada & Harada, 1996; Shivakumar & Vijayendra, 2006; Freitas, Alves, & Reis, 2011; Patel & Prajapati, 2013; Pereira et al., 2013; Patel & Prajapati, 2015; Jindal & Khattar, 2018). Food and Drug Administration (United States) has legally approved curdlan as a food additive (USFDA, 2020).

Curdlan is one of the emerging oligosaccharides and exopolysaccharides having prebiotic potential (Fu et al., 2015). In 1966, Harada and coworkers had discovered curdlan gel (Harada, Fujimori, Hirose, & Masada, 1966). Curdlan is a biological polymer produced by several microorganisms, i.e. from some genus of bacteria such as *Agrobacterium* and it is found as a polysaccharide (capsules) in Gram-negative bacteria. Curdlan is a neutral gel β-(1 → 3)-glucan, possibly containing a little intra-chain or inter-chain 1 → 6-bonds (Nishinari, 2000), that contain almost 10% succinate; called succinoglucan, produced as an exopolysaccharide by several species of soil bacteria (Table 1).

The name Curdlan was given because of its ability to "coagulate" when heat treated. It has unique properties such as heat-resistant gel formation which is stable at 80–100 °C (Harada et al., 1966; Nishinari, 2000). The unique physical and chemical properties of curdlan gel have been developed for their vital applications in many industries (Toyoda & Kimura, 2004; Zhang & Edgar, 2014; Jindal & Khattar, 2018). Consequently, this polymer is of great demand and it can exert maximum potential in diverse applications (Freitas et al., 2011; Zhan, Lin, & Zhang, 2012; Divyasri, Gunasekar, Benny, & Ponnusami, 2014; Shobana, Ponnusami, & Sugumaran, 2015). Recently, the production of frozen foods and other packaged food products have greater than

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Available online 02 March 2020
0963-9969/

S. No 28

Journal Pre-proofs

A novel starch from *Pongamia pinnata* seeds: Comparison of its thermal, morphological and rheological behaviour with starches from other botanical sources

Anil Kumar Siroha, Sneh Punia, Maninder Kaur, Kawaljit Singh Sandhu

PII: S0141-8130(19)37251-4
DOI: https://doi.org/10.1016/j.ijbiomac.2019.10.033
Reference: BIOMAC 13437

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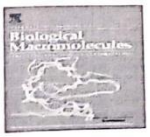
S. No 29

Journal Pre-proofs



Physical, structural and thermal properties of composite edible films prepared from pearl millet starch and carrageenan gum: Process optimization using Response Surface Methodology

Kawaljit Singh Sandhu, Loveleen Sharma, Maninder Kaur, Ramandeep Kaur

PII: S0141-8130(18)36422-5
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Reference: BIOMAC 13356

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Accepted Date: 15 September 2019

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S. No 30

International Journal of Biological Macromolecules 154 (2020) 493–498

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Review

Oat starch: Physico-chemical, morphological, rheological characteristics and its applications - A review

Sneh Punia [a,*], Kawaljit Singh Sandhu [b], Sanju Bala Dhull [a], Anil Kumar Siroha [a], Sukhvinder Singh Purewal [b], Maninder Kaur [c], Mohd. Kashif Kidwai [d]

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ARTICLE INFO

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Pasting
Rheology

ABSTRACT

Oat starch is getting attention owing to its usefulness and potential in a number of food and non-food applications. Starch is by far the main component of oat grains and possesses some unique chemical, physical, and structural properties when compared with other cereal starches. Oat starch offers untypical properties such as small size of granules, well-developed granule surface and high lipid content. Variation in amylose and amylopectin proportion along with the properties associated with the amylopectin molecule makes diversity in composition of oat starch. The pasting and rheological properties of oat starches control food product quality. This review articles outlines the recent developments in understanding of the starch isolation, chemical composition, morphology, pasting, rheological and thermal characteristics and various application of oat starch. Potential applications of oat starches are also reviewed.

Contents

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S. No 31

J Food Sci Technol
https://doi.org/10.1007/s13197-020-04380-y

ORIGINAL ARTICLE

Antioxidant characterization and in vitro DNA damage protection potential of some Indian fenugreek (*Trigonella foenum-graecum*) cultivars: effect of solvents

Sanju Bala Dhull[1] · Maninder Kaur[2] · Kawaljit Singh Sandhu[3]

Revised: 16 March 2020 / Accepted: 31 March 2020

Abstract Indian fenugreek cultivars were characterized for their antioxidant properties and bioactive compounds were quantified using high performance liquid chromatography (HPLC). The extraction efficiencies were compared for two extraction solvents [aqueous ethanol (50%) and methanol]. The bioactive properties studied were total phenolic content (TPC), total flavonoids content (TFC), condensed tannin content (CTC), 2,2′-Azino-bis (3-ethylbenzothiazoline-6-sulfonate) ($ABTS^+$), 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity, total antioxidant capacity (TAC), and reducing power activity (RPA). Aqueous ethanol extracts showed higher TPC, TFC, $ABTS^+$, TAC and RPA as compared to methanol. However, methanolic extracts showed higher CTC and DPPH activity. Higher TPC [45.3 and 45.4 mg gallic acid equivalents (GAE)/g dry weight basis (dwb)], DPPH (93.0 and 93.2%), $ABTS^+$ (98.3 and 98.5%), RPA [40.9 and 44.9 mg quercetin equivalents (QE)/g dwb], were observed for cv.RMT-143 and cv.RMT-365, respectively. TFC (20.5 mg catechin equivalents (CE)/g dwb) and CTC (9.3 mg CE/g dwb) were found the highest for cv. Kasoori methi. Quantification of phenolic compounds using HPLC revealed higher amount of gallic acid (in Kasoori methi), ascorbic and p-coumaric acid (HM-57), benzoic and cinnamic acid (RMT-143) and catechol (only in RMT-365). Significant ($p < 0.05$) protection against in vitro plasmid deoxyribonucleic acid (DNA) (pBR322) oxidative damage was observed for fenugreek extracts.

Keywords Fenugreek · Total phenolic content · Total flavonoids content · Condensed tannin content · In vitro DNA damage protection

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Published online: 23 April 2020

Introduction

Fenugreek (*Trigonella foenum-graecum*) belongs to legume family, believed to be originated from Western Asia and South Eastern Europe, but now grown mainly in India as well as many parts of the world including Northern Africa and USA (Altuntaş et al. 2005). Fenugreek seeds are extensively used as spice in Indian cuisine for flavoring while its leaves, germinated seeds and tender shoots are used as vegetables. The seeds are aromatic, pleasantly bitter and slightly sweet with antidiabetic (Tavakoly et al. 2018) and hypo-cholesterolaemic (Belguith-Hadriche et al. 2013), antimicrobial, carminative, galactogogue, anti-carcinogenic and anti-inflammatory properties (Pandey and Awasthi 2015; Wani and Kumar 2018). Fenugreek seeds have been described as good source of protein (27.5%), soluble (30.6%) and insoluble (20.6%) dietary fiber, crude fat (6.71%) and minerals such as calcium, iron and β-carotene (Naidu et al. 2011).

Free radicals and some other potential toxic compounds are generated due to oxidative stress and autoxidation of human lipids and lipoproteins, causing various health problems (Yen et al. 2018). To solve these health issues, day by day interest is increasing in use of natural antioxidants from plants such as flavonoids, phenolic, and alkaloid compounds (da Silva et al. 2018; Ghasemi et al. 2018).

S. No 32

J Food Sci Technol
https://doi.org/10.1007/s13197-020-04410-9

ORIGINAL ARTICLE

Quantification of phenolic acids and antioxidant potential of wheat rusks as influenced by partial replacement with barley flour

Sneh Punia[1] · Kawaljit Singh Sandhu[1,2] · Maninder Kaur[3]

Revised: 22 November 2019 / Accepted: 2 April 2020

Abstract This study was investigated to evaluate the phenolic acid composition, antioxidant potential and acceptance of rusk prepared by the progressive replacement of wheat flour with barley flour. The wheat-barley blends rusks were also evaluated for their pasting and sensorial properties. The pasting characteristics of wheat flour was influenced by barley flour incorporation with a increase in peak and final viscosity values with increasing amount of barley flour. The results revealed that incorporation of barley flour into wheat flour improved the nutritional and bioactive compounds profile. The free radical scavenging activities towards DPPH and $ABTS^{+}$ was found to be higher for wheat-barley blends rusk in comparison with wheat rusk. As evident from total phenolic content, total flavonoids contents and antioxidant activities, barley flour was found to be rich in bioactive compounds in comparison with wheat flour. Supplementation of rusks with 30% barley flour were suggested to be nutritionally superior with an acceptable sensory score and is a successful approach to enrich rusks with nutrients.

Keywords Barley · Phenolic acids · Pasting · Rusks

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Introduction

Busy life style, hectic schedule and globalization have shifted consumer's interest towards bakery products because of their ready-to-eat nature, convenience, and long shelf life. Biscuits, crackers, cakes, breads, rusks are most popular products of bakery industry. Wheat is the most versatile cereal and generally all the bakery foods are formulated from wheat. Although wheat provides nutrients and calories but it is still bio-actively and nutritionally poor. Wheat's protein quality is inferior to when compared with other cereals because of low lysine, methionine and threonine content of wheat proteins (Yakoob et al. 2018). Traditionally neglected barley cereal used has been boosted either as whole grain or as an ingredient. Barley has an excellent nutritional profile and has increasingly become an active ingredient in healthy food because it has been known to have high amount of dietary fibres (β-glucan), phenolic compounds, arabinoxylans and bioactive polypeptide (Punia et al. 2017; Sandhu and Punia 2017; Alu'datt et al. 2012). Barley mainly contains phenolic such as ferulic acid, caffeic acid, p-coumaric acid, protocatechuic acid, flavonols and flavan-3-ols (Hernanz et al. 2001). Being a source of functional compounds, barley is reported to have potential of lowering blood cholesterol, glycemic index (GI) and reduce the risk of chronic diseases (Brennan and Cleary 2005). Barley is a healthier version of other cereals and addition of barley or barley constituents to foods is usually aimed at increasing the content of total and soluble fibre in foods, improving their physiological efficacy, and providing health benefits. Therefore, the supply of barley's functional components through baked products may be an interesting opportunity to improve the nutritional behavior of bakery products (Dhull et al. 2019). By the consequences of modern life style and changing environment,

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S. No 33

J Food Sci Technol
https://doi.org/10.1007/s13197-020-04434-1

ORIGINAL ARTICLE

Kinetic, rheological and thermal studies of flaxseed (*Linum usitatissiumum* L.) oil and its utilization

Sneh Punia[1] · Kawaljit Singh Sandhu[1,2] · Sanju Bala Dhull[1] · Maninder Kaur[3] · Anil Kumar Siroha[1]

Revised: 19 March 2020 / Accepted: 8 April 2020

Abstract In present study kinetic, thermal and rheological characteristics of oil isolated from flaxseed were studied and because of high content of α-linolenic acid (essential omega-3 fatty acid), flaxseed oil was incorporated in muffins by replacing fat/shortening at different levels (10%, 20%, 30% and 40%). To evaluate rheological behaviour, the experimental data of flow behaviour for flaxseed oil was fitted to Power law model, consistency index (K) and flow behaviour index (n) and Arrhenius parameters (activation energy and frequency factor) were evaluated. The n value of the oil treated at 10, 15, 20, 25 and 30 °C were found between 0.8 to 0.9, which suggested the non-Newtonian fluid behaviour of flaxseed oil. Thermal properties of flaxseed oil was evaluated using DSC (differential scanning calorimetry). The flaxseed oil possessed three endothermic and one shoulder peak. Gas chromatography revealed the fatty acids composition qualitatively and quantitatively and flaxseed oil is dominated by unsaturated fatty acids. Saturated oil was replaced with flaxseed unsaturated fat and results showed that substituting oil with flaxseed fat at level upto 20% produced muffins possessed the better texture, colour, aroma, mouth feel and overall quality score. **Practical application:** Modern diet lifestyle demands of healthy natural foods represent a challenge for food manufacturers to lead towards the healthy new trends. Fats imparts lubrication, texture, flavour and acceptability therefore used as major ingredients in bakery goods. Fats contains saturated fatty and dietary intake of saturated fatty acids in excess amount leads to many health disorders. Therefore, substitution of saturated fatty acid with PUFAs (omega-3 and omega-6) for the protection against diseases and metabolic disorders may be a solution for healthy and nutritious product development.

