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

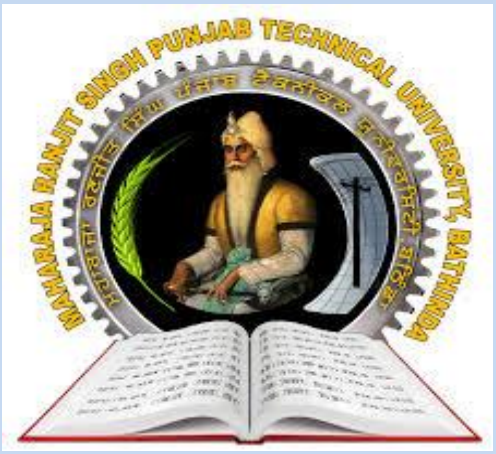
2021

RESEARCH PUBLICATIONS

MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY

Bathinda-151001 (Punjab), India

ANNUAL REPORT- RESEARCH PUBLICATIONS



2021

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

ANNUAL REPORT- RESEARCH PUBLICATIONS [2021]

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Year 2021

INTERNAL QUALITY ASSURANCE CELL

ANNUAL REPORT- RESEARCH PUBLICATIONS

2021

RESEARCH PUBLICATIONS [2021]		
Department of Pharmaceutical Sciences &Technology		
Sr. No.	**Research Publication**	**Impact Factor**
1	Singh A, Mandal UK, Narang RK (2021) Development and characterization of enteric coated pectin pellets containing mesalamine and Saccharomyces boulardii for specific inflamed colon: *In vitro* and *in vivo* evaluation. *Journal of Drug Delivery Science and Technology*, 62, 102393.	3.981
2	Kumari S, Deshmukh R (2021) β-lactam antibiotics to tame down molecular pathways of Alzheimer's disease. *European Journal of Pharmacology*, 895,173877.	4.432
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	Department of Chemistry	
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	Department of Mathematics	
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	University Business School	
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101	Kaur S, Bansal S, Bansal RK (2021) Image steganography for securing secret data using hybrid hiding model *Multimedia Tools and Applications*, 80, 7749-7769.	2.517
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	Department of Textile	
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Research paper

Development and characterization of enteric coated pectin pellets containing mesalamine and *Saccharomyces boulardii* for specific inflamed colon: *In vitro* and *in vivo* evaluation

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ABSTRACT

The objective of this study was to develop and characterize enteric-coated pectin pellets containing mesalamine and *S.boulardii* for specific colon targeted drug delivery for ulcerative colitis management. Pellets of mesalamine and *S.boulardii* were produced by extrusion-spheronization technique by using pectin and microcrystalline cellulose and coated with Cellulose acetate phthalate. The pellets were evaluated for morphology, micromeritic properties as well as through fourier transform infrared spectroscopy, differential scanning calorimetry and X-ray diffraction techniques and the results confirmed that all the ingredients of the pellets were compatible with each other without revealing any specific interaction. The dissolution profiles of uncoated and coated pellets were examined at pH 1.2, 6.8 and 7.4 with and without rat cecal content. Further pharmacokinetic studies revealed a lower value of maximum concentration in the case of cellulose acetate phthalate coated pellets formulation in comparison to uncoated ones which, evidenced the lower systemic exposure of the drug. Finally, to ensure the therapeutic activity of the selected formulation, a 2,4,6-trinitrobenzene sulfonic acid-induced colitis model was used. Colon/Bodyweight ratio, myeloperoxidase, lipid peroxidase level, glutathione activity and histological evaluation were performed in the colitis model. Animal experiments revealed that coated pellets of mesalamine and *S.boulardii* significantly improved the diseased conditions in Wistar rats. The confirmation of which was done by the gain in weight, clinical improvement in macroscopic and microscopic factors of induced colitis. These findings evince that coated pellet formulation has promising potential for targeted drug delivery of mesalamine and *S.boulardii* to the colon as well as to improve the viability of probiotics and enhancement in the effectiveness of mesalamine in management of ulcerative colitis.

1. Introduction

In recent trends on colon-targeting systems, many drug carrier strategies were implemented to target human colon via time-dependence, pH and bacterially degradable, but due to huge variation of physiological conditions in G.I. tract, it was often witnessed that a single system is not sufficient to release the drug at colon site [1–3]. Mesalamine is the first-line choice of drug which is frequently used in the management of UC, which works by inhibiting the inflammatory cytokines responsible for inflammation [4]. Although mesalamine has been proven to be a promising drug for UC, still many side effects are reported with conventional formulations, due to the non-specific targeted drug delivery to the colon [5]. To combat such issues, a variety of strategies have been reported for targeting colon such as pH-sensitive polymers, fabrication of pro-drugs, timed-release systems, hydrogels, pellets, microparticles, enzyme-based biodegradable polymers embedding in biodegradable matrix or reservoir system [6–10]. Coating of the carrier system with Eudragit S-100 is massively reported by various researchers to provide

Abbreviations: UC, Ulcerative colitis; *S.boulardii*, *Saccharomyces boulardii*; CAP, Cellulose acetate phthalate; MCC, Microcrystalline cellulose; DMSO, Dimethyl sulfoxide; IBD, Inflammatory bowel disease; SGF, Simulated gastric fluid; SIF, Simulated intestinal fluid; SCF, Simulated colonic fluid; TNBS, 2,4,6-Trinitrobenzenesulfonic acid; Mes, Mesalamine; Pro, Probiotic; MPO, Myeloperoxidase; LPO, Lipid peroxidase level; GSH, Glutathione; NO, Nitric Oxide; C_{max}, Maximum concentration of the drug; T_{max}, Peak time when drug achieves; C$_{max}$, Maximum plasma drug concentration; AUC, Area under the curve; MRT, Mean residence time; RH, Relative humidity.

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Review

β-lactam antibiotics to tame down molecular pathways of Alzheimer's disease

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ABSTRACT

Alzheimer's disease is a multifactorial disorder characterized by extracellular accumulation of amyloid-β (Aβ) and intracellular accumulations of neurofibrillary tangles. Numerous drug targets have been explored for therapeutic efficacy but failed to deliver successful treatment clinically. However, over the years our understanding of the disease pathophysiology increased significantly. Many of the novel targets which can cure or modify disease pathology are being explored preclinically as well as clinically. On contrarily, the drug discovery and development process is lengthy and the cost involved makes it difficult for faster translation of therapeutic outcomes. Therefore, repurposing existing drugs for a new therapeutic indication is considered a better approach and helps in the fast translation of therapeutic information. The existing drugs have well-proven records on their safety, pharmacokinetics, etc. In recent years, beta (β)-lactam antibiotics have been repurposed for the management of neurodegenerative pathologies. Here in the current review, we have explored β-lactam antibiotics, their target sites, molecular mechanisms, and their therapeutic potential in Alzheimer's disease.

1. Introduction

Alzheimer's disease (AD) is the progressive neurodegenerative disorder that affects memory and other cognitive functions with the increasing age (Scopa et al., 2020). Extracellular synaptic accumulation of amyloid-β (Aβ) and intracellular neuronal accumulation of neurofibrillary tangles (NFTs) of hyper-phosphorylated micro-tubular tau protein (Soejitno et al., 2018) are the two major hallmarks of AD pathology. The Aβ deposits and NFTs impair the neuronal communications and trigger the activation of various deleterious pathways including oxidative stress, excitotoxicity, neuroinflammation, etc. which ultimately cause neuronal cell death (Reggiani et al., 2020). Thus novel strategies are required to tame down this complicated neuropathology. To year with time, the expenditure involved, and the possibility of failure, in today's era concept of repurposing is being used as a novel approach in the drug introduction process for the search of effective therapies (Parvathaneni et al., 2019). Repurposing means to study and develop the new uses of already marketed or withdrawn drugs, and this has numerous precedence over de-novo drug discovery (Mehla, 2017). Here in the safety profile, pharmacokinetics, formulation, and manufacturing issues of the drugs have already been resolved. Therefore the drug repurposing is one of the ways for the quick conveyance of existing therapeutic information for a new indication. Beta (β)-lactam antibiotics have been repurposed for AD treatment. There are pre-clinical shreds of evidence, which suggest the effectiveness of β-lactam antibiotics in AD pathology. Here in the current review, we have discussed in detail the pre-clinical and clinical evidence of β-lactam antibiotics in AD pathology.

2. β-lactam antibiotics and brain disorders

The commonly used antibiotics might prove more beneficial than just killing pathogenic microbes. Beta (β)-lactam antibiotics have been considered an optimistic group of drugs for treating neurodegenerative pathologies. In a far-reaching effort, it has been reported that β-lactam antibiotics (Rothstein et al., 2005) are the only targets capable of modulating the transcription and expression of the glutamate transporter 1 (GLT-1) that protects neurons from excitotoxic neuronal damage. Glutamate mediated excitotoxicity is one of the major pathogenic factors involved in various neurodegenerative pathologies including AD (Sheldon-Ribeiro et al., 2016). The most remarkable members of the β-lactam class of antibiotics are penicillin's, cephalosporins, monobactams, and carbapenems. Among β-lactam class of antibiotics only few from the penicillin and cephalosporins category enters the brain at a

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Nanocarrier vaccines for SARS-CoV- 2

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ABSTRACT

The SARS-CoV-2 global pandemic has seen rapid spread, disease morbidities and death associated with substantive social, economic and societal impacts. Treatments rely on re-purposed antivirals and immune modulatory agents focusing on attenuating the acute respiratory distress syndrome. No curative therapies exist. Vaccines remain the best hope for disease control and the principal global effort to end the pandemic. Herein, we summarize those developments with a focus on the role played by nanocarrier delivery.

1. Overview: pathways toward an effective COVID-19 vaccine

In late 2019, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) first emerged and on March 11, 2020 it was declared a pandemic [1]. Clinical outcomes ranged from asymptomatic infection to severe acute respiratory distress syndrome (ARDS) and death. The World Health Organization (WHO) named the resultant disease complex coronavirus disease 2019 (COVID-19) [2,3]. COVID-19 has negatively impacted the global socioeconomic well-being of the world's population. Global lack of health care, infrastructure, and preparedness has intensified the pandemic's impact [4].

Viral detection, mobilization and control of person-to-person spread served as the primary means for containment. Induction of effective host antiviral immunity against SARS-CoV-2 comes secondary to infection [5,6]. An uncontrolled innate immune response is the signature of virus-induced pro-inflammatory responses for an ARDS. Alveolar macrophage inflammation disrupts cell and tissue homeostasis leading to end-organ lung disease [7,8]. In the absence of a vaccine, virus-induction of adaptive humoral immune responses can attenuate disease progression [9].

A vaccine can elicit protective antiviral responses against SARS-CoV-2. Short of containment it is the most effective means to prevent infection in susceptible people [10]. To this end, there are more than 137 vaccine candidates in development and 23 in Phase 2 or 3 trials [11,12]. One promising candidate BNT162b2 is already approved while several others are soon to be approved for prevention in the United States of America (USA) [13,14]. However, how long an induced immune response remains effective is in question. Final outcomes will depend, in part, on the continuance of a neutralizing antibody response, the limitations seen on viral mutations and the long-term induction of antiviral

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INVITED REVIEW

A Role for Extracellular Vesicles in SARS-CoV-2 Therapeutics and Prevention

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Abstract
Extracellular vesicles (EVs) are the common designation for exosomes, microparticles and microvesicles serving dominant roles in intercellular communication. Both viable and dying cells release EVs to the extracellular environment for transfer of cell, immune and infectious materials. Defined morphologically as lipid bi-layered structure EVs show molecular, biochemical, distribution, and entry mechanisms similar to viruses within cells and tissues. In recent years their functional capacities have been harnessed to deliver biomolecules and drugs and immunological agents to specific cells and organs of interest or disease. Interest in EVs as putative vaccines or drug delivery vehicles are substantial. The vesicles have properties of receptor nanoassembly on their surface. EVs can interact with specific immunocytes that include antigen presenting cells (dendritic cells and other mononuclear phagocytes) to elicit immune responses or affect tissue and cellular homeostasis or disease. Due to potential advantages like biocompatibility, biodegradation and efficient immune activation, EVs have gained attraction for the development of treatment or a vaccine system against the severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) infection. In this review efforts to use EVs to contain SARS CoV-2 and affect the current viral pandemic are discussed. An emphasis is made on mesenchymal stem cell derived EVs' as a vaccine candidate delivery system.

Keywords Extracellular vesicles (EVs) · Mesenchymal stem cells (MSCs) · Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) · Coronavirus disease 2019 (COVID-19)

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S. No. 5

BRILL

Possible role of traditional systems of medicine to manage COVID-19: A review

In: Israel Journal of Plant Sciences

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Abstract

The COVID-19 pandemic has wreaked havoc on the global healthcare system and the economy. At present, no specific antiviral vaccine is available to combat this contagious virus. Traditional medicine has a long history of playing a significant role in managing several infectious diseases. In this context, scientists around the globe are also exploring various traditional medical interventions to prevent the COVID-19 pandemic. In the present work, we summarize available scientific data advocating the use of traditional medicine for preventing COVID-19. A robust literature review was conducted using scientific platforms such as Science Direct, National Center for Biotechnology Information (NCBI), Pubmed, Google Scholar, and online database like The Plant List (The Plant List 2013)

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ORIGINAL PAPER
METABOLISM & ENDOCRINOLOGY

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Economic costs of hospitalisation and length of stay in diabetes with coexisting hypertension with correlation to laboratory investigations: Where does India stand? A 5-year ground report

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Abstract

Introduction: The coexistence of diabetes mellitus (DM) and hypertension (HTN) worsens clinical outcomes and contributes to increased morbidity and mortality.

Objective: This study aims to analyse the length of stay and healthcare costs by calculating the direct and indirect costs of diabetes with coexisting hypertension in North India.

Methods: A prospective observational study was conducted at the medicine department of the three different hospitals.

Results: The patients' mean age was (M = 53.8, SD = 11.5) years. Out of 1914 patients, 53.65% were female. Our study revealed that the median cost of medical supplies and equipment was 21.2 $. The median cost of dialysis was 47.5 $; the median cost of hospitalisation was 142.6 $. The treatment's median direct cost was 188.5 $, followed by the overall median cost of 295.6 $. The maximum overall cost of treatment was observed at 603.9 $. It was observed that maximum LOS was 14 days for patients having BPS between 140 and 159 mmHg and BPD between 110 and 119 mmHg, and minimum LOS was found 3.5 days.

Conclusion: The present study highlighted that diabetes coexisting hypertension poses a high-economic burden on patients. This study explored that highly significant result for BPS, BPD, FBS and HbA_1c, whereas the significant results were obtained when RBS is compared with LOS and treatment costs. Our study concluded that mean difference of 9.24 $ in patients having FBS was 261-290 mg/dL and >290 mg/dL. The LOS is increased by 6.57 days for patients with BPS between 140 and 159 mmHg compared with BPS between 180 and 209 and above mmHg, which lowers treatment costs by −21.31$.

1 | INTRODUCTION

The coexistence of diabetes mellitus (DM) and hypertension (HTN) worsens clinical outcomes and contributes to increased morbidity and mortality.[1] Both DM and HTN are important risk factors for cerebrovascular disease, heart failure and coronary artery disease (CAD).[2] Hypertension is a prevalent comorbid condition in diabetes, affecting ~20% to 60% of patients with diabetes, depending on obesity, ethnicity and age.[2] Both DM and HTN present considerable challenges in developing countries like India.[3] The presence of hypertension, particularly with diabetes mellitus leading to target organ damage and associated with renal disease risk, substantially increases the risk of (CVDs) cardiovascular risk disease.[4] CVDs are the leading causes of death as of 2015. In 2012, it claimed that an

S. No. 7

HOW TO SPOT COVID-19 PATIENTS: SPEECH & SOUND AUDIO ANALYSIS FOR PRELIMINARY DIAGNOSIS OF SARS-COV-2 CORONA PATIENTS

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November 26, 2020

Abstract

Background: The global cases of Covid-19 increasing day by day. On Nov. 25, 2020, a total of 59,850,910 cases reported globally with a 1,411,216 global death. In India, total cases in the country now stand at 91,77,841 including 86,04,955 recoveries and 4,38,667 active cases as of Nov. 24, 2020, as per data issued by ICMR. A new generation of voice/audio analysis application which can tell whether the person is suffering from COVID-19 or not. Aims: To describe how to establish a new generation of voice/audio analysis applications to identify the suspected covid-19 hidden cases in hotspot areas with the help of an audio sample of the general public. Materials & Methods: The different patents and data available as literature on the internet are evaluated to make a new generation of voice/audio analysis application with the help of an audio sample of the general public. Results: The collection of the audio sample will be done from the already suffered covid-19 patients in (.Wave files) personally or through phone calls. The audio samples like the sound of the cough, the pattern of breathing, respiration rate, and way of speech will be recorded. The parameters will be evaluated for loudness, articulation, tempo, rhythm, melody, and timbre. The analysis and interpretation of the parameters can be made through machine learning and artificial intelligence to detect corona cases with an audio sample. Discussion: The voice/audio application current project can be merged with a mobile App called "Aarogya Setu" by Govt. of India. The project can be implemented in the high-risk area of Covid-19 in the country. Conclusion: This new method of detecting cases will decrease the workload in the covid-19 laboratory.

HOW TO SPOT COVID-19 PATIENTS: SPEECH & SOUND AUDIO ANALYSIS FOR PRELIMINARY DIAGNOSIS OF SARS-COV-2 CORONA PATIENTS

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S. No. 8

REVIEW ARTICLE

Review on perfume and present status of its associated allergens

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First published: 23 May 2020

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Abstract

Background

Perfume is basically a cosmetic product applied to human body for an amusing scent or the feeling of freshness. A certain amount of perfume penetrates and remains attached to the protein of the skin when perfume is applied on the body. It evokes a surge of events in human immune system which results with allergic symptoms. Fragrance ingredients are leading cause that can be responsible for the occurrence of allergic contact dermatitis that is recently studied under cosmetic adverse reaction.

Aim

The aim of this review article was to define the allergies that are caused by fragrance ingredients. This review highlights the various aspects of perfume with respect to its manufacturing process, compositions, and fragrance ingredients identified as allergens and its present regulatory status.

Method

There area 175 frangrance ingredients that are used in perfumes cause allergic reaction. Several studies were conducted on the patients. The study was conducted on four fragrance markers in the baseline series: fragrance mix I (FM I), Myroxylon pereirae, fragrance mix II (FM II), and hydroxyisohexyl 3-cyclohexene carboxaldehyde.

Result

Around 658 patients showed allergy due to fragrance ingredients when the patch test was performed. In other study, out of 1253 patients, 90% of the FM I and M. pereirae detected 90% of the cases.

Conclusion

Majority of the fragrance ingredients can cause allergic reactions and hence act as allergens and thus increase the risk of sensitization on activation. If any individual suffers from allergy or contact dermatitis on use of any perfume, he/she should be aware of it and should reduce or avoid its use to overcome such problems of hypersensitivity.

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Neurological Sciences
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ORIGINAL ARTICLE

Pharmacokinetic and pharmacodynamic evaluation of Solid self-nanoemulsifying delivery system (SSNEDDS) loaded with curcumin and duloxetine in attenuation of neuropathic pain in rats

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Abstract
The present investigation is focused on improving oral bioavailability of poorly soluble and lipophilic drugs, curcumin (CRM) and duloxetine (DXH), through the solid self-nanoemulsifying drug delivery system (S-SNEDDS) and identifying their potential against attenuation of NP in chronic constriction injury (CCI)–induced rats through the solid self-nanoemulsifying drug delivery system (S-SNEDDS). The optimized batch of S-SNEDDS reported was containing CRM and DXH (30 mg each), castor oil (20% w/w), tween-80 (40% w/w), transcutol-P (40% w/w), and syloid 244 FP (1 g). The high dose of each of naïve CRM (NCH), naïve DXH (NDH), physical mixture of DXH and CRM (C-NCM-DXH), S-SNEDDS-CRM (SCH), S-SNEDDS-DXH (SDH), and S-SNEDDS-CRM-DXH (C-SCH-SDH) was subjected for MTT assay. The developed formulations were subjected to pharmacokinetic studies and results showed about 8 to 11.06 and 2-fold improvement in oral bioavailability of CRM and DXH through S-SNEDDS. Furthermore, CCI-induced male Wistar rats were treated with SSNEDDS containing CRM and DXH, S-SNEDDS containing individual drug, individual naïve forms, and their combination from the day of surgery for 14 days and evaluated for behavioral at pre-determined time intervals. On the terminal day, animals were sacrificed to assess tissue myeloperoxidase, superoxide anion, protein, tumor necrosis factor-α, total calcium levels, and histopathological changes. Pronounced effect was observed in rats treated with S-SNEDDS containing both drugs with respect to rats receiving any of other treatments owing to enhanced oral bioavailability through S-SNEDDS. Therefore, it can be concluded that S-SNEDDS of both drugs and their coadministration can accelerate the prevention of NP.

Keywords Curcumin · Duloxetine · Chronic constriction injury · TNF-α · Calcium inhibition

Introduction

Abnormal sensory processing in peripheral as well as central nervous systems develops a chronic painful condition known as neuropathic pain (NP) which is characterized by allodynia and hyperalgesia [1]. Conventional therapies like non-steroidal anti-inflammatory drugs (NSAIDs), opioid analgesics, tricyclic antidepressants (TCA), and anticonvulsants have been extensively reported in the treatment of NP; however, they have several side effects such as dry mouth, orthostatic hypotension, constipation, and urinary retention [2–5]. There are many etiologies and mechanisms that cause NP; hence, combination therapy with agents that act at different sites and mechanisms may provide better alternative for NP [1, 5, 6]. Chronic

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ORIGINAL PAPER

Economic costs of hospitalisation and length of stay in diabetes with coexisting hypertension with correlation to laboratory investigations: Where does India stand? A 5-year ground report

Amit Sharma, Ashish Baldi, Dinesh Kumar Sharma

First published: 05 January 2021
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Abstract

Introduction

The coexistence of diabetes mellitus (DM) and hypertension (HTN) worsens clinical outcomes and contributes to increased morbidity and mortality.

Objective

This study aims to analyse the length of stay and healthcare costs by calculating the direct and indirect costs of diabetes with coexisting hypertension in North India.