Keywords Flaxseed oil · GC–MS · DSC · Rheology · Muffins

Introduction

Flax (*Linumusitassimum*), a small flowering annual herb commonly known as linseed, belongs to family*Lineaceae* and used as food, for medicinal purposes and as nutritional product. On the report of FAO (2017), the global production of flaxseed was 2,794,344 tonnes whereas it was 184,000 tonnes in India. Flaxseed has come out as one of the functional ingredient in food and is the richest source of lipids (40%), proteins (25%), dietary fiber (28%), vitamins and minerals (de Moura et al. 2016). These components in flaxseed that are associated with health benefits are include α-linolenic acid (essential amino acid), and dietary fiber (Hall et al. 2006) and phenolic acids, flavonoids, phenylpropanoids and tannins (Kasote 2013). Flax oil is rich in polyunsaturated fatty acid (73%) followed by monounsaturated fat (18%) and saturated fat (9%) (Cunnane et al. 1993; Dubois et al. 2007). Among PUFAs, flaxseed oil is a dietary source of essential fatty acid, omega-3 (n-3, alpha-linolenic acid) and it plays an important role in the

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Effect of cross-linking on physico-chemical, thermal, pasting, *in vitro* digestibility and film forming properties of Faba bean (*Vicia faba* L.) starch

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ABSTRACT

Faba bean starch was crosslinked (CL) at different levels (1, 3 & 5%) using sodium trimetaphosphate and studied for physicochemical, thermal, pasting and *in vitro* digestibility characteristics. Further, films were prepared from these starches and characterized for moisture content, thickness, water solubility, opacity, water vapor permeability (WVP) and mechanical properties. Amylose content, swelling power and solubility decreased after modification. CL resulted in decrease in peak viscosity (PV) whereas pasting temperature increased; CL (5%) showed the lowest PV (6474 mPa.s). Steady shear properties showed flow behavior index values <1 for starch pastes, indicating pseudoplastic and shear-thinning behavior. Thermal properties of CL starches showed higher transition temperatures and enthalpy of gelatinization (ΔH_{gel}) as compared to native starch. ΔH_{gel} values of CL starches ranged from 10.70 to 14.20 J/g whereas for native starch, the value was 9.47 J/g. CL resulted in increased resistant starch (from 49.8 to 61.1%), the highest value was for CL (5%). CL starch films exhibited lower moisture content, water solubility and WVP. Film thickness, however, was not affected by modification. CL (5%) starch film showed the highest tensile strength (14.28 MPa) and the lowest elongation at break (25.62%). CL resulted in improved mechanical and barrier properties of starch films.

1. Introduction

Faba bean (*Vicia faba* L.) is a versatile pulse crop cultivated in low temperature regions and widely used as food and feed in developing countries. Mature faba bean contains ~40% starch, protein (26–34%), dietary fiber (15–24%), and crude fat (2–4%) [1]. It has oval, kidney or irregularly shape starch granules with higher amylose and resistant starch content than conventional starches [2]. Due to these properties faba bean starch has been explored in glass noodles formulation, as gelling agent in jello-type dessert and utilized in biodegradable film formation [3].

In recent years, due to concern about food safety and environmental issues caused by petroleum-based plastic packaging films, much attention has been focused on the development of edible and biodegradable films based on materials from renewable sources that are abundant in nature. The commonly investigated bio-based materials include polysaccharides, proteins and lipids [4,5]. Polysaccharide-based films are more attractive than protein- and lipid-based films due to their advantages of low-cost, abundant resources, good film-forming ability as well as relatively stable performance [6]. Starch has been considered as an important polysaccharide polymer because of its capability to develop continuous matrix, low cost, renewable and abundant resources [7]. This biopolymer has been extensively used as an attractive film-forming material for edible packaging in recent times [8]. Native starches, however, have limitations in film forming because of high water vapor permeability and poor mechanical resistance properties of films made from them [9].

Modified starches have played a significant role in food and pharmaceutical industries in the past few decades. They possess some distinctive properties which are not found in native starches thus making them suitable for the development of new products [10]. Generally, there are four basic techniques used for starch modification namely, physical, chemical, enzymatic and genetic [11]. Chemically modified starches behave more efficiently towards physical, barrier, mechanical and morphological properties, which are considered desirable for film forming characteristics [12]. Among chemical modifications, crosslinking is a promising technique to improve the performance and

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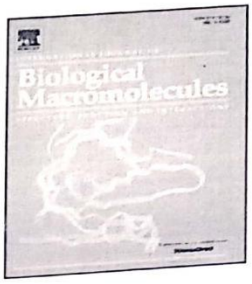

Functional, thermal and rheological behavior of fenugreek (Trigonella foenum–graecum L.) gums from different cultivars: A comparative study

Sanju Bala Dhull, Kawaljit Singh Sandhu, Sneh Punia, Maninder Kaur, Prince Chawla, Anju Malik

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Development, characterization, and biocompatibility of zinc oxide coupled starch nanocomposites from different botanical sources

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ABSTRACT

Starch nanoparticles (SNP) were prepared from different botanical sources (wheat, potato, mung bean, water chestnut and mango kernels) and these were further coupled with zinc oxide (ZnO) to form starch nanocomposites. The nanocomposites were characterized for their particle size, morphological properties, energy dispersive X-ray spectroscopy (EDX) and their biocompatibility was analyzed by MTT [3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide] assay, using HeLa cells. From the morphological results, it was observed that ZnO forms super molecules with SNP. Further, EDX studies also confirmed the presence of zinc in coupled molecules. The size distribution of ZnO coupled SNP from different botanical sources revealed that the average diameter of nanocomposites ranged between 506 and 1209 nm. ZnO coupled starch nanocomposites were found to be biocompatible with 77–90% cell viability up to 24 h on HeLa cells. Among all botanical sources studied, ZnO coupled mung bean starch nanocomposite showed the highest cell viability (75% up to 50 h) while ZnO coupled potato starch nanocomposite showed the lowest cell viability (65% up to 50 h).

1. Introduction

Among the natural polymers, starch has been considered as one of the most promising candidates because it is cheap, renewable, worldwide available, and biodegradable [1,2]. Native starches, however, have some limitations in industrial applications such as insolubility in cold water with poor emulsifying ability and high retrogradation rate. Granules of native starch hydrates easily, swell rapidly, rupture, loose viscosity, and produce cohesive pastes [3]. Modification of starch to the nanometer level to meet the requirements of industrial applications has become a major focus in the field of starch research. Nanoparticles made from natural polysaccharides such as starch [4,5] are harmless to human health [6], biodegradable and biocompatible. Starch nanoparticles (SNPs) have various distinctive properties by which it is widely used as compared to starch particles [7]. Starch nanoparticles have gained much attention because of their nano-size, large surface area, good biocompatibility, biological activity, unique biodegradable, and adsorptive properties. Starch nanoparticles from different botanical sources have been prepared by various researchers [8–13]. These nanoparticles are generally used in the food industry, biomedical fields, as a fat replacer, composites filler, water treatment agent, and catalytic nanosystems [14,15].

Bio-nanocomposites and their synthesis have gained significant attention in nanomaterial science. Chemical and physical techniques used for the synthesis of metal nanoparticles are costly, time-consuming and laborious. Moreover, a large number of secondary byproducts/waste is generally produced during the synthesis of nanoparticles leading to the limited use of such techniques. Chemical synthesis techniques involve the use of some poisonous chemicals which have adverse effects upon medical applications [16,17]. Green chemistry has been emphasized for the synthesis of such materials to eliminate or reduce the generated waste and to implement sustainable processes [18]. Now a day, natural biopolymers composites with better functional properties are preferred by the researchers. The non-toxicity and high surface reactivity of biopolymer composites make them extremely reactive and diversified materials. Biopolymer based nano drug carriers are gaining research interest day by day [19,20]. Soluble starches have been used as a template in the solution of silver nitrate for green synthesis of silver nanoparticles.

Zinc oxide (ZnO) nanoparticles are non-toxic and have antimicrobial, barrier and mechanical properties and belong to the GRAS category [21]. Additionally, the non-central symmetry and biocompatible nature of ZnO make it the most important nanomaterial in research and applications. ZnO nanoparticles exhibit exceptional luminescent, thermal

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International Journal of Fruit Science

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Nutritional Profile and Health Benefits of Kinnow: An Updated Review

Sukhvinder Singh Purewal & Kawaljit Singh Sandhu

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ORIGINAL ARTICLE

Synthesis and characterization of nano starch-based composite films from kidney bean (*Phaseolus vulgaris*)

Ishita Sharma[1] · Archana Sinhmar[1] · Rahul Thory[1] · Kawaljit Singh Sandhu[2] · Maninder Kaur[3] · Vikash Nain[4] · Ashok Kumar Pathera[1] · Prafull Chavan[1]

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Abstract This study was aimed to synthesize and evaluate the nano starch-based composite films by the addition of nano starch in film formulation at 0.5, 1, 2, 5 and 10% level of total starch. The acid hydrolysis technique was used to reduce the size of starch granules of kidney bean starch. The physicochemical properties of both native and nano starch were determined. Nano starch showed a higher value for swelling power, solubility, water and oil absorption capacity when compared with native starch. The particle size of kidney bean nano starch was 257.7 nm at 100% intensity. The size of starch granule affects various properties of films. The thickness, solubility and burst strength of the composite films were increased significantly ($p \leq 0.05$) with an increase in the concentration of nano starch in film formulation. While the moisture content and water vapour transmission rate (WVTR) were decreased significantly ($p \leq 0.05$) with an increase in the concentration of nano starch in film formulation. The results suggested that kidney bean starch could be used for the development of packaging films. The utilization of nano starch in film formulations had an additional advantage in improving the film properties.

Keywords Kidney bean · Nano starch-based composite films · Water vapour transmission rate · Burst strength

Introduction

Starch is an energy reserve, stored in stems, roots, seeds, and tubers. Commercial starches are abundantly available and isolated from corn, potato, wheat, rice, and tapioca. In addition to that, it is odorless, tasteless and does not require extreme purification (Daudt et al. 2014). Starch granules vary in size, shape and striations or lamellae. The shape of starch granules may be spherical, disk, oval, polygonal or

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MINI-REVIEW

Legume Science WILEY

Kidney bean (*Phaseolus vulgaris*) starch: A review

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Abstract

The mini review focuses on the morphology, pasting, rheological and in vitro digestibility of kidney bean starch. In legumes seeds, *starch* is the *most abundant carbohydrate* reserve in plants and have been ascribed medicinal and cultural as well as nutritional roles. The major carbohydrate of kidney bean seeds is starch, which accounts for 25–45% of the dry matter. Lower swelling and high solubility of kidney bean starches indicate their higher functional properties than cereal starches. High amount of resistant starch (RS) and slow digestible starch (SDS) and low amount of rapidly digestible starch (RDS) present in kidney bean starches provide their potentiality as a good source of RS. Starch is a macro-constituent of many foods and its properties and interactions with other constituents, particularly water and lipids, are of interest to the food industry and for human nutrition as starch properties may greatly determine the product quality.

KEYWORDS

S.NO 40

Effect of debittered fenugreek (*Trigonella foenum-graecum* L.) flour addition on physical, nutritional, antioxidant, and sensory properties of wheat flour rusk

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Abstract

Fenugreek (*Trigonella foenum-graecum*) is a unique legume crop having many pharmacological properties and health benefits attributed to its high soluble dietary fiber and phytochemicals. The main objective of this study was to evaluate selected functional and physical (color and pasting) properties of debittered fenugreek flour (DFF) and its addition on the nutritional value and acceptance of wheat flour rusk, prepared with 5%, 10%, 15%, and 20% DFF. The antioxidant potential and sensory attributes of DFF-added rusks were also analyzed. The results revealed that with successive increase of DFF level, the nutritional, mineral, dietary fiber, and bioactive contents of the rusks were significantly ($p \leq .05$) enhanced. The progressive replacement at 0% to 20% level significantly ($p \leq .05$) improved the total phenolic content (157.5 to 455.8 mg GAE per 100 g), total flavonoid content (5.5 to 8.2 mg CE per 100 g), and antioxidant activity (20.4% to 45.5%). DFF incorporation significantly ($p \leq .05$) increased the water and oil absorption capacity, whereas peak viscosity, breakdown viscosity, final viscosity,

S.NO 41

Physicochemical, pasting, and rheological properties of pearl millet starches from different cultivars and their relations

Authors: A.K. Siroha[a], S. Punía[a], K.S. Sandhu[a,b], a...

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Keywords: pearl millet starch; physicochemical; rheology; particle size

ABSTRACT/EXCERPT REFERENCES CITED BY RECOMMENDED ARTICLES

Physicochemical, pasting, and rheological properties of pearl millet starches were studied and correlations among these properties were calculated. Amylose content, swelling power, and solubility of starches varied

COMPUTATIONAL SCIENCES

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ORIGINAL ARTICLE

Content-based image retrieval system using ORB and SIFT features

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Abstract
Measures of components in digital images are expanded and to locate a specific image in the light of substance from a huge database is sometimes troublesome. In this paper, a content-based image retrieval (CBIR) system has been proposed to extract a feature vector from an image and to effectively retrieve content-based images. In this work, two types of image feature descriptor extraction methods, namely Oriented Fast and Rotated BRIEF (ORB) and scale-invariant feature transform (SIFT) are considered. ORB detector uses a fast key points and descriptor use a BRIEF descriptor. SIFT be used for analysis of images based on various orientation and scale. *K*-means clustering algorithm is used over both descriptors from which the mean of every cluster is obtained. Locality-preserving projection dimensionality reduction algorithm is used to reduce the dimensions of an image feature vector. At the time of retrieval, the image feature vectors are stored in the image database and matched with testing data feature vector for CBIR. The execution of the proposed work is assessed by utilizing a decision tree, random forest, and MLP classifiers. Two, public databases, namely Wang database and corel database, have been considered for the experimentation work. Combination of ORB and SIFT feature vectors are tested for images in Wang database and corel database which accomplishes a highest precision rate of 99.53% and 86.20% for coral database and Wang database, respectively.