Methods

A prospective observational study was conducted at the medicine department of the three different hospitals.

Results

The patients' mean age was (M = 53.8, SD = 11.5) years. Out of 1914 patients, 53.65% were female. Our study revealed that the median cost of medical supplies and equipment was 21.2 $. The median cost of dialysis was 47.5 $; the median cost of hospitalisation was 142.6 $. The treatment's median direct cost was 188.5 $, followed by the overall median cost of 295.6 $. The maximum overall cost of treatment was observed at 603.9 $. It was observed that maximum LOS was 14 days for patients having BPS

S. No. 11

Journal of Drug Delivery Science and Technology 66 (2021) 102799

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Journal of Drug Delivery Science and Technology

journal homepage: www.elsevier.com/locate/jddst

Implementing risk-based quality by design for development and optimization of flavored oral disintegrating mini tablets

Subh Naman [a], Nupur Madhavi [a], Bhupendra Singh [b], Jitendra Madan [c], Ashish Baldi [a,*]

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ARTICLE INFO

Keywords:
Central composite design
Paediatrics
Quality by design
Mini tabs
Risk assessment
Quality risk management

ABSTRACT

Paediatric patients differ from adult in various aspects of pharmacotherapy, including the abilities of drug admistration, medicine related toxicity and taste partialities. It is very much important that paediatrics drugs should best fit the child's size, age, various physiologic conditions of the children. The objective of present study was to develop oral disintegrating mini tablet of paracetamol employing quality by design approach. Quality target product profile and critical quality attributes for paracetamol oral disintegrating mini tablet were identified. Potential factors affecting the quality of final formulation were identified by constructing fishbone diagram and risk assessment matrix. Screened factors were further optimized by employing the central composite design. 2D and 3D contour plots were drawn for determining the optimum concentration of selected critical parameters. Developed mathematical model were found to be appropriate to define the disintegration time and hardness with 93.18% and 90.27% validity. Various quality control test were defined for the direct compression method. Developed formulation were characterized for the various methods like hardness, friability, disintegration time and *in vitro* drug release profile and results were found to be satisfactory. The study offers a systematic study for design and optimization of patient compliant dosage form involving quality by design practices.

1. Introduction

organization (WHO) proficient discussion extended a model move toward pediatric oral solids considering stability issues and subsequently,

S. No. 12

Journal of Applied Research on Medicinal and Aromatic Plants

Volume 25, December 2021, 100342

Determining constraints in medicinal plants adoption: A model geospatial study in the Indian state of Punjab

Preet Amol Singh [a, b] ✉, Anil Sood [c] ✉, Ashish Baldi [a] ✉

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https://doi.org/10.1016/j.jarmap.2021.100342

Highlights

- Punjab follows intensive cropping pattern leading to exploitation of natural resources.

S. No. 13

International Journal of *Molecular Sciences*

MDPI

Review

Mitochondrial Modulations, Autophagy Pathways Shifts in Viral Infections: Consequences of COVID-19

Shailendra Pratap Singh [1,*,†], Salomon Amar [1,2,*,†], Pinky Gehlot [3], Sanjib K. Patra [4], Navjot Kanwar [5] and Abhinav Kanwal [6]

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† Authors equally contributed.

Abstract: Mitochondria are vital intracellular organelles that play an important role in regulating various intracellular events such as metabolism, bioenergetics, cell death (apoptosis), and innate immune signaling. Mitochondrial fission, fusion, and membrane potential play a central role in maintaining mitochondrial dynamics and the overall shape of mitochondria. Viruses change the dynamics of the mitochondria by altering the mitochondrial processes/functions, such as autophagy, mitophagy, and enzymes involved in metabolism. In addition, viruses decrease the supply of energy to the mitochondria in the form of ATP, causing viruses to create cellular stress by generating ROS in mitochondria to instigate viral proliferation, a process which causes both intra- and extra-mitochondrial damage. SARS-COV2 propagates through altering or changing various pathways, such as autophagy, UPR stress, MPTP and NLRP3 inflammasome. Thus, these pathways act as potential targets for viruses to facilitate their proliferation. Autophagy plays an essential role in SARS-COV2-mediated COVID-19 and modulates autophagy by using various drugs that act on potential targets of the virus to inhibit and treat viral infection. Modulated autophagy inhibits coronavirus replication; thus, it becomes a promising target for anti-coronaviral therapy. This review gives immense knowledge about the infections, mitochondrial modulations, and therapeutic targets of viruses.

Keywords: mitochondria; SARS-COV2; potential targets; autophagy; COVID-19; viral infections

check for updates

Citation: Singh, S.P.; Amar, S.; Gehlot, P.; Patra, S.K.; Kanwar, N.; Kanwal, A. Mitochondrial Modulations, Autophagy Pathways Shifts in Viral Infections: Consequences of COVID-19. *Int. J. Mol. Sci.* **2021**, *22*, 8180. https://doi.org/10.3390/ijms22158180

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1. Introduction

Mitochondria are membrane-bound cell organelles which produce energy in the form of adenosine triphosphate (ATP). Mitochondria regulate various intracellular functions like metabolism, bioenergetics, cell death, innate immune signaling, and cellular homeostasis [1].

Mitochondrial dynamics and mitochondria, selective autophagy, or mitophagy, work to maintain mitochondrial quality control [2]. By altering mitochondrial dynamics, viruses influence innate immune signaling [which is mediated through the mitochondrial antiviral signaling (MAVS) protein], as well as favoring their propagation by taking advantage of mitochondrial metabolite.

S. No. 14

Biomedicine & Pharmacotherapy 140 (2021) 111796

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journal homepage: www.elsevier.com/locate/biopha

Review

Rice bran, an off-shoot to newer therapeutics in neurological disorders

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ARTICLE INFO

Keywords:
Neurodegeneration
Rice bran
Nutritional intake
Natural anti-oxidant
Anti-inflammation
γ-oryzanol

ABSTRACT

Normal brain functioning involves the interaction of interconnected molecular and cellular activities, which appear to alter normal to abnormal brain functioning when worsened, contributing to the emergence of neurological disorders. There are currently millions of people who are living with brain disorders globally and this will rise if suitable prevention strategies are not explored. Nutraceutical intended to treat numerous health goals with little adverse effect possible together can be more beneficial than pharmaceutical monotherapy for fostering balanced brain functioning. Nutraceutical provides a specific composition of effective macronutrients and micronutrients that are difficult to synthesize in the laboratory. Numerous elements of rice fibers in rice bran are characterized as natural anti-oxidant and having potential anti-inflammatory activity. The rice bran captures interest among the researchers as it is widespread, affordable, and rich in nutrients including protein, fat, carbohydrates, bioactive components, and dietary fiber. This review covers the neuroprotective multiplicity of rice bran and its constituents to deter pathological conditions of the brain and to facilitate balanced brain functioning at the same time.

S. No. 15

Inflammopharmacology (2021) 29:1001–1016
https://doi.org/10.1007/s10787-021-00826-7

Inflammopharmacology

REVIEW

Role of vitamins and minerals as immunity boosters in COVID-19

Puneet Kumar[1] · Mandeep Kumar[2] · Onkar Bedi[3] · Manisha Gupta[3] · Sachin Kumar[4] · Gagandeep Jaiswal[4] · Vikrant Rahi[4] · Narhari Gangaram Yedke[4] · Anjali Bijalwan[1] · Shubham Sharma[1] · Sumit Jamwal[5]

Received: 28 April 2021 / Accepted: 29 May 2021 / Published online: 10 June 2021

Abstract
Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) known as coronavirus disease (COVID-19), emerged in Wuhan, China, in December 2019. On March 11, 2020, it was declared a global pandemic. As the world grapples with COVID-19 and the paucity of clinically meaningful therapies, attention has been shifted to modalities that may aid in immune system strengthening. Taking into consideration that the COVID-19 infection strongly affects the immune system via multiple inflammatory responses, pharmaceutical companies are working to develop targeted drugs and vaccines against SARS-CoV-2 COVID-19. A balanced nutritional diet may play an essential role in maintaining general wellbeing by controlling chronic infectious diseases. A balanced diet including vitamin A, B, C, D, E, and K, and some micronutrients such as zinc, sodium, potassium, calcium, chloride, and phosphorus may be beneficial in various infectious diseases. This study aimed to discuss and present recent data regarding the role of vitamins and minerals in the treatment of COVID-19. A deficiency of these vitamins and minerals in the plasma concentration may lead to a reduction in the good performance of the immune system, which is one of the constituents that lead to a poor immune state. This is a narrative review concerning the features of the COVID-19 and data related to the usage of vitamins and minerals as preventive measures to decrease the morbidity and mortality rate in patients with COVID-19.

Keywords COVID-19 · Corona virus · Minerals · Therapy · Vitamin

S. No. 16

Journal of Pharmaceutical Innovation
https://doi.org/10.1007/s12247-019-09415-2

ORIGINAL ARTICLE

Effects of Different Formulation Methods on Drug Crystallinity, Drug-Carrier Interaction, and Ex Vivo Permeation of a Ternary Solid Dispersion Containing Nisoldipine

May Kyaw Oo [1] · Syed Mahmood [2,3] · Wong Tin Wui [4] · Uttam Kumar Mandal [5] · Bappaditya Chatterjee [1,6]

Abstract

Background Solid dispersion (SD) is an established approach to increase the solubility and dissolution of BCS class II drugs. The selection of a suitable method of preparation and the suitable polymeric carrier are the two most important parameters for a successful SD. The present research is aimed to evaluate the effect of preparation method on drug crystallinity, drug-polymer interaction, ex vivo permeability, and SD stability.

Method A ternary SD containing nisoldipine as drug and PVP K30, poloxamer 188 as the carrier was prepared by hot melt mixing, solvent evaporation by rotary vacuum evaporator, and lyophilization. The prepared samples were analyzed in comparison in order to meet the objectives.

Results All three methods yielded a mixed system of the crystalline and amorphous phase with a significant increase in saturation solubility compared to the raw drug. Infra-red spectroscopy study showed the highest degree of H bonding between drug and carrier in the freeze-dried formulation. X-ray diffraction study showed maximum loss of drug crystallinity from the rotary vacuum evaporated SD (3.70% at 11.3, 2θ angle). Ex vivo permeability study showed the maximum drug permeation by freeze-dried product. But freeze-dried product was shown to be the least stable in stability analysis. In terms of product stability, melt mixing is the best out of the three methods tested.

Conclusion Different methods of preparation have different impacts on functional group interaction, loss of crystallinity, ex vivo permeation, and stability of ternary SD.

Keywords Nisoldipine · Solid dispersion · Ex vivo permeability study · Drug-carrier interaction

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Introduction

Solid dispersion (SD) is one of the most effective strategies to improve the dissolution profile and bioavailability of poorly

S. No. 17

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DOI: 10.1002/jdn.10089

REVIEW ARTICLE

INTERNATIONAL JOURNAL OF DEVELOPMENTAL NEUROSCIENCE

WILEY

Animal models of attention-deficit hyperactivity disorder (ADHD)

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Abstract

Attention-deficit hyperactivity disorder (ADHD) is a heterogeneous neuropsychiatric disorder characterized by three primary symptoms hyperactivity, attention deficit, and impulsiveness, observed in both children and adults. In childhood, this disorder is more common in boys than in girls, and at least 75% will continue to suffer from the disorder until adulthood. Individuals with ADHD generally have poor academic, occupational, and social functioning resulting from developmentally inappropriate levels of hyperactivity and impulsivity, as well as impaired ability to maintain attention on motivationally relevant tasks. Very few drugs available in clinical practice altogether abolish the symptoms of ADHD, therefore, to find new drugs and target it is essential to understand the neuropathological, neurochemical, and genetic alterations that lead to the progression of ADHD. With this contrast, an animal study is the best approach because animal models provide relatively fast invasive manipulation, rigorous hypothesis testing, as well as it provides a better angle to understand the pathological mechanisms involved in disease progression. Moreover, animal models, especially for ADHD, serve with good predictive validity would allow the assess-

S. No. 18

Pharmacological Reports (2021) 73:372–385
https://doi.org/10.1007/s43440-020-00201-3

REVIEW

Neuroprotection through G-CSF: recent advances and future viewpoints

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

Received: 12 March 2020 / Revised: 18 November 2020 / Accepted: 21 November 2020 / Published online: 2 January 2021

Abstract
Granulocyte-colony stimulating factor (G-CSF), a member of the cytokine family of hematopoietic growth factors, is 19.6 kDa glycoprotein which is responsible for the proliferation, maturation, differentiation, and survival of neutrophilic granulocyte lineage. Apart from its proven clinical application to treat chemotherapy-associated neutropenia, recent pre-clinical studies have highlighted the neuroprotective roles of G-CSF i.e., mobilization of haemopoietic stem cells, anti-apoptotic, neuronal differentiation, angiogenesis and anti-inflammatory in animal models of neurological disorders. G-CSF is expressed by numerous cell types including neuronal, immune and endothelial cells. G-CSF is released in autocrine manner and binds to its receptor G-CSF-R which further activates numerous signaling transduction pathways including PI3K/AKT, JAK/STAT and MAP kinase, and thereby promote neuronal survival, proliferation, differentiation, mobilization of hematopoietic stem and progenitor cells. The expression of G-CSF receptors (G-CSF-R) in the different brain regions and their upregulation in response to neuronal insult indicates the autocrine protective signaling mechanism of G-CSF by inhibition of apoptosis, inflammation, and stimulation of neurogenesis. These observed neuroprotective effects of G-CSF makes it an attractive target to mitigate neurodegeneration associated with neurological disorders. The objective of the review is to highlight and summarize recent updates on G-CSF as a therapeutically versatile neuroprotective agent along with mechanisms of action as well as possible clinical applications in neurodegenerative disorders including AD, PD and HD.

Keywords Granulocyte-colony stimulating factor · Granulocyte-colony stimulating factor-receptors · Neuroprotection · Alzheimer's disease · Parkinson's disease · Huntington's disease

S. No. 19

ChemistrySelect

Reviews
doi.org/10.1002/slct.202100468

Europe
European Chemical Societies Publishing

Materials Science inc. Nanomaterials & Polymers

Recent Development in Synthesis of Carbon Dots from Natural Resources and Their Applications in Biomedicine and Multi-Sensing Platform

Puja Bag,[a] Rahul K. Maurya,[b] Ankita Dadwal,[c, d] Mrinmoy Sarkar,[a] Pooja A. Chawla,[a, e] Raj K. Narang,[c] and Bhupinder Kumar*[a, e]

Carbon has always found a spotlight in human life either in the form of graphite, diamonds, activated charcoal, carbon nanotubes, or carbon dots (CDs). Carbon quantum dots (CQDs) or CDs became the centre of attraction because of their potential applications in biomedical field such as bio-imaging, drug nanocarriers, gene therapeutics, photosensitizing agents, theranostics and provides other multifunctional diagnostic platforms. There are numerous advantages of CDs due to their biocompatibility, reduced toxicity, water-solubility, ease of scale-up, and, most notably their fluorescence properties contrary to other carbon nanostructures. In last few years, significant efforts have been put by various research teams to synthesize and develop nanostructured materials possessing specific functional properties and characteristics. This work focus on the recent developments in the synthetic approaches applied for CDs using environment-friendly sources. This review also highlights the mechanistic aspects, applications of CDs in biomedicine and a multi-sensing platform along with challenges and future perspectives of this promising field. The authors believe that this review will help audible researchers to select a suitable environment-friendly approach for the synthesis of CDs from green sources with required functions and properties. It will also guide researchers to develop a more convenient, efficient, and environment-friendly method for the synthesis of new tunable carbon dots.

1. Introduction

The carbon dots (CDs) with fluorescent properties or carbon quantum dots (CQDs) have emerged as a new class of carbon nanomaterial and drawn much attention from the researchers due to their versatility of applications in biomedical, analytical, fluorescent nanodots started with SQDs in 1981, the CDs were firstly isolated from arc-discharge soot in 2004 and after that in 2006 removal of cement and graphite using laser. Carbon is considered as a material having low water solubility and weak fluorescence. However, the CDs are known to possess good

S. No. 20

RJPT Research Journal of Pharmacy and Technology

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Formulation and Evaluation of In vitro Potential of Punarnava ghan Tablet against Urolithiasis (Mutrakrichra)

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DOI: 10.5958/0974-360X.2021.00261.4

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S. No. 21

Journal of Neuroimmune Pharmacology
https://doi.org/10.1007/s11481-020-09968-x

INVITED REVIEW

Pharmacotherapeutics of SARS-CoV-2 Infections

Bhavesh D. Kevadiya[1] · Jatin Machhi[1] · Jonathan Herskovitz[1,2] · Maxim D. Oleynikov[1] · Wilson R. Blomberg[1] · Neha Bajwa[3] · Dhruvkumar Soni[4] · Srijanee Das[1,2] · Mahmudul Hasan[4] · Milankumar Patel[1] · Ahmed M. Senan[5] · Santhi Gorantla[1] · JoEllyn McMillan[1] · Benson Edagwa[1] · Robert Eisenberg[6] · Channabasavaiah B. Gurumurthy[1] · St Patrick M. Reid[2] · Chamindie Punyadeera[7] · Linda Chang[8] · Howard E. Gendelman[1,2,4]

Received: 19 October 2020 / Accepted: 27 October 2020

Abstract
The COVID-19 pandemic has affected more than 38 million people world-wide by person to person transmission of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Therapeutic and preventative strategies for SARS-CoV-2 remains a significant challenge. Within the past several months, effective treatment options have emerged and now include repurposed antivirals, corticosteroids and virus-specific antibodies. The latter has included convalescence plasma and monoclonal antibodies. Complete viral eradication will be achieved through an effective, safe and preventative vaccine. To now provide a comprehensive summary for each of the pharmacotherapeutics and preventative strategies being offered or soon to be developed for SARS-CoV-2.

Keywords SARS-CoV-2 · COVID-19 therapeutics · Antivirals · Antibodies · Vaccine

Introduction

The novel coronavirus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), after its first appearance in Wuhan, China, speread globally and soon it was declared the third global pandemic by zoonotic coronaviruses, successed by

with comorbid conditions like diabetes, hypertension (Machhi et al. 2020; Xu et al. 2020; Yang et al. 2020a). The SARS-CoV-2 enters the lung after binding to the epithelial angiotensin-converting enzyme 2 (ACE2) receptors and spread to the distal organs including heart, liver, kidney, gastrointestinal tract and brain, to induce systemic inflammatory immune responses (Gu

S. No. 22

Journal Pre-proof

Implicating the effect of ketogenic diet as a preventive measure to obesity and diabetes mellitus

Sachin Kumar, Tapan Behl, Monika Sachdeva, Aayush Sehgal, Shilpa Kumari, Arun Kumar, Gagandeep Kaur, Harlokesh Narayan Yadav, Simona Bungau

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S. No. 23

Taylor & Francis

Journal of Biomolecular Structure and Dynamics

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Identifying novel putative ERK1/2 inhibitors via hybrid scaffold hopping –FBDD approach

Shelly Pathania , Pankaj Kumar Singh , Raj Kumar Narang & Ravindra K. Rawal

To cite this article: Shelly Pathania , Pankaj Kumar Singh , Raj Kumar Narang & Ravindra K. Rawal (2021): *Identifying novel putative ERK1/2 inhibitors via* hybrid scaffold hopping –FBDD approach, Journal of Biomolecular Structure and Dynamics, DOI: 10.1080/07391102.2021.1889670

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OXFORD Toxicology Research

Toxicology Research, 2021, 10, 40–50

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Paper

PAPER

Neuroprotective effect of nerolidol in traumatic brain injury associated behavioural comorbidities in rats

Amandeep Kaur,[1] Gagandeep Jaiswal,[1] Jasdeep Brar[1] and Puneet Kumar[1,2,*]

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S. No. 25

SAR and QSAR in Environmental Research ›
Volume 32, 2021 - Issue 10

Research Article

Structure based designing of thiazolidinone-pyrimidine derivatives as ERK2 inhibitors: Synthesis and in vitro evaluation

S. Pathania, P.K. Singh, R.K. Narang & R.K. Rawal

Pages 793-816 | Received 10 Jul 2021, Accepted 23 Aug 2021, Published online: 29 Sep 2021

S. No. 26

Brain Injury ›
Volume 35, 2021 - Issue 10

Review

Neurobiology of traumatic brain injury

Kajal Bagri, Puneet Kumar & Rahul Deshmukh

Pages 1113-1120 | Received 08 Feb 2021, Accepted 24 May 2021, Published online: 06 Sep 2021

ABSTRACT

Traumatic brain injury (TBI) involves structural damage to the brain regions causing death or disability in patients with lifelong sufferings. Accidental injuries to the brain, besides structural damage, if any, cause activation of various deleterious pathways leading to

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ORIGINAL PAPER

Metabolism & Endocrinology

THE INTERNATIONAL JOURNAL OF CLINICAL PRACTICE WILEY

Impact of physical activity and cooking oil amongst diabetes with coexisting hypertension patients on economic cost and length of stay: A 1914 patient's observational study

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Abstract

Aim of the Study: The study aimed to investigate the impact of the patients' physical activity status and the type of cooking oil consumed by patients in their daily routine on glycaemic profile, lipid profile, the hypertensive profile of the patients, the length of stay and overall cost of the treatment.

Methods: This is a prospective observational study. All the patients referred to the medicine department of the three different hospitals located in Moga, City Punjab, and those hospitalised due to diabetes mellitus (types I and II) with coexisting hypertension were asked to participate in the study.