Keywords CBIR · ORB · SIFT · *K*-means · LPP

1 Introduction

In the development of Internet and multimedia, expansive measure of images is produced and dispersed yet to share and store such a lot of information effectively is a noteworthy issue. The most effective method to retrieve desired information from a bulky database is as yet a major issue. So, content-based image retrieval (CBIR) techniques are used to retrieve the images from bulky database based on the desired information. In CBIR, the stored database and query image features are extracted and compared with each other, from which most comparable outcomes are come back to the client. In the present days, many of the real-world image-based retrieval applications used CBIR strategies. For example, physician may use CBIR strategy to retrieve comparative patient issues from a database, so that a best decision can be taken by the physician in the treatment of patients. The CBIR computation complexity is high because of the huge measure of database. Numerous strategies have been proposed in the past decades for retrieval of images based on their contents from bulky database, but issues for extracting features and results of the proposed systems are not appropriately satisfactory. To dump these issues, we present another technique using SIFT and ORB feature extraction techniques. We utilized two component extraction techniques in our examination work in light of the fact that a solitary element extraction strategy does not demonstrate all elements in an image, so the combination of extraction techniques preferred over a solitary one. The SIFT descriptor utilizes a 128-element feature dimensions in one key point and ORB descriptor

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A Study on Recognition of Pre-segmented Handwritten Multi-lingual Characters

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Abstract

Wide research has been carried out for recognition of handwritten text on various languages that include Assamese, Bangla, English, Gujarati, Hindi, Marathi, Punjabi, Tamil etc. Recognition of multi-lingual text documents is still a challenge in the pattern recognition field. In this paper, a study of various features and classifiers for recognition of pre-segmented multi-lingual characters consisting of English, Hindi and Punjabi has been presented. In feature extraction phase, various techniques, namely, zoning features, diagonal features, horizontal peak extent based features and intersection and open end point based features are considered. In classification phase, three different classifiers, namely, k-NN, Linear-SVM, and MLP are attempted. Different combinations of various features and classifiers have been also performed. For script identifica- tion, we have achieved maximum accuracy of 92.89% using a combination of Linear-SVM, k-NN, and MLP classifiers, and for character recognition of English, Hindi and Punjabi, we have achieved a recognition accuracy of 92.18%, 84.67% and 86.79%, respectively.

Introduction

The field of pattern recognition contributed up to a great extent in the machine vision applications. Handwriting rec- ognition is a part of the area under pattern recognition com- munity. Handwriting recognition is a technique or ability of a computer to receive and interpret intelligible handwrit- ten text input from source such as paper documents, touch screen, photographs, etc. In general, handwriting recogni- tion is classified into two types, namely, online recognition and offline recognition. Online handwriting recognition involves the automatic conversion of text as it is written on a special digitizer or personal digital assistant (PDA), where a sensor picks up the pen-tip movements as well as pen-up/ pen-down switching. That kind of data can be regarded as a dynamic representation of handwriting. Offline handwriting

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Artificial Intelligence Review https://doi.org/10.1007/s10462-019-09727-2

Performance evaluation of classifiers for the recognition of offline handwritten Gurmukhi characters and numerals: a study

Munish Kumar[1] · M. K. Jindal[2] · R. K. Sharma[3] · Simpel Rani Jindal[4]

Abstract

Classification is a process to pull out patterns from a number of classes by using various statistical properties and artificial intelligence techniques.The problem of classification is considered as one of the important problems for the development of applications and for efficient data analysis. Based on the learning adaptability and capability to solve complex computations, classifiers are always the best suited for the pattern recognition problems. This paper presents a comparative study of various classifiers and the results achieved for offline handwritten Gurmukhi characters and numerals recognition. Various classifiers used and evaluated in this study include *k*-nearest neighbors, linear-support vector machine (SVM), RBF-SVM, Naive Bayes, decision tree, convolution neural network and random forest classifier. For the experimental work, authors used a balanced data set of 13,000 samples that includes 7000 characters and 6000 numerals. To assess the performance of classifiers, authors have used the Waikato Environment for Knowledge Analysis which is an open source tool for machine learning. The performance is assessed by considering various parameters such as accuracy rate, size of the dataset, time taken to train the model, false acceptance rate, false rejection rate and area under receiver operating characteristic Curve. The paper also highlights the comparison of correctness of tests obtained by apply- ing the selected classifiers. Based on the experimental results, it is clear that classifiers considered in this study have complementary rewards and they should be implemented in a hybrid manner to achieve higher accuracy rates. After executing the experimental work, their comparison and analysis, it is concluded that the Random Forest classifier is per- forming better than other recently used classifiers for character and numeral recognition of offline handwritten Gurmukhi characters and numerals with the recognition accuracy of87.9% for 13,000 samples.

Keywords Artificial intelligence · Classification algorithms · Supervised learning · Performance measurement · Comparative studies

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S. No. 45

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ASRoIL: a comprehensive survey for automatic speech recognition of Indian languages

Amitoj Singh[1] · Virender Kadyan[2] · Munish Kumar[1] · Nancy Bassan[3]

Abstract

India is the land of language diversity with 22 major languages having more than 720 dialects, written in 13 different scripts. Out of 22, Hindi, Bengali, Punjabi is ranked 3rd, 7th and 10th most spoken languages around the globe. Expect Hindi, where one can find some significant research going on, other two major languages and other Indian languages have not fully developed Automatic Speech Recognition systems. The main aim of this paper is to provide a systematic survey of the existing literature related to automatic speech recognition (i.e. speech to text) for Indian languages. The survey analyses the possible opportunities, challenges, techniques, methods and to locate, appraise and synthesize the evidence from studies to provide empirical answers to the scientific questions. The survey was conducted based on the relevant research articles published from 2000 to 2018. The purpose of this systematic survey is to sum up the best available research on automatic speech recognition of Indian languages that is done by synthesizing the results of several studies.

Keywords Automatic speech recognition · Indian languages · Feature extraction techniques · Classification techniques · Speech corpus

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Soft Computing
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METHODOLOGIES AND APPLICATION

Forensic document examination system using boosting and bagging methodologies

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Abstract

Document forgery has increased enormously due to the progression of information technology and image processing software. Critical documents are protected using watermarks or signatures, i.e., active approach. Other documents need passive approach for document forensics. Most of the passive techniques aim to detect and fix the source of the printed document. Other techniques look for the irregularities present in the document. This paper aims to fix the document source printer using passive approach. Hand-crafted features based on key printer noise features (KPNF), speeded up robust features (SURF) and oriented FAST rotated and BRIEF (ORB) are used. Then, feature-based classifiers are implemented using K-NN, decision tree, random forest and majority voting. The document classifier proposed model can efficiently classify the questioned documents to their respective printer class. Further, adaptive boosting and bootstrap aggregating methodologies are used for the improvement in classification accuracy. The proposed model has achieved the best accuracy of 95.1% using a combination of KPNF ? ORB ? SURF with random forest classifier and adaptive boosting methodology.

Keywords Document forensics · Printer forensics · KPNF · SURF · ORB · AdaBoost · Bagging

1 Introduction

Digital documents and their use have become increasingly dominant in the present era. It is almost impossible to avoid their use these days. These digital documents could be official contract images, bills and checks, etc. Paperless world is the objective behind these digital documents. Moreover, a digital document is easy, economical and efficient to maintain as compared to a hard copy, but its security is a challenge. Manipulation of digital documents has increased enormously due to the progression of infor- mation technology and image processing software. Docu- ment analysis and its authentication is a critical challenge.

Important documents such as bank cheques, educational certificates, passports have watermarks on them which authenticate the digital document. Although active tech- nologies dominate in this domain, still passive analysis for unprotected documents is always required. Active tech- nologies add some security features in the digital docu- ment. Active approaches mainly use digital signatures or watermarks as defensive measures to protect the images. Originality and legitimacy of images and digital documents can be checked using the watermark or signature embedded in the image. Active techniques are used to protect copy- right images and important documents. In active approach, a watermark or signature code is embedded in the image itself. It is embedded in the form of bits. These bits can later be extracted and checked to validate the image

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S. No. 47

Multimedia Tools and Applications (2020) 79:7435–7448
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Newspaper text recognition of Gurumukhi script using random forest classifier

Rupinder Pal Kaur[1] · Munish Kumar[2] · M. K. Jindal[3]

Received: 6 April 2019 / Revised: 29 September 2019 / Accepted: 9 October 2019 /
Published online: 23 December 2019

Abstract

Newspapers consist of very crucial information related to current as well memorable events. So, newspaper text needs to be preserved in a computer processable form for indexing of headline or making possible the search operations on newspaper text. For accurate results of recognition of text, appropriate classification of text based on extracted features is very important. Random Forest classifier is a widely used classifier in the field of pattern recognition and computer vision applications. In this paper, we have presented the recognition results using random forest classifier for newspaper text printed in Gurumukhi script. Different kinds of feature extraction techniques are used to extract the feature of characters that are fed to the random forest classifier. Standard k-fold cross validation and dataset partitioning strategy has been used for experimental work. Using the proposed method, maximum recognition accuracy of 96.9% and 96.4% has been achieved, using 5-fold cross validation and dataset partitioning strategy, respectively.

S. No 48

A Comprehensive Survey on the Biometric Recognition Systems based on Physiological and Behavioral Modalities

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Abstract

Biometrics is the branch of science that deals with the identification and verification of an individual based on the physiological and behavioral traits. These traits or identifiers are permanent, unique and can separate one individual from another. Biometric recognition systems integrate complex definitional, technological and operational selection under various contexts. The systems are not going to replace the authentication tools and technologies, but the combination of biometric approaches and authentication methods to help in improving the security aspects of the applications where user cooperation can be inferred. Biometric based recognition methods and tools have become popular for the development of many useful, challenging and widely accepted applications such as security issues, surveillance, forensic investigations, fraudulent technologies, identity access management and access control. These systems also help to identify an individual in group of industrial networks, home/office building and control system. For the successful implementation of the biometric systems, deep artificial neural networks are in great demand. These systems can be built up either on the single modality or multiple modalities. This article explicates the comprehensive and deep survey that compactly and systematically summarizes the literature work done on unimodal and multimodal biometric systems and analyzes the feature extraction techniques, classifiers, datasets, results, efficiency and reliability of the system with high and multi-dimensional perspectives. This article also justifies in detail the classical methods, influential methods and taxonomy based on the biometric attributes. The goal is to aware the researchers of this area regarding various dimensions for the development of biometric systems to enhance the security aspects. The article begins with the fundamentals, types, need of system, challenges, uncertainties, motivations and then to the survey work. The tabular representation prepares for each biometric trait shows the author, year, major findings and results achieved with the synthesis analysis and the evaluation. The article finally ends up with the 3D biometric, a future perspective and concluding remarks.

S. No 49

Soft Computing
https://doi.org/10.1007/s00500-020-04733-x

METHODOLOGIES AND APPLICATION

A computational approach for printed document forensics using SURF and ORB features

Munish Kumar[1] · Surbhi Gupta[2] · Neeraj Mohan[3]

Abstract

Document forgery is quite common nowadays due to the availability of cost-effective scanners and printers. Important documents like certificates, passport, identification cards, etc., are protected using watermarks or signatures. These are made secured with a protective printing mechanism with extrinsic fingerprints. Therefore, it is easy to authenticate such documents. Other documents required a passive approach for their authentication. These approaches look for document inconsistencies for chances of modification. Some of these attempt to detect and fix the source of the printed document. This paper proposes a classifier-based model to identify the source printer and classify the questioned document in one of the printer classes. A novel approach of utilizing Speeded Up Robust Features and Oriented Fast Rotated and BRIEF feature descriptors is proposed for printer attribution. Naive Bayes, *k*-NN, random forest and different combinations of these classifiers have been experimented for classification. The proposed model can efficiently classify the questioned documents to their respective printer class. An accuracy of 86.5% has been achieved using a combination of Naive Bayes, *k*-NN, random forest classifiers with a simple majority voting scheme and adaptive boosting methodology.

Keywords Docu

S. No 50

Artificial Intelligence Review https://doi.org/10.1007/s10462-020-09827-4

Ancient text recognition: a review

Sonika Rani Narang[1] · **M. K. Jindal**[2] · **Munish Kumar**[3]

Abstract

Optical character recognition (OCR) is an important research area in the field of pattern recognition. A lot of research has been done on OCR in the last 60 years. There is a large volume of paper-based data in various libraries and offices. Also, there is a wealth of knowledge in the form of ancient text documents. It is a challenge to maintain and search from this paper-based data. At many places, efforts are being done to digitize this data. Paper based documents are scanned to digitize data but scanned data is in pictorial form. It cannot be recognized by computers because computers can understand standard alpha- numeric characters as ASCII or some other codes. Therefore, alphanumeric information must be retrieved from scanned images. Optical character recognition system allows us to convert a document into electronic text, which can be used for edit, search, etc. operations. OCR system is the machine replication of human reading and has been the subject of inten-sive research for more than six decades. This paper presents a comprehensive survey of the work done in the various phases of an OCR with special focus on the OCR for ancient text documents. This paper will help the novice researchers by providing a comprehen- sive study of the various phases, namely, segmentation, feature extraction and classifica- tion techniques required for an OCR system especially for ancient documents. It has been observed that there is a limited work is done for the recognition of ancient documents espe- cially for Devanagari script. This article also presents future directions for the upcoming researchers in the field of ancient text recognition.

Keywords OCR · Feature extraction · Classification · Devanagari · Ancient

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S. No 51

Methodologies and Application | Published: 22 April 2020

Time series data analysis of stock price movement using machine learning techniques

Irfan Ramzan Parray, Surinder Singh Khurana, Munish Kumar ✉ & Ali A. Altalbe

Soft Computing **24**, 16509–16517 (2020) | Cite this article

Abstract

Stock market also called as equity market is the *aggregation* of the sellers and buyers. It is concerned with the domain where the shares of various public listed companies are *traded*. For predicting the growth of economy, stock market acts as an index. Due to the nonlinear nature, the prediction of the stock market becomes a difficult task. But the application of various machine learning techniques has been becoming a powerful source for the prediction. These techniques employ historical data of the stocks for the training of machine learning algorithms and help in predicting their future behavior. The three machine learning

S. No 52

Soft Computing
https://doi.org/10.1007/s00500-020-05018-z

METHODOLOGIES AND APPLICATION

On the recognition of Devanagari ancient handwritten characters using SIFT and Gabor features

Sonika Rani Narang[1] · M. K. Jindal[2] · Shruti Ahuja[1] · Munish Kumar[3]

Abstract

Recognition of Devanagari ancient handwritten character is an important task for resourceful contents' exploitation of the priceless information contained in them. There are numerous Devanagari ancient handwritten documents from fifteenth to the nineteenth century. This paper presents an optical character recognition system for the recognition of Devanagari ancient manuscripts. In this paper, improved recognition results for Devanagari ancient characters have been presented using the scale-invariant feature transform (SIFT) and Gabor filter feature extraction techniques. Support vector machine (SVM) classifier is used for the classification task in this work. For experimental results, a database consisting of 5484 samples of Devanagari characters was collected from various ancient manuscripts placed in libraries and museums. SIFT- and Gabor filter-based features are used to extract the properties of the handwritten Devanagari ancient characters for recognition. Principle component analysis is used to reduce the length of the feature vector for reducing training time of the model and to improve recognition accuracy. Recognition accuracy of 91.39% has been achieved using the proposed system based on tenfold cross-validation technique and poly-SVM classifier.

Keywords Ancient manuscripts · Devanagari historical documents · SIFT · Gabor · SVM

1 Introduction

Apart from diversified languages, India is a home to a remarkable array of scripts derived from the Brahmi script. These ancient scripts transmit knowledge about cultural and scientific heritage from one generation to another.

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S. No 53

Designing of fog based FBCMI2E Model using machine learning approaches for intelligent communication systems

Computer Communications (IF3.167), **Pub Date : 2020-09-14**, *DOI: 10.1016/j.comcom.2020.09.005*

Simar Preet Singh, Anju Sharma, Rajesh Kumar

The work discusses the evolution of communication models and technological aspects for developing inclusive platforms. The paper gives illustrations and graphical presentations about components of the inclusive platform. An inclusive platform consists of fog devices that can collect the fitness data, geospatial data and mobile call details from the people who are in need of help from the government agencies. The paper discusses the controversies around the definition and qualification of the informal economy as well as presents a simulated scenario. The case presented here gives an insight on how fog devices and data mining can be used for bringing people into main fold of the economy. The inclusiveness index of the person is computed on the basis of four aspects. The first aspect is the fitness, the second is his inner social circle, third is her/his reliability to remain in a place, and last is call analysis. While computing the fitness index, it was found that Naive Bayes (NB) algorithm has the maximum accuracy with respect to K-Nearest Neighbors (KNN), Decision Tree (DT) and Linear Discriminant Analysis (LDA). For computing inner social circle, Louvain algorithm helped to compute stability and strength of socio-economic ties of the individual. For geospatial and call analysis, insights from knowledge discovery algorithm such as FP-Growth helped to arrive at decision to qualify the person for inclusive program. The paper ends with details on how to automate the inclusiveness index computation using neural network. The research indicates that energy is the key constraint for implementing such programs. Hence, a theoretical analysis about energy efficiency is also explained in the paper.

S. No 54

updates

A Survey of Deep Learning and Its Applications: A New Paradigm to Machine Learning

Shaveta Dargan[1] · Munish Kumar[1] · Maruthi Rohit Ayyagari[2] · Gulshan Kumar[3]

Received: 11 November 2018 / Accepted: 26 May 2019 / Published online: 1 June 2019

Abstract

Nowadays, deep learning is a current and a stimulating field of machine learning. Deep learning is the most effective, supervised, time and cost efficient machine learning approach. Deep learning is not a restricted learning approach, but it abides various procedures and topographies which can be applied to an immense speculum of complicated problems. The technique learns the illustrative and differential features in a very stratified way. Deep learning methods have made a significant breakthrough with appreciable performance in a wide variety of applications with useful security tools. It is considered to be the best choice for discovering complex architecture in high-dimensional data by employing back propagation algorithm. As deep learning has made significant advancements and tremendous performance in numerous applications, the widely used domains of deep learning are business, science and government which further includes adaptive testing, biological image classification, computer vision, cancer detection, natural language processing, object detection, face recognition, handwriting recognition, speech recognition, stock market analysis, smart city and many more. This paper focuses on the concepts of deep learning, its basic and advanced architectures, techniques, motivational aspects, characteristics and the limitations. The paper also presents the major differences between the deep learning, classical machine learning and conventional learning approaches and the major challenges ahead. The main intention of this paper is to explore and present chronologically,

S. No 55

Writer identification system for pre-segmented offline handwritten Devanagari characters using *k*-NN and SVM

Shaveta Dargan[1] · Munish Kumar[1] · Anupam Garg[2] · Kutub Thakur[3]

Published online: 14 November 2019

Abstract
A biometric identification system based on single and multiple modalities has been an evolving concept for solving criminal issues, security and privacy maintenance and for checking the authentication of an individual. The writer identification system is a type of biometric identification in which handwriting of an individual is taken as a biometric identifier. It is a system in which the writer can be identified based on his handwritten text. These systems employ machine learning and pattern recognition algorithms for the generation of a framework. In this paper, the authors have presented a novel system for the writer identification based upon the pre-segmented characters of Devanagari script and also presenting comprehensive state-of-the-art work. The experiment is performed on the corpus consisting of five copies of each character of Devanagari script written by 100 different writers, selected randomly at the public places and consisting of total 24,500 samples of Devanagari characters. Four feature extraction methodologies such as zoning, diagonal, transition and peak extent-based features and classification methods such as *k*-NN and linear SVM are used with identification accuracy of 91.53% when using zoning, transition and peak extent-based features with a linear SVM classifier.

Keywords Forensic record examination · Writer identification · Devanagari character recognition · Feature extraction · *k*-NN · SVM

1 Introduction

Writer identification system is one of the important appli-

written by a person, implementation of classification algorithms and so on. Automatic identification of the writer for the online or offline digitized handwriting sample

S. No 56

Design and exploration of load balancers for fog computing using fuzzy logic

Simar Preet Singh [a], Anju Sharma [b], Rajesh Kumar [a]

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https://doi.org/10.1016/j.simpat.2019.102017

Abstract

This research work presents an exploratory study to find answers for managing traffic and payloads in edge/fog zone of the networks. Initial deployments have shown that edge computing has helped in fine grain customization of services and have produced better experiences for the users. However, at the same time, it also invites challenges such as overload, underload and imbalance in utilization of resources such as bandwidth, time responses, throughput etc. The main reason is highly

S. No 57

Efficient content retrieval in fog zone using Nano-Caches

Simar Preet Singh, Rajesh Kumar, Anju Sharma

First published: 09 July 2019 | https://doi.org/10.1002/cpe.5438 | Citations: 1

Summary

It is always desired to improve the response time from cloud servers, which deliver contents without buffering. As the penetration of mobile/fog devices is increasing, the limits of cellular ranges come under question. This question arises in spite of the fact that the current Internet Service Providers and data operators are adding cellular towers frequently to reduce delay and enhance performance. This performance can be improved by increasing Nano-Cache(s) at the edges of the network for forwarding interrelated contents to remote corner of the earth. In this research work, Nano-Caches are integrated for delivering contents efficiently, using search-based optimization techniques, which are energy and response aware in nature. An algorithm, namely, Modified Teaching Learning-Based Optimization(MTLBO), is devised and implemented in fog zone to find efficient route for forwarding contents using Nano-Caches and

S. No 58

A swarm intelligence-based quality of service aware resource allocation for clouds

Ashok Kumar, Anju Sharma and Rajesh Kumar

Published Online: July 6, 2020 • pp 129-140

PDF Tools Share

Abstract

The growing popularity of cloud computing results in very large data centres around the world with vast amount of energy requirements and CO_2 emissions. These large sized data centres demand efficient management of resources to conserve energy while satisfying quality of service (QoS) requirements of the end users. In this paper, a QoS-aware resource allocation approach using ant colony optimisation is proposed. The proposed approach is implemented in CloudSim and

S. No 59

Leveraging energy-efficient load balancing algorithms in fog computing

Concurrency and Computation: Practice and Experience (IF1.536), **Pub Date : 2020-07-21**, *DOI: 10.1002/cpe.5913*

Simar Preet Singh, Rajesh Kumar, Anju Sharma, Anand Nayyar

Cloud computing and smart gadgets are the need of smart world these days. This often leads to latency and irregular connectivity issues in many situations. In order to overcome this issue, an emerging technique of fog computing is used for cloud and smart devices. A decentralized computing infrastructure in which all the elements, that is, storage, compute, data and the applications in use, are passed in an efficient and logical place between cloud and the data source, is called Fog computing. The cloud computing and services are generally extended by fog computing, which brings the power and advantages of data creation and data analysis at the network edge. Real-time location based services and applications with mobility support are enabled due to the physical proximity of users and high speed internet connection to the cloud. Fog computing is promoted with leveraging load balancing techniques so as to balance the load which is done in two ways, that is, static load balancing and dynamic load balancing. In this paper, different load balancing algorithms are discussed and their comparative analysis has been carried out. Round Robin load balancing is the simplest and easiest load balancing technique to be implemented in fog computing environments. The major problem of Source IP Hash load balancing algorithm is that each change can redirect to anyone with a different server, and thus, is least preferred in fog networks. The mechanisms to make energy efficient load balancing are also considered as the part of this paper.

S. No 60

A benchmark dataset of online handwritten gurmukhi script words and numerals

Singh H; Sharma R.K; Kumar R; Verma K; Kumar R; Kumar M.

URI: 10.1007/978-981-15-4018-9_41
http://hdl.handle.net/123456789/2090
Date: 2020

Abstract:

This paper presents an online handwritten benchmark dataset (OHWR-Gurmukhi) for Gurmukhi script. TIET, Patiala released the unconstrained online handwriting databases, OHWR-GNumerals and OHWR-GScript, which contain isolated strokes samples produced by 190 writers. The OHWR-GNumerals covers 10 stroke classes and OHWR-GScript covers 95 stroke classes to represent the Gurmukhi character set. For data collection, two data sets of Gurmukhi words have been finalized after having a consultation with language experts in order to collect the balanced stroke samples. The preprocessing methods used to prepare these datasets include: size normalization, removing duplicate points, interpolating missing points and re-sampling. The purpose of this benchmark is to create a common platform and make the benchmark dataset publically available for research endeavors in the area of online handwriting recognition. The dataset is available as supplement at https://sites.google.com/view/ohwr-gurmukhi-script/. &#65533; Springer Nature Singapore Pte Ltd 2020.

DEPARTMENT OF PHYSICS

S. No 61

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DOI: 10.1002/pc.25795

RESEARCH ARTICLE

Polymer COMPOSITES WILEY

Modulation in polymer properties in PVDF/BCZT composites with ceramic content and their energy density capabilities

Tarun Garg[1,2,3] | **Venkateswarlu Annapureddy**[4] | **K. C. Sekhar**[5] | **Dae-Yong Jeong**[6] | **Navneet Dabra**[7] | **Jasbir S. Hundal**[2]

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Abstract

The lead-free $0.5((Ba_{0.7}Ca_{0.3})TiO_3)$-$0.5(Ba(Zr_{0.2}Ti_{0.8}))O_3$(BCZT) piezoceramics were synthesized using sol-gel method. The Rietveld analysis of X-ray diffraction (XRD) data and differential scanning calorimetry (DSC) studies of as-synthesized BCZT powder suggests the co-existence of ferroelectric orthorhombic (O) and tetragonal (T) phases at room temperature (RT). The value of curie temperature ($T_{F\text{-}C}$) as depicted from DSC and dielectric studies was found to be $\approx 110^{\circ}$C. The BCZT ceramic particles were dispersed in the polyvinylidene fluoride (PVDF) matrix, an electroactive polymer with great ferro/piezoelectric response in its distinct β and γ phases, to form ferroelectric ceramic-polymer composites for their applications in flexible energy storage capacitors. The present work reports the Fourier-transform infrared spectroscopy (FTIR), XRD, dielectric, ferroelectric, and energy density properties of PVDF/BCZT composite films having different wt% of BCZT content fabricated by the solution-cast technique. The FTIR and XRD studies depict the γ-PVDF and pure BCZT phases in composite films. The dielectric studies estimated the relative permittivity (ϵ_r) of a composite film with 50 wt% of BCZT content to be ≈ 31 (at 120 Hz) which was about three times as compared with that of pure PVDF. The dielectric loss (tan δ) was maximum ≈ 0.15 (at 120 Hz) for 50 wt % BCZT composition. The ferroelectric studies and energy storage calculations showed that the value of remnant polarization (P_r), coercive field (E_c) and energy storage density (W) attain the maximum value of 0.63 $\mu C/cm^2$, 35.22 kV/cm, and 70.46 mJ/cm^3, respectively for the film sample having 40 wt% BCZT content. The maximum energy storage efficiency, η (%) is calculated to be ≈ 60 for 50 wt% BCZT composition. The results indicated that the incorporation of BCZT particles