Results: The patients' mean age was found to be M = 53.85, SD = 11.54 years. Out

S. No. 28

Research Article

Development and Characterization of a Clobetasol Propionate Nanostructured Lipid Carrier-Based Gel for the Treatment of Plaque Psoriasis

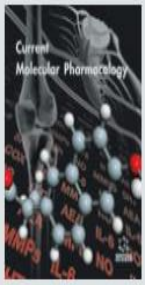
Author(s): Ankita Dadwal, Neeraj Mishra, Raj K. Narang*

Journal Name: Current Molecular Pharmacology

Volume 14 , Issue 3 , 2021

DOI : 10.2174/1874467213666200628135552

S. No. 29



Research Article

The Beneficial Effect of Rice Bran Extract Against Rotenone-Induced Experimental Parkinson's Disease in Rats

Author(s): Sachin Kumar, Puneet Kumar*

Journal Name: Current Molecular Pharmacology

Volume 14 , Issue 3 , 2021

DOI : 10.2174/1874467214666210126113324

S. No. 30

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Journal of Drug Delivery Science and Technology

journal homepage: www.elsevier.com/locate/jddst

Research paper

In vitro antioxidant assay guided *ex vivo* investigation of cytotoxic effect of phytosomes assimilating taxifolin rich fraction of *Cedrus deodara* bark extract on human breast cancer cell lines (MCF7)

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[b] Department of Pharmacognosy, ISF College of Pharmacy, Moga, Punjab, India
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ARTICLE INFO

Keywords:
Cedrus
Phytosomes
Antioxidant
Anticancer
Taxifolin
Bark

ABSTRACT

Objective: Characterization, *in vitro* evaluation of antioxidant activity and *ex vivo* investigation of cytotoxic effect of phytosomes assimilating ethyl acetate fraction fractionated from hydro alcoholic extract of *Cedrus deodara* bark.

Method: Solvent fractions of hydro alcoholic extract were analyzed by HPTLC to identify taxifolin, using toluene: ethyl acetate: formic acid (04:38:06) as mobile phase. Phytosomes of ethyl acetate fraction were prepared with antisolvent precipitation method and characterized by particle size analysis, entrapment efficiency, DSC, IR spectroscopy and partition coefficient. Phytosomes were screened for *in vitro* antioxidant activity and concentration exhibiting highest antioxidant activity was reinforced ahead for evaluation of *ex vivo* anticancer investigation by MTT assay and TB assay using MCF7 cell lines.

Result: Owing to identification of taxifolin (R_f=0.61) in ethyl acetate fraction during HPTLC, it was utilized further for complexation. Oval shape, particle size (544 nm), zeta potential (−28.1) and polydispersity index (0.141) of PC_3 phytosomes concluded about characterization of the complex. Entrapment efficiency (75.40 ± 0.53%) and partition coefficient (0.89 ± 0.91) of PC_3 phytosomes was higher as compared to PC_1 and PC_2 complex, therefore, PC_3 was evaluated for *ex vivo* studies after DSC and infrared spectroscopic evaluation. PC_3 phytosomes (100 mg/mL) exhibited highest antioxidant activity ($P < 0.001$) and reduced IC_{50} value, as compared to ethyl acetate fraction and standard. Further on *ex vivo* investigation, it also showed enhancement in cytotoxic activity ($P < 0.001$) in contrast to ethyl acetate fraction.

S. No. 31

Journal of Drug Delivery Science and Technology
Volume 63, June 2021, 102545

Research paper

Pharmacokinetic evaluation of the synergistic effect of raloxifene loaded transfersomes for transdermal delivery

Syed Mahmood [a, d], Bappaditya Chatterjee [b, d], Uttam Kumar Mandal [c, d]

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https://doi.org/10.1016/j.jddst.2021.102545

Highlights

- Ultra deformable liposomes (transfersomes) were formulated using

S. No. 32

Journal of Molecular Structure
Volume 1231, 5 May 2021, 129691

Armamentarium of anticancer analogues of curcumin: Portray of structural insight, bioavailability, drug-target interaction and therapeutic efficacy

Sheshank Sethi [a, †], Shalki Choudhary [a, †], Deepika Sharma [b, †], Vaskuri G S Sainaga Jyothi [c], Ashish Baldi [d], Neelesh Kumar Mehrac Jitender Madan [c]

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S. No. 33

nature materials

REVIEW ARTICLE

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Diagnostics for SARS-CoV-2 infections

Bhavesh D. Kevadiya[1], Jatin Machhi[1], Jonathan Herskovitz[1,2], Maxim D. Oleynikov[1], Wilson R. Blomberg[1], Neha Bajwa[3], Dhruvkumar Soni[4], Srijanee Das[1,2], Mahmudul Hasan[4], Milankumar Patel[1], Ahmed M. Senan[5], Santhi Gorantla[1], JoEllyn McMillan[1], Benson Edagwa[1], Robert Eisenberg[6], Channabasavaiah B. Gurumurthy[1], St Patrick M. Reid[2], Chamindie Punyadeera[7], Linda Chang[8,9] and Howard E. Gendelman[1,2,4] ✉

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has spread to nearly every corner of the globe, causing societal instability. The resultant coronavirus disease 2019 (COVID-19) leads to fever, sore throat, cough, chest and muscle pain, dyspnoea, confusion, anosmia, ageusia and headache. These can progress to life-threatening respiratory insufficiency, also affecting the heart, kidney, liver and nervous systems. The diagnosis of SARS-CoV-2 infection is often confused with that of influenza and seasonal upper respiratory tract viral infections. Due to available treatment strategies and required containments, rapid diagnosis is mandated. This Review brings clarity to the rapidly growing body of available and in-development diagnostic tests, including nanomaterial-based tools. It serves as a resource guide for scientists, physicians, students and the public at large.

In the span of a few months, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified as the aetiological agent of coronavirus disease 2019 (COVID-19). Weeks later, viral urgent need[7]. Serological testing complements virus detection, indicating past infection, which could be harnessed for therapeutic gain. Antibodies are detected by enzyme-linked immunosorbent assay

S. No. 34

Original Article

An Agro-ecological Zoning Model Highlighting Potential Growing Areas for Medicinal Plants in Punjab

Preet Amol Singh[1], Anil Sood[2], Ashish Baldi[3,*]

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ABSTRACT

Background: The Ministry of AYUSH, Government of India has decided to emerge cultivation of medicinal plants as an attractive farming option due to a sharp increase in demand for medicinal plants. Punjab produces approximately twenty and nine percent of India's wheat and rice, respectively. At present, less than 1% of the state's land is under Medicinal and Aromatic Plant (MAP) cultivation. Agro-ecological zoning for potential medicinal plants is one of the major constraints faced by the farmers. The present study is aimed to determine the land potential for selected medicinal plants such as *Asparagus racemosus* Willd. and *Rauvolfia serpentina* (L.) Benth. ex Kurz. in Punjab. **Materials and Methods:** Agro-ecological aptitudes for the plants were defined by analysing the edaphic and climatological data of the past years. Base maps of rainfall, temperature, benchmark soil were prepared, defined and superimposed using Arc. GIS 10.3 to highlight optimally suitable, suitable and lesser suitable zones for selected medicinal plants. **Results and Discussion:** *Asparagus racemosus* Willd. was: Optimally suitable to zones-II, III; Suitable to I; Lesser suitable to zone IV and V. Similarly, *Rauvolfia serpentina* (L.) Benth. ex Kurz, was: Optimally suitable to zone I; Suitable to II and III; Lesser suitable to IV and V. **Conclusion:** This agro-ecological zoning model can act as a baseline study for other medicinal plants with same or different bioclimatic indices and can be used in any part of the world for determining potential growing areas for new crops.

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Article

Formulation, Evaluation and Assessment of In Vitro Potential of Gokshur Ghan Tablet against Urolithiasis (Mutrakrichra)

April 2021 · Research Journal of Pharmacy and Technology · Follow journal
DOI: 10.52711/0974-360X.2021.00344

Dileep Singh Baghel · Amit Mittal · Saurabh Singh · Show all 6 authors · Shruti Chopra

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Abstract

Background: Tribulus species spread in the warm, temperate regions and prevalent in zone where hot summers and dry soil present. Tribulus species comprises of more than 25 species. Tribulus terrestris L. (Zygophyllaceae) consists of ripe, dried, whole fruit and an annual herb, rarely perennial that grows worldwide, particularly in the temperate regions. It is used as traditional medicines in India, China, South Africa, Bulgaria and many other countries. It is used for strengthening (balya), nutritive

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

S. No. 36

LWT - Food Science and Technology 152 (2021) 112341

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LWT

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Unraveling the efficacy of different treatments towards suppressing limonin and naringin content of Kinnow juice: An innovative report

Sukhvinder Singh Purewal [a, *], Sneh Punia [b], Pinderpal Kaur [a], Kawaljit Singh Sandhu [a, **], R.A. Ilyas [c,d], Surender Kumar Singh [e], Maninder Kaur [f]

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ARTICLE INFO

Keywords:
Kinnow
Bitterness
Debittering methods
Antioxidants

ABSTRACT

Bitterness in juice significantly affects consumer acceptability as well as its shelf life. Juice extracted from Kinnow fruit becomes bitter due to the presence of limonin and naringin. Therefore to remove bitterness from Kinnow juice, different debittering methods have been studied. These methods include hot water treatment, lye treatment (1–2%), Florisil®, β-cyclodextrin (0.5–2.5%) and their optimized treatment (NaOH 1.5% + Florisil® 3% + β-cyclodextrin 2%). Significant effect of treatments on pH, acidity, and TSS (Total soluble solids) was observed. Control (P_1) and treated juice samples [lye treated juice (1.5%) (P_2); lye treated juice (1.5%) + Florisil® (3%) (P_3), and juice from optimized treatment (P_4)] were studied for the presence of bioactive compounds and antioxidant properties. The antioxidant profiles of control and treated juice samples were compared using different antioxidant assays. Phenolic compounds in debittered juice (P_4) were significantly higher (94.5 mg GAE/100 mL) as compared to control (P_1) (90.1 mg GAE/100 mL). HPLC was performed to check the presence of bitter compounds (limonin and naringin) in control and treated juice. A significant decrease in the concentration of limonin (124.45–57.89 μg/mL) and naringin (2.38–1.26 μg/mL) was observed in the selected combined treatment.

1. Introduction

Fruits attract consumers' attention throughout the world because of their specific nutrients and bioactive metabolites (Pereira et al., 2020). Worldwide, citrus fruits are grown and consumed as they contain a wide variety of nutrients, especially vitamin C. Among the diverse group of Rutaceae family (lemon/lime, grapefruit, orange, citron, Kinnow, tangelo, tangerine, etc.), Kinnow mandarin (*Citrus nobilis* × *Citrus deliciosa*) has its importance because of the presence of minerals, ascorbic acid, and antioxidants. Kinnow is widely grown in the Northern regions of India, especially in Punjab, Haryana, Himachal Pradesh, and Rajasthan (Mahajan et al., 2016). As this fruit is a seasonal commodity and highly perishable, the shortage of cold storage and distribution chains in India results in a huge post-harvest loss. Generally, to increase the shelf life of Kinnow, waxing with citrashine (shellac) followed by packing in polymeric films is currently being practiced (Purewal & Sandhu, 2020; Lange, 2000). However, the shelf life is increased by 35–60 days following a waxing treatment. To overcome seasonal availability, fruits can be converted into value-added products, including juice, jam, jelly, beverages, etc. However, during the extraction of Kinnow juice, bitterness is one of the major problems faced by Kinnow processing industries, limiting them to store the juice for longer durations. Bitter compounds in juice determine consumer acceptability as well as their demand. Therefore, the taste, quality, and shelf life of liquid are the crucial factors that decide the commercial status of juice and processed juice products.

Citrus fruits have been reported to contain various bitter compounds; however, limonin and naringin are considered major compounds responsible for bitterness (Purewal & Sandhu, 2021; Singh et al., 2003).