S. No 62

Title:	Computational studies for the effective electrical conductivity of Copper powder filled LDPE/LLDPE composites
Authors:	Singh, R P Singh, Sukhmander Gill, Reenu Kumar, Rishi Sharma, Pradeep Kumar, Gurupal Luyt, Adriaan S
Keywords:	Effective electrical conductivity;Artificial neural network;Training functions;Volume fraction
Issue Date:	Jun-2020
Publisher:	NISCAIR-CSIR, India
Abstract:	The effective electrical conductivity (EEC) of low density polyethylene (LDPE) and linear low density polyethylene (LLDPE) polymer composites filled with copper has been studied. The nonlinear behavior has been observed for effective electrical conductivity versus filler content. Several approaches have been described to predict the electrical conductivities of polymer composites. EEC is described by artificial neural network (ANN) and it demonstrates the accurate match of experimental data for EEC with different training functions (TRAINOSS, TRAINLM, TRAINBR, TRAINSCG, TRAINBFG, and TRAINRP). The ANN approach satisfied the experimental data for EEC of polymer composites reasonably well. The complex structure encountered in LDPE/Cu and LLDPE/Cu, along with the difference in the EEC of the components, make it difficult to estimate the EEC exactly. This is the reason for which artificial neural network has been employed here. By using ANN approach

DEPARTMENT OF CHEMISTRY

S. No 63

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Reactions of $MoCl_5$ and MoO_2Cl_2 with 4-Phenylimidazole-2-thiol and 2-Thiazoline-2-thiol

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ABSTRACT

Reactions of $MoCl_5/MoO_2Cl_2$ with 4-phenylimidazole-2-thiol/2-thiazoline-2-thiol in CH_3CN solvent in 1:1/1:2 molar ratios have been carried out at room temperature. Products obtained $MoCl_4(C_9H_7N_2S)(CH_3CN)$.[1]; $MoCl_4(C_9H_7N_2S)(CH_3CN)$, [2]; $Mo_2OCl_4(C_9H_6N_2S)_2$, [3] and $Mo_4O_2Cl_{10}(C_9H_7N_2S)_4$, [4]; $MoO_2Cl_2(C_3H_5NS_2)_2$, [5] and $Mo_2O_4Cl_2(C_3H_5NS_2)_2$, [6] have been analyzed and characterized by elemental analysis, FTIR, ^{1}H NMR and LC-MS techniques. Compounds being moisture and air sensitive, these have been prepared in inert atmosphere using vacuum line and liquid nitrogen cooled traps. Fragments obtained in LC-MS spectra support the formulae derived.

Keywords: $MoCl_5$, MoO_2Cl_2, 4-phenylimidazole-2-thiol, 2-thiazoline-2-thiol, FTIR, ^{1}H NMR and LC-MS, Fragments.

INTRODUCTION

Reactions of $MoCl_5$ and MoO_2Cl_2 with various ligands have been reported in the literature. Earlier, $MoCl_5$ reactions with 1,4-diaminobutane, potassium phthalimide, pyrazole, 2-mercaptopyridine-N-oxide sodium, imidazole, 2-methylpyridine, 3-methylpyridine, 4-methtylpyridine, succinimide, 2-thiazoline-2-thiol have been reported[1,3-4,6-7] by the author. Reactions of MoO_2Cl_2 with 1,3-diaminopropane, 1,4-diaminobutane, 1,3-propandiol, imidazole, pyrazole, acetamide, succinimide, potassium phthalimide, 2-thiazoline-2-thiol have also been reported[1-3,6-7] by the author.

In the current paper, reactions of 4-phenylimidazole-2-thiol/2-thiazoline-2-thiol with $MoCl_5/MoO_2Cl_2$ in CH_3CN solvent at room temperature have been carried out to study addition, substitution, reduction, rearrangement or polymerization processes occurring.

^{1}HNMR, FTIR of the compounds synthesized have been studied to determine the bonding of the ligands to Mo. Fragmentation pattern

S. No 64

RESEARCH ARTICLE

Synthesis, characterization, and visible-light-induced photocatalytic activity of powdered semiconductor oxides of bismuth and zinc toward degradation of Alizarin Red S

Gurpreet Kaur ,[1] Seema Sharma ,[2,*] Kirandeep Kaur ,[2] Priti Bansal [3,*]

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Additional Supporting Information may be found in the online version of this article.

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DOI: 10.1002/wer.1333

Abstract

Semiconductor oxides of bismuth and zinc have been synthesized using modified sol–gel method and sol-combustion method, respectively. The synthesized catalysts were characterized by X-ray powder diffraction (XRD), field emission scanning electron microscopy (FESEM), energy-dispersive X-ray spectroscopy (EDS), X-ray photoelectron spectroscopy (XPS), and UV-vis spectroscopy. The photocatalytic activity of Bi_2O_3 and ZnO was evaluated for the degradation of Alizarin Red S (ARS), as a model pollutant, at 20 mg/L level in water under visible light irradiation. The percentage of photocatalytic degradation was determined using UV-vis spectrophotometer. The photocatalytic results revealed that Bi_2O_3 and ZnO could effectively degrade 73% and 53% of ARS, respectively, within 13 hr under visible light illumination, indicating that synthesized Bi_2O_3 is a better photocatalyst than ZnO. Photodegradation of ARS with Bi_2O_3 and ZnO is remarkably influenced by change in pH of the dye solution, and pH 8 was found to be the most favorable for maximum removal of ARS in case of both Bi_2O_3 (75%) and ZnO (58%) photocatalyst. © 2020 Water Environment Federation

Practitioner points

- Photocatalytic degradation of ARS dye depends on pH of the solution.
- Calcination temperature influences the crystallite size of prepared semiconductor oxides of bismuth and zinc.
- Bi_2O_3 shows better photocatalytic degradation efficiency than ZnO under visible light illumination.

Key words

ARS dye; Bi_2O_3; photocatalytic degradation; visible light; ZnO

Introduction

Semiconductor-mediated photocatalysis has attracted wide interest for the degradation of various organic pollutants present in environment such as dyes, medicines, and pesticides since it permits easy way to use solar or artificial light radiations to execute degradative chemical transformations (Hou, Yang, Wang, Jiao, & Zhu, 2013; Silva, Goncalves, & Araujo, 2019; Sun, Wang, Zhang, & Xu, 2012; Yang et al., 2019). Several photosensitive oxides of titanium, zinc, bismuth, tungsten, etc. have been reported as photocatalysts to deteriorate the organic pollutants (Senthilraja, Subash, Dhatshanamurthi, Swaminathan, & Shanthi, 2015; Wang, Dong, Chang, Zhou, & Hu, 2012). The excellent optical and electronic properties of ZnO, the second most investigated photocatalyst after TiO_2, are accountable for the efficient photocatalytic degradation

S. No 65

Desalination and Water Treatment
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Visible light responsive heterostructured α-Bi_2O_3/ZnO doped β-Bi_2O_3 photocatalyst for remediation of organic pollutants

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ABSTRACT

Novel visible-light active α-Bi_2O_3/ZnO doped β-Bi_2O_3 (ZB) photocatalyst was synthesized at different temperatures 400°C (ZB4), 500°C (ZB5), and 600°C (ZB6) by modified sol–gel method. The structural, morphological, compositional, and optical properties of synthesized photocatalyst were characterized using X-ray powder diffraction, field emission scanning electron microscopy, energy dispersive X-rays spectroscopy, Fourier transform infrared spectroscopy, and UV-vis spectroscopy. With an increase in calcination temperature, the bandgap of the prepared photocatalyst increases, and metastable β-phase Bi_2O_3 changes to α-phase. The photocatalytic activity was evaluated using Alizarin Red S (ARS) as a model organic compound. The rate of degradation was estimated from residual concentration spectrophotometrically. The results revealed that with an increase in calcination temperature, the photocatalytic activity of synthesized ZB photocatalyst decreases. Maximum decolorization efficiency (88%) was shown by the photocatalyst prepared at 400°C which is 29% and 37% higher than that of photocatalyst prepared at 500°C and 600°C, respectively.

Keywords: ZnO; Bi_2O_3; Photocatalyst; Alizarin Red S; Visible light

DEPARTMENT OF MATHEMATICS

S. No 66

KRAGUJEVAC JOURNAL OF MATHEMATICS
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CONVERGENCE OF DOUBLE COSINE SERIES

KARANVIR SINGH[1] AND KANAK MODI[2]

ABSTRACT. In this paper we consider double cosine series whose coefficients form a null sequence of bounded variation of order $(p,0)$, $(0,p)$ and (p,p) with the weight $(jk)^{p-1}$ for some $p>1$. We study pointwise convergence, uniform convergence and convergence in L^r-norm of the series under consideration. In a certain sense our results extend the results of Young [7], Kolmogorov [3] and Móricz [4, 5].

1. INTRODUCTION

Consider the double cosine series

$$\sum_{j=0}^{\infty}\sum_{k=0}^{\infty}\lambda_j\lambda_k a_{jk}\cos jx\cos ky, \tag{1.1}$$

on positive quadrant $T=[0,\pi]\times[0,\pi]$ of the two dimensional torus where $\lambda_0=\frac{1}{2}$ and $\lambda_j=1$ for $j=1,2,3,\ldots$.

The rectangular partial sums $S_{mn}(x,y)$ and the *Cesàro* means $\sigma_{mn}(x,y)$ of the series (1.1) are defined as

$$S_{mn}(x,y)=\sum_{j=0}^{m}\sum_{k=0}^{n}\lambda_j\lambda_k a_{jk}\cos jx\cos ky,$$

$$\sigma_{mn}(x,y)=\frac{1}{(m+1)(n+1)}\sum_{j=0}^{m}\sum_{k=0}^{n}S_{jk}(x,y),\quad m,n>0,$$

Key words and phrases. Rectangular partial sums, L^r-convergence, *Cesàro* means, monotone sequences.

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L^1-Convergence of New Modified Cosine and Sine Sums

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Abstract

In this paper, new customized trigonometric (sine and cosine) sums are introduced by us and L^1 convergence of these sums are studied underneath some special co-efficients eleganceand with some unique condition.

Keywords:*Conjugate Dirichlet kernel, Dirichlet kernel, Fezer Kernel, L^1-convergence, modified sums*

I.INTRODUCTION

Let $f(x) = \frac{a_0}{2} + \sum_{m=1}^{\infty} a_m \cos mx$ ... (1) and $g(x) = \sum_{m=1}^{\infty} b_m \sin mx$ ... (2) be thetrigonometriccosine and sine series. Then $S_n(x) = \sum_{m=1}^{n} a_m \cos mx$ and and$\tilde{S}_n(x) = \sum_{m=1}^{n} b_m \sin mx$ be the partial sums of the series (1) and (2) respectively, where $a_0, a_1, a_2, \ldots$and $b_0, b_1, b_2, \ldots$are real coefficients.

Convergence in L^1 norm: The series (1) is said to converge in $L^1(0, \pi)$ norm if

$\|f - S_n\| = 0(1), n \to \infty$, where we denote $\|f\| = \int_0^{\pi} |f| \, dz$ where L is metric space.

Convex Sequence:([1], Vol. I, p. 4) A sequence $\{\beta_k\}$ is said to be convex if $\Delta^2\beta_k \geq 0$

Where $\Delta\beta_k = \beta_k - \beta_{k+1}$ and $\Delta^2\beta_k = \Delta\beta_k - \Delta\beta_{k+1}$

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DEPARTMENT OF UBS

S. No 68

ROLE OF BIG DATA AND ITS APPLICATION OVER E-GOVERNANCE - AN EXTENSIVE REVIEW

*Poonam Salwan **Veerpaul Kaur Maan

*Research Scholar I.K. Gujral Punjab Technical University, Jalandhar, Punjab, India,

**Assistant Professor Giani Zail Singh Punjab Technical University, Bathinda, Punjab, India

ABSTRACT

Due to various new initiatives under e-governance and digitization, the transactional data is growing rapidly. It has become much harder now to analyze this massive data, stored at a manifold locations, with traditional data mining tools and approaches. As a result, the alternative way to analyze these big datasets is to use the big data analytic tools in e-governance projects, as these tools have capabilities of mining the large number of distributed data set quickly and efficiently. Big data analytics will help the governments to make a better decision and on the other hand, people will also be able to get reliable information on time. This research paper mainly focuses on the role of big data analytics in e-governance projects and also discuss the various tools of big data analysis and its techniques that will be helpful to provide effective support to e-governance projects.

Keywords: Big data; Data mining; Big Data Analytics; E-Governance

S. No 69

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Bitcoins as a determinant of stock market movements: A comparison of Indian and Chinese Stock Markets

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Abstract. *The present paper aims to examine the relationship between price movement of cryptocurrency (Bitcoin) and stock exchange movements of two major global economies i.e. India and China. 1133 number of observations on daily basis were taken from 1st January 2015 to 29th November 2019 and analysed using statistical software E-views. Statistical techniques like Granger Causality, Johnsen Co-integration and VECM have been employed to achieve the objective of the paper. The empirical results of the paper depict that long run relationship exists between Bitcoin and stock exchanges of India and China. Sensex has the unidirectional causality with Bitcoin. The significant t-statistics imply an influential role of Sensex in Bitcoin price movement. The results further indicate that there is no evidence of any causal relationship between Bitcoin and Chinese Stock exchange, which suggests a better risk-return mechanism for the global investors and policy makers. The findings of the paper can be imparted as guidelines for the global investors for diversifying their portfolios.*

Keywords: Bitcoin, Sensex, SSIC, Granger causality, VECM.