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Key words:

Micronutrients, heavy metals, antioxidants, supplementary food, nutrition

Practical application:

Supplementary food is necessary to overcome malnutrition and related complications. Many types of supplementary foods, which are available are quite expensive and the parents belonging to middle and lower income groups are unable to afford them. Hence, children in these families have to consume the foods that the adults eat. Preparation of supplementary foods such as *Panjiri* on home-scale provides better option in combating the malnutrition problems. These foods may be formulated with oilseeds (flaxseed), which can enhance their nutritional qualities to desired levels. The nutraceutical components found in different cereals and oilseeds might be helpful in curing chronic health problems and other related co-morbidities. In addition, home-scale formulations of *Panjiri* can also be easily afforded by middle class and low income families.

Formulation and evaluation of a supplementary food (*Panjiri*) using wheat and flaxseed flour composites: micronutrients, antioxidants and heavy metals content

Brij Lal Karwasra[1]*, Maninder Kaur[2], Kawaljit Singh Sandhu[3], Anil Kumar Siroha[1] and Balmeet Singh Gill[2]

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S. No. 38

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JOURNALS BOOKS

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INVITED REVIEW

Rice-bran oil: An emerging source of functional oil

Sneh Punia, Manoj Kumar, Kawaljit Singh Sandhu, William Scott Whiteside

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INVITED REVIEW
Rice-bran oil: An emerging source of functional oil
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First published: 22 January 2021 | https://doi.org/10.1111/jfpp.15318

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Abstract

Rice (*Oryza sativa* L.) is the major food crops in the world and accounting for around 20% of the dietary energy intake of the global population. Rice bran (RB), the outer brown layer of rice, is one of the main by products during milling. It is a rice source of rice bran oil (RBO) with good fatty acid profile and phytonutrients like oryzanols, tocopherols, tocotrienols, phytosterols, and importantly dietary fibers. These bioactive compounds possess cardioprotective, anti-oxidative, anti-inflammatory, antimicrobial, antidiabetic, and antitumor properties. RBO has become an increasingly popular vegetable oil because of its very high burning point, neutral taste, and delicate flavor. RBO has gained many food, industrial, technological, and pharmaceutical applications due to its distinctive properties and nutritional value. This review paper deals with comprehensive information on extraction methods, oil stabilization, existing applications, and health

Related Information

Metrics

S. No. 39

foods

MDPI

Article

Aspergillus oryzae Fermented Rice Bran: A Byproduct with Enhanced Bioactive Compounds and Antioxidant Potential

Sneh Punia [1,*], Kawaljit Singh Sandhu [2,*], Simona Grasso [3], Sukhvinder Singh Purewal [2], Maninder Kaur [4], Anil Kumar Siroha [1], Krishan Kumar [1], Vikas Kumar [1] and Manoj Kumar [5,*]

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Abstract: Rice bran (RB) is a byproduct of the rice industry (milling). For the fermentation process and to add value to it, RB was sprayed with fungal spores (*Aspergillus oryzae* MTCC 3107). The impact of fermentation duration on antioxidant properties was studied. Total phenolic content (TPC) determined using the Folin–Ciocalteu method, increased during fermentation until the 4th day. The antioxidant activity analyzed using the 2,2 Diphenyl–1' picrylhydrazyl (DPPH) assay, total antioxidant activity (TAC), 2,2'-azinobis 3-ethylbenzothiazoline-6-sulfonic acid ($ABTS^{+}$) assay, reducing power assay (RPA) and hydroxyl free radical scavenging activity (HFRSA) for fermented rice bran (FRB) were determined and compared to unfermented rice bran (URB). TAC, DPPH, $ABTS^{+}$ and RPA of FRB increased till 4th day of fermentation, and then decreased. The specific bioactive constituents in extracts (Ethanol 50%) from FRB and URB were identified using high performance liquid chromatography (HPLC). HPLC confirmed a significant ($p < 0.05$) increase in gallic acid and ascorbic acid. On the 4th day of fermentation, the concentrations of gallic acid and ascorbic acid were 23.3 and 12.7 µg/g, respectively. The outcome of present investigation confirms that antioxidant potential and TPC of rice bran may be augmented using SSF.

Keywords: rice bran; solid state fermentation; antioxidant activity; bioactive compounds; *Aspergillus oryzae*; HPLC; total phenolic content; reducing power assay

Citation: Punia, S.; Sandhu, K.S.; Grasso, S.; Singh Purewal, S.; Kaur, M.; Kumar Siroha, A.; Kumar, K.; Kumar, V.; Kumar, M. *Aspergillus oryzae* Fermented Rice Bran: A Byproduct with Enhanced Bioactive Compounds and Antioxidant Potential. *Foods* **2021**, *10*, 70. https://doi.org/10.3390/foods10010070

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1. Introduction

Rice (*Oryza sativa*) belongs to the grass family and is the most widely consumed grass by a significant proportion of human population, especially in Asian regions. It is an agricultural commodity with the third highest worldwide production [1]. The total worldwide production of rice was about 769, 657,791 tonnes in an area of 167,249,103 ha, of which India produced 168,500,000 tonnes [1]. Rice bran (RB) is the major byproduct of milling industry, especially processing rice, and ultimately represents 5–10% of the total grain. RB constitutes crude protein (11–13%), oil (20%) and dietary fibers (22.9%), including hemicelluloses, arabinogalactan, arabinoxylan, xyloglycan, and raffinose with good sources of bioactive Y-oryzanol, Vitamin-E and minerals [2–4].

In routine practice, RB is used as feed for animals or in the production of edible cooking oils [5]. In the context of making our economies more circular and our diets more

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Scientia Horticulturae 276 (2021) 109750

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Review

Debittering of citrus juice by different processing methods: A novel approach for food industry and agro-industrial sector

Sukhvinder Singh Purewal *, Kawaljit Singh Sandhu *

Department of Food Science & Technology, Maharaja Ranjit Singh Punjab Technical University, Bathinda, India

ARTICLE INFO

Keywords:
Bitter compounds
Fruit juice
Debittering methods
Microbial consortia

ABSTRACT

Bitterness in citrus fruit juices is the major problem faced by food processing industries. Because bitterness reduce the shelf life of juice and consumer acceptability. The major components responsible for the bitterness in citrus fruit juices are limonin and naringin. Several researchers/scientists are working in the direction to remove bitterness from citrus fruit juices so that shelf life may be enhanced. The major scientific methods used for the reduction of bitterness in the citrus fruit juices are lye treatment, addition of sugars, β-cyclodextrin, hot water treatment, cellulose acetate layers, enzymatic methods using microbial consortia. Capability of microbial consortia for the production of debittering enzymes has been explored and discussed in a systematic manner. The present review paper has its focus on major problems faced during processing of fruit juices, debittering methods, challenging tasks and future prospects.

1. Introduction

Citrus fruits are one of the famous world fruit crops which are rich in specific vitamins, minerals and bioactive compounds. Major citrus fruit grown by Indian farmers are mosambi, kinnow, orange, bitter orange, lemon, lime, galgal, tangerine and grapefruit and they belongs to family *Rutaceae* and Plantae kingdom. Throughout the world they are being consumed either directly or in the form of fresh juice/processed fruit products. Fruits are well known for their specific taste, aroma and oils (Zou et al., 2016; Cai et al., 2004; Ke et al., 2015). Despite seasonal availability, packing of fruit juices and products could be an alternate option to make them available throughout the year. Packing of food materials facilitates the easiest way to transport fruits based products to distant places (Purewal and Sandhu, 2020; Matche, 2018; Ramos et al., 2015). However, the bitterness of citrus juice may create problem during their long term storage. Chemical composition indicates the presence of various metabolites in the fruits which are chemically bitter (Naringin, tangeretin, nobiletin, sinensetin, quercetin, limonin, nomilin and neohesperidin) however only few selected metabolites (limonin and naringin) play an important role in causing bitterness (Singh et al., 2003). During processing of citrus fruits, the major problem is bitter taste (Ley, 2008; Drewnoswki, 2001). Bitterness may results in deterioration of quality, reduced consumer acceptability and economic value of the fruit based products (Kore and Chakraborty, 2015; Mongkolkul et al., 2006).

The concentration of the bitterness causing components in citrus fruits may vary with the fruit type, fruit parts, cultivars and conditions under which they are growing. In fruits, a non bitter compound limonoate A-ring lactone is formed which is converted to limonin (bitter compound) in acidic conditions. Scientific studies reported that under low pH conditions the conversion of limonoate-A ring lactone to limonin occurs at faster rate (Hasegawa et al., 1991). Majority of consumer's rejects fruit products having bitter taste. Bitter taste in fruit juices/-products is not desirable so there is a need to eliminate bitterness from citrus juice.

Researchers are focusing on the scientific methods which could be utilized for the debittering of fruit juices to enhance the shelf life of fruits juices as well as to increase the consumer acceptability. Worldwide physical, chemical and microorganisms based biological methods are being screened for the efficacy towards bitterness reduction in citrus fruits. Artificial sweeteners, resins and enzymes are also being used to reduce the bitterness and improve the taste. The basic mechanism behind reduction of bitterness includes i) removal of bitter compounds ii) removal of physical barriers such as pith iii) flavor enhancers and use of bitter compounds scavengers (salt, sugar, florisil) iv) enzymatic (naringinase and α-L-rhamnosidase) reduction of bitter components v) use of genetic engineering techniques for modulating the synthetic pathways of bitter compounds. The present review paper has its focus on major problems in processing of citrus fruit juices, debittering methods,

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antioxidants

MDPI

Article

Unraveling the Bioactive Profile, Antioxidant and DNA Damage Protection Potential of Rye (*Secale cereale*) Flour

Pinderpal Kaur [1], Kawaljit Singh Sandhu [1,*], Sneh Punia Bangar [2,*], Sukhvinder Singh Purewal [1], Maninder Kaur [3], Rushdan Ahmad Ilyas [4,5], M. R. M. Asyraf [6] and M. R. Razman [7,*]

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Abstract: Six different solvents were used as extraction medium (water, methanol, ethanol, acidified methanol, benzene and acetone) to check their phenolics extraction efficacy from flour of two rye cultivars. Rye extracts with different solvents were further analyzed for the estimation of phytochemicals and antioxidant properties. Different tests (TPC, TAC, DPPH, FRAP, ABTS, RPA and CTC) were performed to check the antioxidant properties and tannin contents in extracts. A bioactive profile of a rye cultivar indicated the presence of total phenolic compounds (0.08–2.62 mg GAE/g), total antioxidant capacity (0.9–6.8 mg AAE/g) and condensed tannin content (4.24–9.28 mg CE/100 g). HPLC was done to check phenolics in rye extract with the best solvent (water), which indicated the presence of Catechol (91.1–120.4 mg/100 g), resorcinol (52–70.3 mg/100 g), vanillin (1.3–5.5 mg/100 g), ferulic acid (1.4–1.5 mg/100 g), quercetin (4.6–4.67 mg/100 g) and benzoic acid (5.3 mg/100 g) in rye extracts. The presence of DNA damage protection potential in rye extracts indicates its medicinal importance. Rye flour could be utilized in the preparation of antioxidant-rich health-benefiting food products.

Keywords: rye cultivars; extraction; phytochemicals; total phenolic compounds; antioxidant properties

1. Introduction

Frequent use of unhealthy food products (junk foods), less physical activity, a busy working schedule and deficiency of health-benefiting nutrients in a daily diet may heighten susceptibility to chronic diseases [1,2]. The addition of whole grains and grain-based healthy food products are favorably supported in diet charts, as they provide significant amounts of protein, fibers, carbohydrates, minerals and bioactive compounds. Rye (Secale cereale) is considered an important traditional cereal crop, and is cultivated worldwide. Rye stands in second place as a cereal grain after wheat, whose flour is utilized for the preparation of bakery products, especially bread and biscuits [3]. Rye (*Secale cereale*) belongs to the *Poaceae* family and its genus is Secale. Rye crops are believed to have originated in southwestern Asia and are widely cultivated in Europe, North America and Asia [4]. Rye

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Review

Rye: A wonder crop with industrially important macromolecules and health benefits

Pinderpal Kaur [a], Kawaljit Singh Sandhu [a,*], Sukhvinder Singh Purewal [a], Maninder Kaur [b], Surender Kumar Singh [c]

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ARTICLE INFO

Keywords:
Rye
Starch
Nutritional composition
Health benefits
Food products

ABSTRACT

Rye (*Secale cereale*) is a rich source of macromolecules, especially starch, fiber, and proteins which encourages the researchers and industries to use it for various purposes including bakery products, beverages and edible films formulation. However, despite many nutritional and health benefiting properties, rye has not been explored up to its full potential. Interest of consumers in formulating foods with high fiber and phenolic compounds has generated our interest in compiling the detailed information on rye. The present review on rye grains summarizes the existing scientific data on rye macronutrients (starch, arabinoxylan, β-glucan, fructan and proteins) and their corresponding industrial importance. Detailed description in this review unfolds the potential of rye grains for human nutrition. This review provides comprehensive knowledge and fills the remaining gap between the previous and latest scientific findings. Comprehensive information on rye nutrients along with health benefits will help to open a new era for scientific world and industrial sectors.

1. Introduction

Cereal grains are gaining interest from food manufacturers and pharmaceutical industries because of their role in reducing several chronic diseases. Now a day's majority of people are focusing on diet rich in specific nutrients and bioactive compounds as they have variety of health related benefits (Purewal, Salar, Bhatti, Sandhu, Singh, & Kaur, 2020). Worldwide researchers are exploring the hidden potential of different cereal grains. Different cereals being explored for their nutritional composition and health benefiting features are wheat (Gupta, Meghwal, & Prabhakar, 2021; Shewry, 2018); rice (Sangma & Parameshwari, 2021; Verma & Srivastav, 2020); maize (Trinidad-Calderon, Acosta-Cruz, Rivero-Masante, Diaz-Gomez, Garcia-Lara, & Lopez-Castillo, 2021; Poole, Donovan, & Erenstein, 2021); millets (Diaz-Martins, Bezerra, Pacheco, Rodrigues, & Carvalho, 2018; Chandra, Chan-

value. Europe, Asia and America are major producers of rye since ancient times; however, in India it is not explored up to its potential. Rye is a good source of starch, fibers, proteins, antioxidants as well as micronutrients. Starch is a major carbohydrate (55–70%) present in rye as well as in other cereals grains. Starch is a significant source of energy in human diet. It also contributes to the functional properties to food products. Along with starch, dietary fibers have their own importance because of their role in weight management and in maintaining digestive system activity. Dietary fibers profile of rye grain indicates the presence of arabinoxylan in major proportion followed by fructan, β-glucan and lignins (Kamal-Eldin, Learke, Knudsen, Lambi, Piironen, Adlercreutz, Katina, Poutanen, & Aman, 2009). Rye is the only crop after wheat which possess good amount of gluten proteins, thereby widely used by food industries throughout the world for the preparation of products like bread, biscuits, malt, flakes, beer etc. Scientific reports on

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Original Article | Published: 04 February 2021

Effect of selected physical and chemical modifications on physicochemical, pasting, and morphological properties of underutilized starch from rice bean (*Vigna umbellata*)

Yashika Thakur, Rahul Thory, Kawaljit Singh Sandhu, Maninder Kaur, Archana Sinhmar ✉ & Ashok Kumar Pathera

Journal of Food Science and Technology **58**, 4785–4794 (2021) | Cite this article

165 Accesses | **1** Citations | Metrics

Abstract

Starch was extracted from the rice bean which is largely underutilized and modified by physical (i.e. heat moisture treatment and retrogradation) and chemical (i.e. esterification and acid alcohol modification) methods. Both, physical and chemical modifications significantly ($p < 0.05$) affected the physicochemical, pasting, particle size and morphological properties of

S. No. 44

coatings

MDPI

Article

Effect of Cross-Linking Modification on Structural and Film-Forming Characteristics of Pearl Millet (*Pennisetum glaucum* L.) Starch

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Citation: Siroha, A.K.; Bangar, S.P.; Sandhu, K.S.; Trif, M.; Kumar, M.; Guleria, P. Effect of Cross-Linking Modification on Structural and Film-Forming Characteristics of Pearl Millet (*Pennisetum glaucum* L.) Starch.

Abstract: Pearl millet starch was modified using epichlorohydrin (EPI) at different concentrations (0.1%; 0.3%; 0.5%; and 0.8%) and evaluated for physicochemical, rheological, in vitro digestibility, and film-forming characteristics. The degree of cross-linking was observed at higher levels (0.5% and 0.8%) of EPI. Upon cross-linking, breakdown and setback viscosity reduced whereas pasting temperature was increased. Storage modulus (G′) and loss modulus (G″) value of cross-linked (CL) starches ranged between 2877 to 5744 Pa and 168 to 237 Pa, respectively, during the frequency sweep test. A drastic decrease was observed for steady shear (yield stress and consistency index) characteristics of CL starches. Resistant starch (RS) content was increased after starch modification, which imparts its nutritional values and starch modified at 0.8% had the highest RS content. Modifications of

S. No. 45

coatings

MDPI

Article

Proso-Millet-Starch-Based Edible Films: An Innovative Approach for Food Industries

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Abstract: The present investigation searches for functional and antioxidant properties in proso millet starch and films. Proso millet starch was studied for its physical, chemical, morphological, and antioxidant properties. Furthermore, films were prepared from proso millet starch (native) and a starch–k-carrageenan blend. Both films were characterized for moisture content, thickness, water-solubility, opacity, water vapor permeability, and textural and antioxidant properties. The amylose content, water absorption capacity, swelling, and solubility power of the proso millet starch were 19.19%, 87.5%, 15.32%, and 19%, respectively. Compared to aqueous extracts (0.68 mg GAE/g and 0.36 mg AAE/g), the total phenolics and total antioxidant capacity were observed to be higher in methanolic starch extracts (0.75 mg GAE/g and 0.41 mg AAE/g). Methanol extracts of native starch-based films showed higher antioxidant activity than the film prepared using a k-carrageenan blend. The water vapor permeability and solubility of films prepared from native starch (2.38 g/Pa·s·m^2 and 28%) were lower than those prepared using the k-carrageenan blend (3.19 g/Pa·s·m^2 and 42.05%). The findings may be of commercial interest to pharmaceutical and food industries in producing new antioxidant-rich drugs and food products.

Keywords: proso millet starch; k-carrageenan; antioxidant properties; film; phenolics

Citation: Punia Bangar, S.; Sandhu, K.S.; Rusu, A.V.; Kaur, P.; Purewal, S.S.; Kaur, M.; Kaur, N.; Trif, M. Proso-Millet-Starch-Based Edible Films: An Innovative Approach for Food Industries. *Coatings* **2021**, *11*, 1167. https://doi.org/10.3390/coatings11101167

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foods

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Review

Functionality and Applicability of Starch-Based Films: An Eco-Friendly Approach

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Abstract: The accumulation of high amounts of petro-based plastics is a growing environmental devastation issue, leading to the urgent need to innovate eco-safe packaging materials at an equivalent cost to save the environment. Among different substitutes, starch-based types and their blends with biopolymers are considered an innovative and smart material alternative for petrol-based polymers because of their abundance, low cost, biodegradability, high biocompatibility, and better-quality film-forming and improved mechanical characteristics. Furthermore, starch is a valuable, sustainable food packaging material. The rising and growing importance of designing starch-based films from various sources for sustainable food packaging purposes is ongoing research. Research on "starch

Citation: Bangar, S.P.; Purewal, S.S.; Trif, M.; Maqsood, S.; Kumar, M.; Manjunatha, V.; Rusu, A.V. Functionality and Applicability of Starch-Based Films: An Eco-Friendly

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Rheological, thermal, and structural properties of high-pressure treated Litchi (*Litchi chinensis*) kernel starch

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ABSTRACT

Starch isolated from litchi kernel was subjected to high-pressure (HP) treatment at selected pressures (300, 450 and 600 MPa) for 10 min, and evaluated for its rheological, morphological, thermal and structural properties. The amylose content of native litchi kernel starch (LKS) was 17.4%, which increased significantly upon pressurization. The temperature sweep test of the untreated starch sample resulted in the peak G′ and G″ values of 3417 and 283 Pa, respectively, and those values decreased after pressurization. Oscillatory rheological measurements showed the frequency dependency of tested starch pastes. Furthermore, the mechanical rigidity of the starch pastes improved with pressure treatment. Morphological studies revealed that starch granule structure remained intact after pressurization; however, pressure >450 MPa resulted in surface roughness and small cavities. HP treatment significantly influenced thermal properties of LKS, in particular at 450 and 600 MPa, where a significant drop in the transition temperatures and enthalpy values were recorded. The HP-treated starch samples exhibited distinct X-ray diffraction pattern of native LKS i.e. the blend of A- and B-type allomorphs with a predominating A-type crystalline structure. Upon pressure treatment, the disappearance of 2θ peak at 5.6° and significant changes in peak intensities confirmed the structural change in the starch matrix.