JEL Classification: F33, F43, G15, G41, N25.

S. No 70

A CONCEPTUAL FRAMEWORK FOR ASSESSING RELATIONSHIP BETWEEN ORGANIZATIONAL POLITICAL BEHAVIOR AND JOB SATISFACTION

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**Research Scholar, School of Management Studies, Punjabi University, Patiala and Assistant Professor. MRSPTU, Bathinda

ABSTRACT

Politics in organizations is merely an element of organizational life. Organizational politics refers to intentional behaviors that are designed to protect an individual's self-interest and influence professionally, these behaviors may expand resources and one's responsibilities or gain personal reputation. Likewise, Employees are considered as an important resource among all the resources available for any organization. To get optimum outcomes employees have to be controlled and utilized in a proper manner and contribution from satisfied employees is much essential for the organization. So, the objectives of this paper is to build a model which ascertain the relationship between organizational political behavior and job satisfaction. It is revealed that there is a substantial relationship between organizational political behavior and job satisfaction.

Keywords: Organizational political behavior, influence tactics, job satisfaction, pay, promotion.

ECE

S.No 71

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ORIGINAL RESEARCH

Categorization of self care problem for children with disabilities using partial swarm optimization approach

Manoj Sharma[1]

Received: 9 August 2019 / Accepted: 17 January 2020

Abstract Self-care or personal care denotes those actions or doing that a person undertakes in supporting personal health, limiting personal illness, preventing personal disease and reinstating their own health. Self-caring is big challenge in exceptional/disabled children. With recent advancement in artificial intelligence in last few years, machine learning can be used for classification of self-care problem in children with different age groups. The paper proposed an enhanced expert system based on machine learning for diagnose and classification of self-care issues in children with physical and mental disorder. Partitioned Multifilter with Partial Swarm Optimization (PM-PSO) is used for attribute/feature selection and the outcomes are analogize with Principal Component Analysis (PCA). The preferred features/attributes are tested, trained and validated on following classifiers:-Naïve Bayes, Multilayer Perception (MLP), C-4.5 and Random Tree. tenfolded cross validation is used for validation, testing and training. PCA selects 32 attributes and shows truly categorized instances i.e. accuracy as: (1) 80% for Naïve Bayes; (2) 68.57% for MLP; (3) 68.57% for C 4.5 and; (4) 64.28% for Random Tree. The classifiers show a significant improvement in performance with PM-PSO feature selector. 50 attributes were selected with PM-PSO. It shows truly categorized instances/accuracy as: (1) 81% for Naïve Bayes; (2) 80% for MLP; (3) 80% for C 4.5 and; (4) 78.57% for Random tree.

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Published online: 25 January 2020

Keywords Self care problem · Machine learning · Partial swarm optimization · Naïve Bayes · Multilayer perception

1 Introduction and literature review

The conditions of body which affects ability to sustain prolonged physical or mental effort, physical competency or mobility of person is known as physical disability [1]. Trauma, complications during birth of child or genetic disorder are among the major reasons of physical and motor disabilities. Physical disability may be long-term loss or wearing of body parts function. These motor and physical disabilities confine individual activities [2]. In practise, the diagnosis of physical and motor disability is complex process and expert occupational therapist are required for diagnosis. There is need to collect the characteristics of children with disabilities. Therefore, ICF-CY was projected to accrue the characteristics of children. It is extensively used framework for disability analysis [3–6]. Personal-Care, mobility and home life classification problem can be evaluated by inquiry form in ICF [7, 8]. Drinking, eating, self-washing, to look after body parts and eating are activities that refers to self-care in ICF-CY. Typically, these activities are prolonged from birth to 7 years old [6]. Due to miscellany and complication in classification of personal-care problem and unavailability of occupational therapist there is need of expert system for personal-care classification problem. So, personal-care problem identification is a vital component in child health care system. With the growth of machine learning technologies in last few years, this technology is applied to many areas. Machine learning has applications in economics [9–11], biomedical applications [12, 13], intrusion detection [14], traffic classification [15], cognitive radios

S. No 72

Journal of Ambient Intelligence and Humanized Computing
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SNo. 46

ORIGINAL RESEARCH

Badminton match outcome prediction model using Naïve Bayes and Feature Weighting technique

Manoj Sharma[1] · Monika[2] · Naresh Kumar[3] · Pardeep Kumar[4]

Received: 18 February 2020 / Accepted: 23 September 2020

Abstract
The recent growth in the field of data mining and machine learning has remitted into more recognition of outcome prediction and classification. However, the application of these techniques in the field of sports is still unexplored. This paper presents the implementation of data mining and machine learning in sports particularly. Here, machine learning based algorithm to predict the outcome of the badminton tournament has been proposed. We have employed three classifiers, Naïve Bayes with Correlation Based Feature Weighting (NB-CBFW), Composite Hypercubes on Iterated Random Projections (CHIRP) and Hyper Pipes to predict the outcome of Australian Open 2019, Malaysian Open 2019, German Open 2019 and Singapore Open 2019 Badminton tournaments. The outcome prediction is measured in terms of Accuracy, Root Mean Square Error (RMSE), True Positive Rate (TPR), True Negative Rate (TNR), Positive Predicted Value (PPV), Negative Predicted Value (NPV) and Receiver Operating Characteristics (ROC). After implementing the classifiers, it has been observed that NB-CBFW shows excellent accuracy in match outcome prediction as compared to CHIRP and Hyper Pipes.

Keyword Match outcome prediction · Machine learning · CHIRP classifier · NB-CBFW · Hyper Pipes

Abbreviations

F_i;F_j	Two different feature variables/attributes
T	Target/class variable
f_i, f_j and t	The values of F_i, F_j and T respectively
m	Total number of feature variables
$I(F_i;T)$	The mutual significance or feature-class/target correlative significance
$I(F_i;F_j)$	Average mutual redundancy or average feature-feature correlative significance
Q_i	Difference between the feature-class correlation and the average feature-feature intercorrelation
$NI(F_i;T)$	Normalized mutual significance
$NI(F_i;F_j)$	Normalized average mutual redundancy
FW_i	The final weight to the attribute
F_i	M feature variables with feature values as f_1, f_2, f_3……f_m
$P(t)$	Prior probability
$P(f_i\|t)$	Conditional probability
b	Marginal number of bins
q	Number of instances
B_k	Purity Measure

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1 Introduction

Introduction part is divided into two sub sections first is related to the Badminton sports and second is related to the machine learning algorithms and prediction of the outcome of the match.

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S. No 73

Modified decision based unsymmetric adaptive neighborhood trimmed mean filter for removal of very high density salt and pepper noise

Navdeep Goel, Harpreet Kaur & Jyoti Saxena

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ISSN 1380-7501
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Springer

S. No 74

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A Compact CPW-Fed Planar Stacked Circle Patch Antenna for Wideband Applications

Nancy Gupta[1] · Jyoti Saxena[2] · Kamaljit Singh Bhatia[3] · Romil Kumar[4]

Abstract
The article investigates the performance of planar and compact CPW-fed microstrip patch antenna that offers 10 dB impedance bandwidth over the wide frequency range between 2.59 and 7.61 GHz. The parametric analysis of various design variables is included to acquire the final design of proposed antenna. The prototype exemplary of designed antenna is experimentally tested to obtain the return loss, VSWR, radiation response and gain characteristics. The close agreement is acquired between simulated and experimental results. The projected antenna has compact size of $0.61\lambda_0 \times 0.44\lambda_0 \times 0.027\lambda_0$ mm^3 and offers a 10 dB wide impedance bandwidth of 5.02 GHz. Thus, it may be considered suitable for variety of wireless applications including WLAN, Wi-MAX, fixed satellite services, wireless point-to-point applications etc.

Keywords Microstrip patch antenna · CPW-feed · Wideband antenna · Stacked circle patch

1 Introduction

The wireless communication systems & devices are hugely trending in this modern era. Specifically, those devices which are compact in size and offer exclusive quality voice & data communications, are in massive demand. These modern systems require efficient antennas that possess features such as light weight and wide impedance bandwidth.

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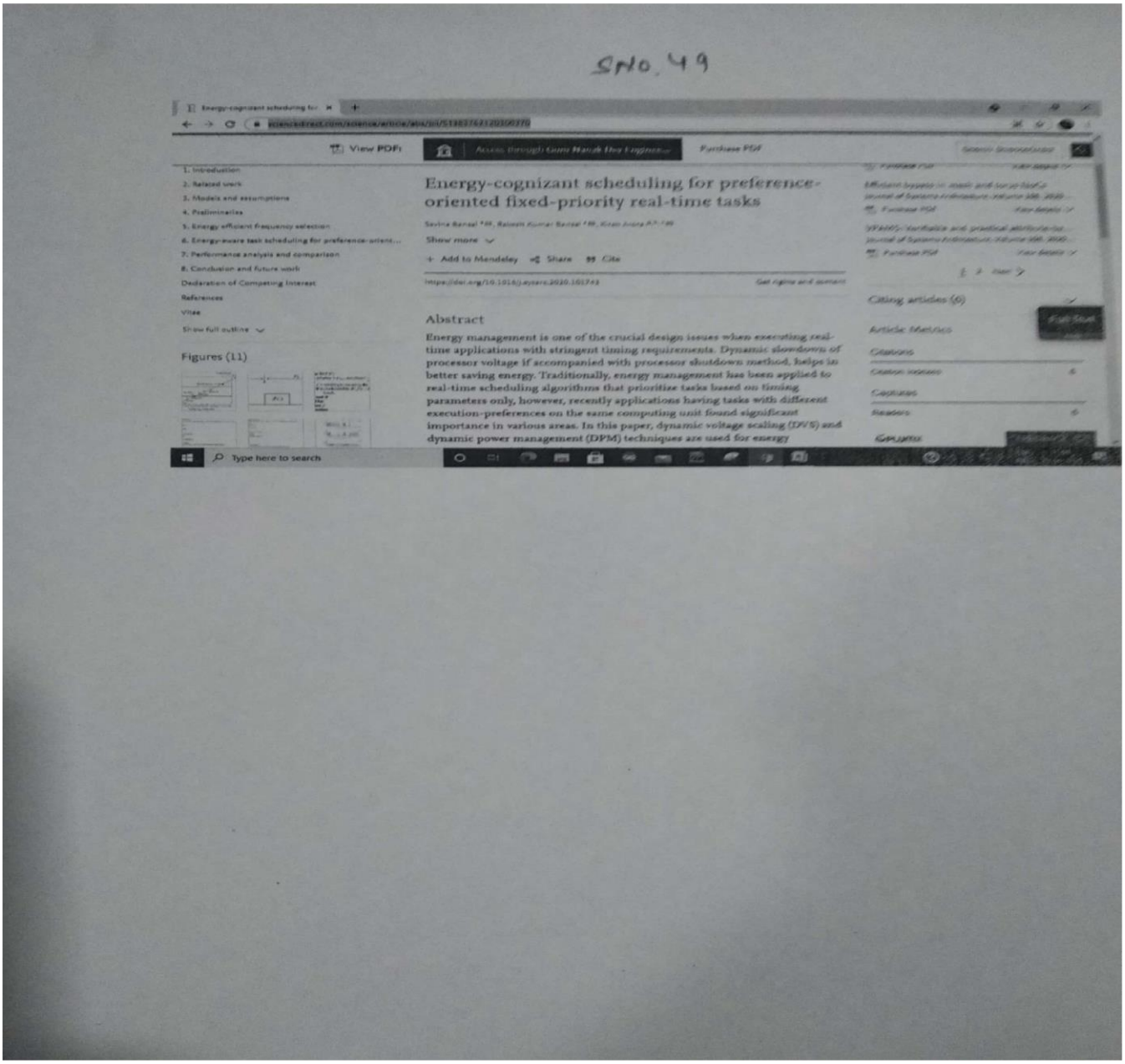
S. No 75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1. Introduction
2. Related work
3. Models and assumptions
4. Preliminaries
5. Energy efficient frequency selection
6. Energy-aware task scheduling for preference-orient...
7. Performance analysis and comparison
8. Conclusion and future work
Declaration of Competing Interest
References
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Energy-cognizant scheduling for preference-oriented fixed-priority real-time tasks
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Abstract
Energy management is one of the crucial design issues when executing real-time applications with stringent timing requirements. Dynamic slowdown of processor voltage if accompanied with processor shutdown method, helps in better saving energy. Traditionally, energy management has been applied to real-time scheduling algorithms that prioritize tasks based on timing parameters only, however, recently applications having tasks with different execution-preferences on the same computing unit found significant importance in various areas. In this paper, dynamic voltage scaling (DVS) and dynamic power management (DPM) techniques are used for energy
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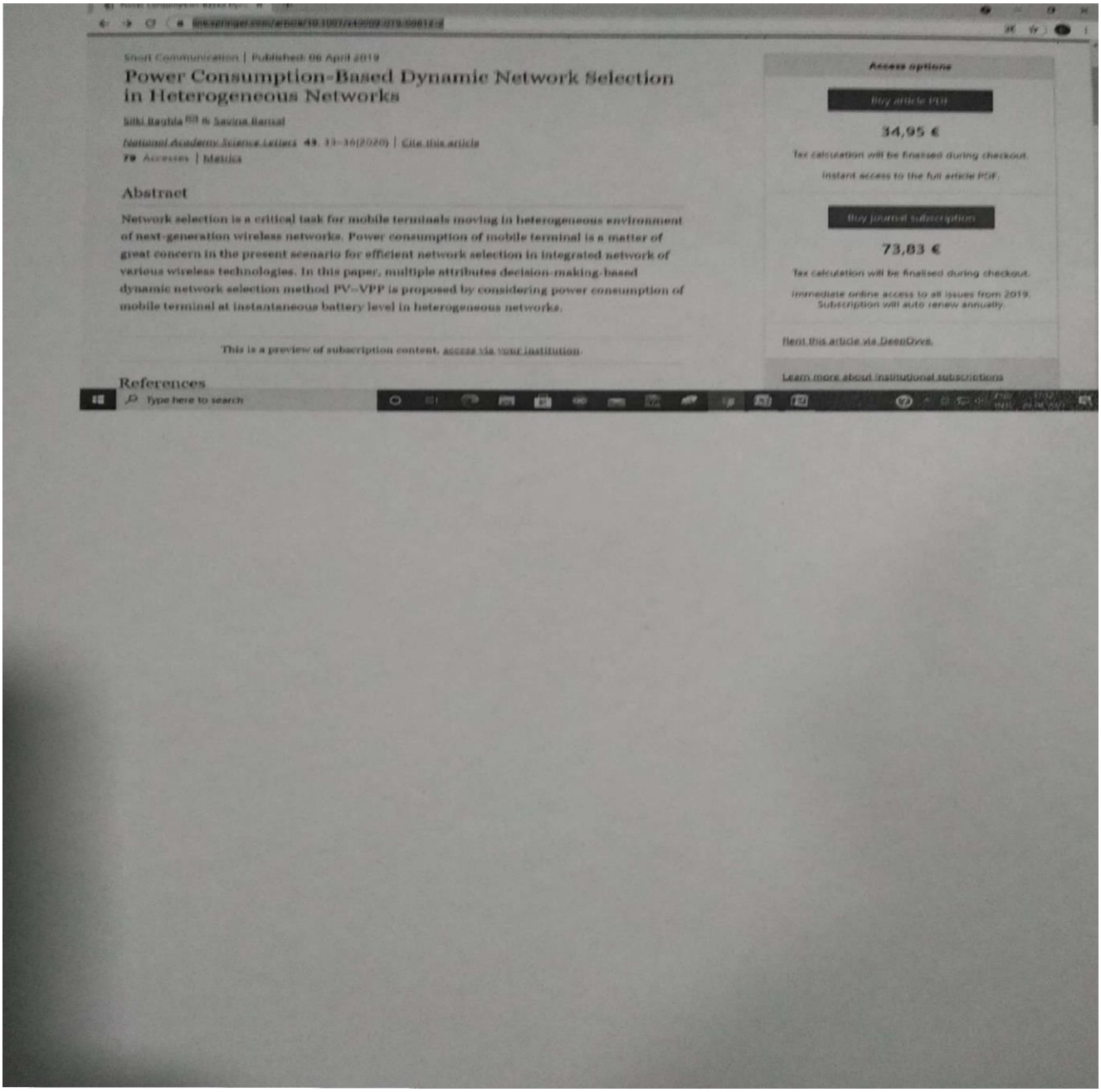

Short Communication | Published: 06 April 2019

Power Consumption-Based Dynamic Network Selection in Heterogeneous Networks

Silki Baghla & Savina Bansal

National Academy Science Letters 43, 33–36(2020) | Cite this article

79 Accesses | Metrics

Abstract

Network selection is a critical task for mobile terminals moving in heterogeneous environment of next-generation wireless networks. Power consumption of mobile terminal is a matter of great concern in the present scenario for efficient network selection in integrated network of various wireless technologies. In this paper, multiple attributes decision-making-based dynamic network selection method PV–VPP is proposed by considering power consumption of mobile terminal at instantaneous battery level in heterogeneous networks.

References

S. No 77

MULTI-LEVEL HETEROGENEITY-AWARE ENERGY-EFFICIENT CLUSTERING TECHNIQUE FOR WIRELESS SENSOR NETWORKS

pages 903-917
DOI: 10.1615/TelecomRadEng.v79.i10.70

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ABSTRACT

Wireless sensor networks (WSNs) are gaining popularity owing to their applications in diverse fields due to availability of low-cost, low-powered miniature components and their enormous capabilities to reach inaccessible fields. In this paper, a multilevel framework for heterogeneous WSNs has been proposed that decides the value of heterogeneity parameters for allotment of number of nodes and initial node energy at each level in a realistic manner. It also provides a common platform for researchers to analyze their protocol. To validate the proposed framework, Heterogeneity-aware

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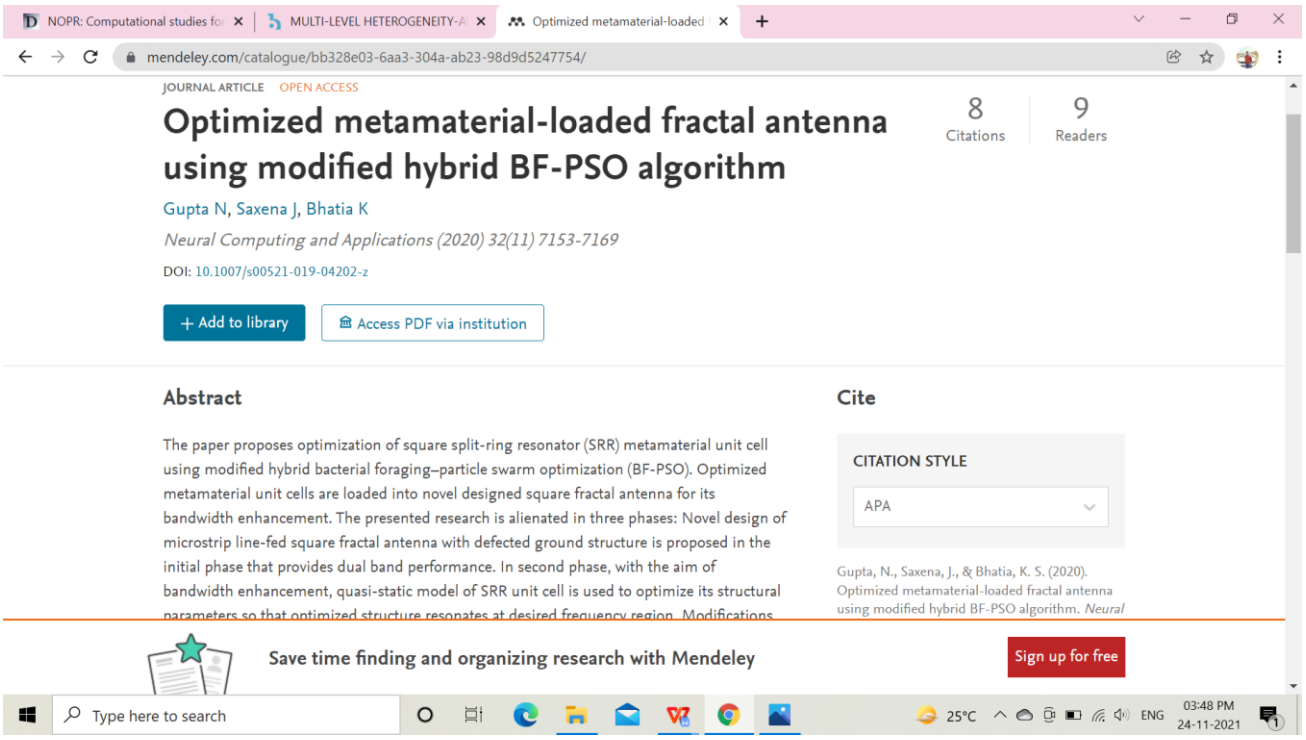
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JOURNAL ARTICLE OPEN ACCESS
Optimized metamaterial-loaded fractal antenna using modified hybrid BF-PSO algorithm
8 Citations
9 Readers
Gupta N, Saxena J, Bhatia K
Neural Computing and Applications (2020) 32(11) 7153-7169
DOI: 10.1007/s00521-019-04202-z
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Access PDF via institution
Abstract
The paper proposes optimization of square split-ring resonator (SRR) metamaterial unit cell using modified hybrid bacterial foraging–particle swarm optimization (BF-PSO). Optimized metamaterial unit cells are loaded into novel designed square fractal antenna for its bandwidth enhancement. The presented research is alienated in three phases: Novel design of microstrip line-fed square fractal antenna with defected ground structure is proposed in the initial phase that provides dual band performance. In second phase, with the aim of bandwidth enhancement, quasi-static model of SRR unit cell is used to optimize its structural
Cite
CITATION STYLE
APA
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S. No 79

Performance enhancements of physical systems by reduced-order modelling and simulation

Ankur Gupta and Amit Kumar Manocha

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Abstract

It is a matter of great concern to simplify the large-scale physical systems for obtaining a better understanding of the behaviour more accurately at a faster rate. The proposed method focuses on the designing of a method of model order reduction of real time physical systems based on the mixed approach. Improved pole clustering is preferred to reduce the

S. No 80

COMPARATIVE ANALYSIS OF TECHNIQUES OF ORDER REDUCTION FOR ANALYSIS OF VEHICLE MODEL

ANKUR GUPTA, AMIT KUMAR MANOCHA[1], AND GURPREET SINGH

ABSTRACT. It is essential to study the transfer function of the processes involved in any vehicle in order to know the behavioral study. As these are large operation processes and strenuous. In the light of this there is requirement to reduce the order of the vehicle's transfer function so that it becomes convenient and easy to analyze various behavioral parameters such as steady state error, settling time, peak overshoot etc. During the process of order reduction of these vehicle systems, it is desirable that the behavior of both original and reduced order system remains identical. So these constraints should be kept in mind by the researcher while designing and developing the model order reduction techniques to obtain the best possible approximation of the higher order system. This paper outlines hankel norm approximation, schur decomposition, normalized co-prime factor technique, balanced stochastic truncation techniques to reduce the order of a higher order system and then comparative study is undertaken for SISO and MIMO system by considering test examples on basis of performance parameters of time domain shown by step response behavior and frequency domain shown by bode plot. The comparative analysis of all the techniques is done to obtain the best technique out of the four techniques.

[1]*correcponding author*

CIVIL ENGINEERING

S. No 81

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ISSN Print: 0976-6480 and ISSN Online: 0976-6499
DOI: 10.34218/IJARET.11.8.2020.047

EFFECT ON CBR VALUE OF EXPANSIVE SOIL WITH GEOGRID REINFORCEMENT

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ABSTRACT

The aim of this study is to look into the effect of geo-grid on the improvement of California bearing ratio (CBR) of expensive soil. Construction of structures over expansive soils possesses difficulties like differential settlements, poor strength and high compressibility. Expansive soils are poor in strength and that they will lead to poor pavement support and ultimately affects the pavement performance and its life period. The status and life of pavement is considerably affected by the type of sub-grade, sub-base, and base course materials. The California bearing ratio (CBR) of these sub-grade soils have low, which leads to provide more thickness of flexible pavement. For this study of improving CBR value of the sub-grade soil one type of geo-grid is used. The result of this study clearly shows that there is significant increase in the CBR value of the sub-grade soil due to the geo-grid reinforcement. The CBR value was tested by placing the geo-grid mesh at varying depths and it was found that geo-grid placed at 0.5 the distance from the top of the CBR test mould shows higher value.

Keywords: CBR, geo-grid, reinforcement, sub-grade, clayey soil

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http://iaeme.com/Home/issue/IJARET?Volume=11&Issue=8

1. INTRODUCTION

The construction of pavements over expansive soil subgrades is pricey, as they require large pavement thickness because of lower CBR values in wet condition. Pavement failures are often noticeable in pavements constructed over clay soil despite building pavements with large thickness. Swelling of subgrade is seen in low traffic roads whereas heavy traffic roads are suffering from excessive settlements or shear failures within the edge regions. The

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S. No 82

Size optimisation of RES-based grid connected hybrid power system using harmony search algorithm

by Priyanka Anand; Sarbjeet Kaur Bath; Mohammad Rizwan

International Journal of Energy Technology and Policy (IJETP), Vol. 16, No. 3, 2020

Abstract: In the present context, renewable energy sources are recognised as the best alternative of fossil fuels in order to fulfil the ever increasing demand with minimum harmful impact on environment. The combination of renewable energy sources can also be used in grid connected environment. This will help in reducing the burden of increasing demand on grid. Also, utility grid can supply deficit demand in case available generation from renewable energy sources becomes less than the demand. In the present paper, intelligent modelling of grid connected hybrid system has been carried out. Further, the total net present cost (NPC) of the considered system is optimised under the constraints of power reliability, storage limit on battery, etc. Finally, a comparative analysis has also been performed between the grid connected and standalone hybrid system based on the size and cost of components.

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DEPARTMENT OF MECHANICAL ENGINEERING

S. No 83

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Research Article

Investigations for surface roughness and dimensional accuracy of biomedical implants prepared by combining fused deposition modelling, vapour smoothing and investment casting

Daljinder Singh, **Rupinder Singh** & K.S. Boparai

Accepted 07 Oct 2020, Published online: 21 Oct 2020

Download citation https://doi.org/10.1080/2374068X.2020.1835007

ABSTRACT

Fused deposition modelling (FDM) is one of the most commonly used additive manufacturing (AM) processes to obtain 3D prototypes/patterns with compromised surface roughness and dimensional accuracy (mainly due to stair case effect). Some studies have been reported on use of vapour smoothing (VS) as post process (which

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Review Article

Manufacturing techniques and applications of polymer matrix composites: a brief review

Jasgurpreet Singh Chohan, Kamaljit Singh Boparai, **Rupinder Singh** & M.S.J Hashmi

Accepted 07 Oct 2020, Published online: 20 Oct 2020

Download citation https://doi.org/10.1080/2374068X.2020.1835012 Check for updates

ABSTRACT

Polymers are naturally occurring or artificially prepared materials consisting of long chains of molecules embedded into three-dimensional geometry having excellent flexibility and strength. The physical and chemical behaviour is further improved by adding specific reinforcements into polymer matrix called polymer matrix composites giving entirely new properties (which has revolutionised the aerospace and automobile industry). This paper reports the brief history of origin of polymers and their area of

S. No. 85

Review Article

Reinforced non-conventional material composites: a comprehensive review

Kamaljit Singh Boparai, **Rupinder Singh** & M. S. J. Hashmi

Accepted 15 Jun 2020, Published online: 25 Jun 2020

Download citation https://doi.org/10.1080/2374068X.2020.1783944 Check for updates

ABSTRACT

The strong incentive to switch from conventional to non-conventional reinforced raw materials along with requirements for compliance of environmental and health issues are major concerns in modern manufacturing sector. The use of bio-compatible, non-conventional materials in different engineering applications is not only ecologically viable but also it is economical and saves conventional resources (like: oil/coal/light, etc.). This paper systematically outlines use of non-conventional reinforced materials from sustainability viewpoint. Further the study summarises the benefits of fibre reinforced thermoplastic composites for additive manufacturing applications as a case

S. No 86

Technical Paper | Published: 17 March 2020

Investigations on hardness of investment-casted implants fabricated after vapour smoothing of FDM replicas

Daljinder Singh, Rupinder Singh ✉ & K. S. Boparai

Journal of the Brazilian Society of Mechanical Sciences and Engineering **42**, Article number: 178 (2020)

Abstract

Fused deposition modelling (FDM) is one of the additive manufacturing processes, which is used to produce three-dimensional functional and non-functional prototypes. This process is commercially acceptable for producing parts with different materials (thermoplastic, wax, etc.), which can be formed into desired shape and can be used as consumable pattern in investment casting (IC) process. The IC process has been established for production of difficult to made parts with high accuracy and finish. By combining both these novel processes, the researchers are serving the field of medicine to satisfy the needs of society. The vapour smoothing is one of the recently developed surface finishing techniques, which has potential to draw remarkable results to improve the quality of FDM replicas and support the IC process to enhance the properties of casted parts. So, in this paper an

S. No 87

Research Article | Published: 19 February 2020

Post-processing of ABS Replicas with Vapour Smoothing for Investment Casting Applications

Jasgurpreet Singh Chohan, Rupinder Singh ✉ & Kamaljit Singh Boparai

Proceedings of the National Academy of Sciences, India Section A: Physical Sciences (2020)

Abstract

The need of customized products with tight dimensional tolerances, lower production cost and shorter lead times led to the development of additive manufacturing techniques like fused deposition modelling (FDM). The digitally fabricated ABS patterns prepared on FDM needs to be processed by vapour smoothing (VS) in order to reduce the surface roughness. The post-processing of FDM-based patterns/replicas with VS increases their density, which increases heat input and complexities in ash removal during burnout stage from ceramic shell in investment casting (IC). This study highlights the step-by-step procedure for controlling the density of master patterns/replicas after processing with VS for IC applications.

S. No 88

Tribological performance of hardfaced and heat treated EN-47 steel used for tillage applications

Surface Topography: Metrology and Properties (IF2.038), **Pub Date : 2020-10-05**, *DOI: 10.1088/2051-672x/abbb7f*

Jagseer Singh, Sukhpal Singh Chatha and Buta Singh Sidhu

In the present work, two different hardfacings, namely SZ (Super-Zed alloy; C3.83Cr33.37) and ZK (Zedalloy-K; C0.65Cr4.5Mo8.18) were deposited on EN-47 ploughshare steel by manual metal arc welding process to enhance the abrasive wear resistance. In addition, the influence of heat-treatment of steel by two different methods, i.e., carburizing (C) and through-hardening (Q&T), on the abrasive wear behaviour has also been investigated. Abrasive wear studies were conducted on bare, hardfaced, and heat-treated steel in a laboratory by using a three-body dry sand rubber wheel test rig as per the ASTM G-65 standard. The bare steel suffered a high wear rate, which may be attributed to its soft ferritic-pearlitic microstructure. The abrasive wear rate of tested specimens was found to be 1.7651 × 10 −3 g m −1 , 0.7439 × 10 −3 g m −1 , 0.961 × 10 −3 g m −1 , 0.992 × 10 −3 g m −1 and 1.21 × 10 −3 g m<...

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S. No 89

Abrasive wear behavior of newly developed weld overlaid tillage tools in laboratory and in actual field conditions

Jagseer Singh [a], Sukhpal Singh Chatha [a], Buta Singh Sidhu [b]

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Abstract

Low alloy spring steel with medium or high carbon is normally used for manufacturing of agriculture and mining tools due to their adequate mechanical properties. In some cases as per end-user requirements these tools do not have enough wear resistant properties, so surface overlying is a good alternative to enhance the wear resistance of these

S. No 90

To study the corrosion behavior of friction stir processed magnesium alloy AZ91

December 2020 · Materials Today: Proceedings 44(1980–2015)

DOI:10.1016/j.matpr.2020.10.920

Authors:

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Balwinder Singh Sidhu
GZS PTU CAMPUS BATHINDA

Pardeep Kumar

S. No 91

ICRACM-2019

EFFECT OF SURFACE ALLOYING ON WEAR BEHAVIOUR OF EN-47 STEEL

Jagseer Singh[*a], Sukhpal Singh Chatha[a], Buta Singh Sidhu[b]

[a]Yadavindra College of Engineering, Punjabi University G.K. Campus, Talwandi Sabo, Punjab, India-151302
[b]*Maharaja Ranjit Singh State Technical University, Bathinda, Punjab, India-151001*

Abstract

Reducing wear would ensure minimize material loss, change over time and labour in different branches of industries. Hardfacing plays a major role in an industry and agriculture in reducing losses due to wear. In the present work three different types of hardfacing electrodes namely H1, H2 and VB were used to enhance the wear resistance of EN-47 steel, used for tillage application in agriculture sector by manual metal arc welding (MMAW) process. The abrasive wear behaviour of bare and hardfaced steel was evaluated by using dry sand rubber wheel tester according to procedure A of ASTM G65 standard. Microstructural characterization and surface analysis of worn out and fresh samples were made by using Optical and scanning electron microscopy. It is found that hardfaced steel (H1, H2 and VB) has significantly shown better wear resistance than bare steel. The wear resistance indices (WRI) of different steel hardfacings i.e. H1, H2 and VB were found to be 1.58, 1.37 and 1.82 respectively. The microstructure of VB hardfaced steel was found laminar dendrites.

Selection and peer-review under responsibility of SIXTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN COMPOSITE MATERIALS, ICRACM-2019.

Keywords: Hardfacing; tillage tools; abrasive wear; material loss; wear resistance

DEPARTMENT OF TEXTILE

S. No 92

Indian Journal of Fibre & Textile Research
Vol. 45, March 2020, pp. 127-132

Performance of Indian crossbred wool on khadi spinning system

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HP Crossbred, JK Crossbred and JK Merino yarns have been spun on the New Model Charkha (NMC) spinning system to find out the suitability of Indian crossbred wool in Khadi sector. These crossbred wools produced in the north temperature region of India have been spun into medium quality yarn linear density of 42 tex. The pure crossbred wool yarns have higher U%, imperfections and hairiness index; and lower tenacity, elongation-at-break and coefficient of friction. The mixing of Australian merino wool with JK crossbred wool significantly improves yarn performance in terms of fineness (31 tex), evenness (U%), imperfections and hairiness index. The tenacity, elongation-at-break and coefficient of friction of mixed yarns increase significantly by mixing of Australian merino wool with JK crossbred wool. These findings will help in increasing the utilization of crossbred wool and reducing the costing of end products.

Keywords: Indian crossbred wool, Khadi sector, NMC charkha, Yarn properties, Wool

Khadi refers to hand spun and handloom textile production. It plays an important role in generating employment opportunities in the unorganized rural non-farm sector, which contributes significantly in rural economy of the country. Khadi sector predominantly uses cotton and wool fibre for yarn production on different Charkha systems[1]. The cotton Khadi sector is well established, however woolen Khadi sector struggles due to fibre shredding, harsh and prickling yarn. The products made from pure indigenous wool are inferior in quality in terms of higher harshness and fibre shredding, resulting in poor acceptance among consumers. There is a scope to improve wool khadi yarn quality through proper fibre mix selection and spinning interventions.

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Wool produced in India has diverse quality attributes due to different climatic conditions across the country. The majority of wool produced is medium-coarse (25-40 μm) and thus not suitable for production of quality fabrics, viz. suiting, knitwears, etc. The Indian crossbred wool produced in J & K, Himachal Pradesh and Uttarakhand has fineness about 22-25μm which is not suitable for high end suiting fabric. However, such wool are suitable for Khadi sector[2]. Due to lack of information, Khadi sector is not using these crossbred wools, rather, it consumes about 1 Mkg of Australian merino wool annually[3]. Australian merino wool is costlier and suitable for production of high value products like suiting, etc. State khadi boards are using Australian merino wool for manufacturing of coarser and heavy weight khadi products. The utilization of Australian merino wool in khadi sector is not only under utilized but uneconomical too. Moreover, this practice also discourages Indian farmers to produce crossbred wool in the country. Thus, the objective of the present study is to encourage utilization of Indian crossbred wool in the khadi sector by mixing it with Australian merino wool and also to improve the spinnability and quality of Indian woolen products manufactured from yarn produced on NMC charkha.

NMC charkha is a modified version of Amber charkha used in the khadi system for woollen spinning[4]. Khadi spinning system is divided in two sections, viz. roving making and NMC charkha spinning. NMC charkha requires roving (pooni) as feeding material for making yarn. Kumar[5] reported spinning performance of Bharat merino wool, Indian farm wool and Chokla wool on NMC charkha. He found that the properties of yarn produced from Bharat merino wool are close to the yarn made from Australian merino wool. Sharma *et al.*[6] successfully blended crossbred wool with cotton using NMC charkha to develop khadi yarn and hand knitted fabric. Sharma and Pant[7] used khadi spinning system to prepare different blended yarns of camel hair with merino wool. Sharma and Pant[8] also conducted trials on the blending of camel hair and Chokla wool on the khadi spinning system. They found that blending of Chokla wool with camel hair improves the strength of the blended yarn and performance of knitted khadi

S. No 93

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Low-Stress Mechanical Properties of Wool-Cotton Blended Fabrics

H. C. Meena, D. B. Shakyawar & R. K. Varshney

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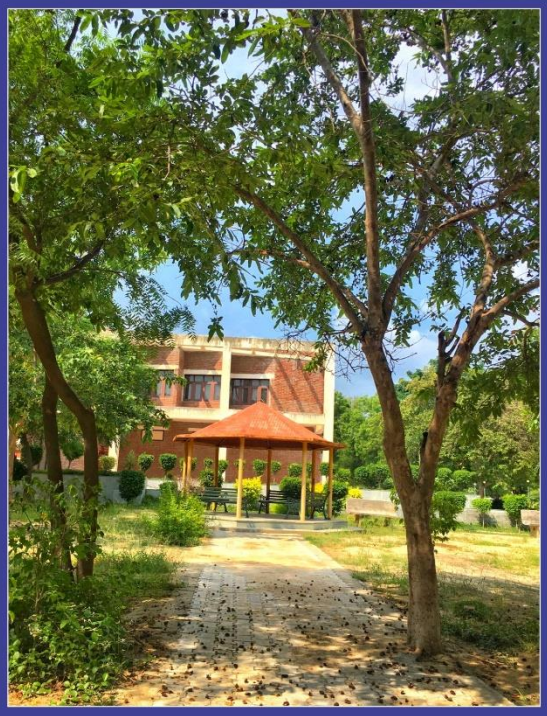

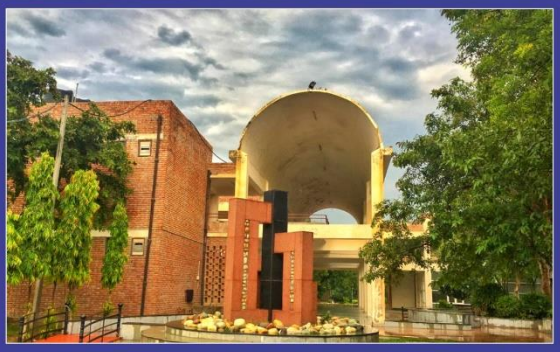

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