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ORIGINAL ARTICLE

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Fermented barley bran: An improvement in phenolic compounds and antioxidant properties

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Abstract

Barley bran (BB), a by-product of the milling process, is rich source of bioactive compounds that have potential nutraceutical effect. Solid substrate fermentation (SSF) of BB was performed for 7 days *Aspergillus oryzae* (MTCC 3107). Soluble free phenolic compounds were extracted from nonfermented (NFBB) and fermented barley bran (FBB). SSF improved the bioactive compounds of BB as indicated by enhanced TPC (from 1.23 to 14.32 mg GAE/g). An increase in bioactive compounds significantly enhanced the antioxidant potential of BB. Further, more bioactive compounds in FBB than NFBB counterparts were confirmed using high-performance liquid chromatography (HPLC). NFBB showed ascorbic acid (20.44 µg/g), gallic acid (12.75 µg/g), and catechin (9.9 µg/g). FBB extract showed the presence of ascorbic acid (107.15 µg/g), gallic acid (405.5 µg/g), catechin (88.3 µg/g), vanillin (40.89 µg/g), and resorcinol (20.7 µg/g), respectively. The outcome of the present study may be helpful in designing BB-based functional food products with many health benefits

S. No. 49

Starch
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Research Article

Physicochemical and Rheological Properties of Cross-Linked Litchi Kernel Starch and Its Application in Development of Bio-Films

Vinita Sharma, Maninder Kaur, Kawaljit Singh Sandhu, Vikash Nain, Sandeep Janghu

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Abstract

In this study, starch from a non-conventional source, that is, litchi is extracted and cross-linked (CL) with varying concentrations (1%, 3%, and 5%) of sodium trimetaphosphate (STMP). The starches are characterized for their physicochemical, pasting, rheological, and thermal properties. Bio-films are also prepared from these starches and analyzed for selected barrier and mechanical properties. The results indicate that an increase in cross

com...

n a significant decrease in amylose content, swelling

S. No. 50

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Review

Rice Bran Oil: Emerging Trends in Extraction, Health Benefit, and Its Industrial Application

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Abstract: Rice bran oil (RBO) is unique among edible vegetable oils because of its unique fatty acid composition, phenolic compound (γ-oryzanol, ferulic acid) and vitamin E (tocopherol and tocotrienol). It has become a great choice of cooking oil because of its very high burning point, neutral taste and delicate flavour. Non-conventional methods of RBO extraction are more efficient and environmentally friendly than conventional extraction methods. Advances in RBO extraction using innovative extraction strategies like super/sub-critical CO_2, microwave-assisted, subcritical H_2O, enzyme-assisted aqueous and ultrasound-assisted aqueous extraction methods have proven to significantly improve the yields along with improved nutritional profile of RBO. The compositions and strategies for stabilization of RBO are well discussed. The constituents are present in the RBO contribute to antioxidative, anti-inflammatory, antimicrobial, anti-diabetic and anti-cancerous properties to RBO. This has helped RBO to become an important substrate for the application in food (cooking oil, milk product and meat product) and non-food industries (polymer, lubricant, biofuel, structural lipid and cosmetic). This review provided comprehensive information on RBO extraction methods, oil stabilization, existing applications and health benefits.

Key words: rice bran oil; extraction; functionalization; stabilization; food/non-food application; fatty acid

COMPUTATIONAL SCIENCES

S. No. 51

Multimedia Tools and Applications https://doi.org/10.1007/s11042-021-10646-0

2D object recognition: a comparative analysis of SIFT, SURF and ORB feature descriptors

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Abstract

Object recognition is a key research area in the field of image processing and computer vision, which recognizes the object in an image and provides a proper label. In the paper, three popular feature descriptor algorithms that are Scale Invariant Feature Transform (SIFT), Speeded Up Robust Feature (SURF) and Oriented Fast and Rotated BRIEF (ORB) are used for experimental work of an object recognition system. A comparison among these three descriptors is exhibited in the paper by determining them individually and with different combinations of these three methodologies. The amount of the features extracted using these feature extraction methods are further reduced using a feature selection (k-means clustering) and a dimensionality reduction method (Locality Preserv- ing Projection). Various classifiers i.e. K-Nearest Neighbor, Naïve Bayes, Decision Tree, and Random Forest are used to classify objects based on their similarity. The focus of this article is to present a study of the performance comparison among these three feature extraction methods, particularly when their combination derives in recognizing the object more efficiently. In this paper, the authors have presented a comparative analysis view among various feature descriptors algorithms and classification models for 2D object recognition. The Caltech-101 public dataset is considered in this article for experimental work. The experiment reveals that a hybridization of SIFT, SURF and ORB method with Random Forest classification model accomplishes the best results as compared to other state-of-the-art work. The comparative analysis has been presented in terms of recogni- tion accuracy, True Positive Rate (TPR), False Positive Rate (FPR), and Area Under Curve (AUC) parameters.

Keywords ORB · SIFT · SURF · K-means · LPP · PCA

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S. No. 52

Soft Computing
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METHODOLOGIES AND APPLICATION

AutoSSR: an efficient approach for automatic spontaneous speech recognition model for the Punjabi Language

Yogesh Kumar[1] · Navdeep Singh[2] · Munish Kumar[3] · Amitoj Singh[3]

Abstract

In this article, the authors have presented the design and development of automatic spontaneous speech recognition of the Punjabi language. To dimensions up to the natural speech recognizer, the very large vocabulary Punjabi text corpus has been taken from a Punjabi interview's speech corpus, presentations, etc. Afterward, the Punjabi text corpus has been cleaned by using the proposed corpus optimization algorithm. The proposed automatic spontaneous speech model has been trained with 13,218 of Punjabi words and more than 200 min of recorded speech. The research work also confirmed that the 2,073,456 unique in-word Punjabi tri-phoneme combinations present in the dictionary comprise of 131 phonemes. The performance of the proposed model has grown increasingly to 87.10% sentence-level accuracy for 2381 Punjabi trained sentences and word-level accuracy of 94.19% for 13,218 Punjabi words. Simultaneously, the word error rate has been reduced to 5.8% for 13,218 Punjabi words. The performance of the proposed system has also been tested by using other parameters such as overall likelihood per frame and convergence ratio on various iterations for different Gaussian mixtures.

Keywords Gaussian mixtures · MFCC · Recognition accuracy · Spontaneous speech · Acoustic model

1 Introduction

From human prehistory to the new media of the future, speech communication has been and will be the leading mode of human social bonding and information exchange. In addition to human communication, the human inclination for spoken language communication finds a replication in human–machine interaction as well. The area of automatic speech recognition (ASR) exploded in the last decades since people incline to be more and more occupied and look after hands-free and eyes-free alternative medium to devices. ASR is the process of taking a sound of dialogue as an input, recorded by a microphone, a phone, etc., and renovates it into transcription as close as likely to the

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FEMT: a computational approach for fog elimination using multiple thresholds

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Published online: 01 September 2020

Abstract

Refining visibility through haze removal from image becomes an inevitable chore and essential to recognize and track vehicles, traffic signal, and signs clearly under road safety. That can face a recurrent degradation under destitute climatic circumstances for instance fog, rain, cloud, and smog. To diminish this constraint, various methods were designed and implemented, but most were not capable of obtaining the improved quantitative outcomes. Therefore, a new algorithm Fog Elimination using Multiple Thresholds (FEMT) for single image haze eviction that meritoriously obtains the signif- icant results on both gray and colored over real and synthetic images using multiple thresholds is proposed in this paper. The proposed method targets on the light regions by reducing the brightness and increasing the contrast of image at different levels. Finally, by grouping all the obtained resultant images leads to the generation of the resultant defogged image. The qualitative and quantitative analysis is carried out for an assessment of digitalized de-hazed images acquired from the proposed algorithm and compared to the prior techniques. Simulated fallouts entitle high resemblance to the corresponding ground truth, reduction in computation time consumption to 88% and error of 98%. The proposed approach can be applied in the field of robotics, human activity monitoring, smart systems, and digital investigation on the hazy images.

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Keywords Fog Removal · Multiple Thresholds · Image Enhancement · Visibility Restoration

1 Introduction

Poor weather sources from the major atmospheric components (such as fog/haze, rain, cloud and smog) turns a diminution in visibility and color distortion in the scenes [11]. Degradation in scene visibility is primary cause of accidents all over the globe. When light approaching

S. No. 54

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AutoFER: PCA and PSO based automatic facialemotion recognition

Malika Arora [1] · Munish Kumar [1]

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Abstract

Automatic emotion recognition is a critical part of human-machine interactions. Reflec- tion of emotions and to develop its understanding is crucial to provide dealings across human beings and machine frameworks. This work determines an automatic system that distinguishes different emotions connoted on the face. The framework is deliberated to apply the hybridization of feature extraction and optimization using PCA and PSO, respectively, to accomplish a high precision rate. PCA is used to get high-quality feature vectors for each category of emotion. Swarm intelligence, optimization is applied to get an optimized feature vector which is essential for classifying the features in the testing phase. For exploratory work, the authors have considered the Japanese Female Facial Expression (JAFFE) dataset. A maximum classification rate of 94.97% is achieved with the proposed technique. The proposed framework execution is assessed in terms of the false rejection rate, false acceptance rate, and accuracy.

Keywords Emotion recognition · Gradient · PCA · PSO · Human-computer interaction

1 Introduction

Communication between individuals incorporate not just spoken language, but also some signs of non-verbal communication as well, for example, hand movement, facial expressions, and voice tone, that indicates feelings and provides feedback. If computers could interpret these emotional sources, they could give specific and suitable help to clients in ways that are more tuned in to the user's needs and inclinations. The interaction between human beings and

Significance of the Work A framework proposed in this article will be helpful for the automatic facial emotion recognition system based on facial expression. A hybridization of feature extraction and optimization using PCA and PSO has been employed in this work to achieve acceptable recognition results.

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S. No. 55

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On the recognition of offline handwritten word using holistic approach and AdaBoost methodology

Harmandeep Kaur [1] · Munish Kumar [1]

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Published online: 4 January 2021

Abstract

Offline handwritten word recognition assumes an imperative part in the domain of document analysis and recognition. This article describes a technique for the recognition of offline handwritten Gurumukhi words. The proposed system uses a holistic approach to recognize a word, where a word itself is considered as an individual item. Thus, the word is recognized without considering any explicit segmentation. A set of features, i.e. zoning features, diagonal features, intersection & open-end point features is considered to extract the desirable characteristics from the word images. The classification techniques like k-Nearest Neighbor (k-NN), Support Vector Machine (SVM) and Random forest classifiers are employed for the recognition purpose. To boost the system performance, majority voting scheme of all the considered classifiers and an ensemble algorithm i.e. AdaBoost(Adaptive Boosting) algorithm are used. This system is evaluated on the database com-prising 1,00,000 samples of 100 different city names handwritten in Gurumukhi script. Maximum recognition accuracy of 88.78% has been achieved using AdaBoost method-ology and the attained results are comparable with state-of-the-art results.

Keywords Handwritten word recognition · Feature extraction · Classification · AdaBoost · Holistic approach

1 Introduction

As the generation is moving in the direction of the digitized world, it is essential to acquire thechanges in the real-life problems. Without digitization, readers face the problem to store the

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S. No. 56

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Face detection in still images under occlusion and non-uniform illumination

Ashu Kumar [1] · Munish Kumar [2] · Amandeep Kaur[3]

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Published online: 26 January 2021

Abstract

Face detection is important part of face recognition system. In face recognition, face detection is taken not so seriously. Face detection is taken for granted; primarily focus is on face recognition. Also, many challenges associated with face detection, increases the value of TN (True Negative). A lot of work has been done in field of face recognition. But in field of face detection, especially with problems of face occlusion and non-uniform illumination, not so much work has been done. It directly affects the efficiency of applications linked with face detection, example face recognition, surveillance, etc. So, these reasons motivate us to do research in field of face detection, especially with problems of face occlusion and non-uniform illumination. The main objective of this article is to detect face in still image. Experimental work has been conducted on images having problem of face occlusion and non-uniform illumination. Experimental images have been taken from public dataset AR face dataset and Color FERET dataset. One manual dataset has also been created for experimental purpose. The images in this manual dataset have been taken from the internet. This involves making the machine intelligent enough to acquire the human perception and knowledge to detect, localize and recognize the face in an arbitrary image with the same ease as humans do it. This article proposes an efficient technique for face detection from still images under occlusion and non-uniform illumination. The authors have presented a face detection technique using a combination of YCbCr, HSV and L × a × b color model. The proposed technique improved results in terms of Accuracy, Detection Rate, False Detection Rate and Precision. This technique can be useful in the surveillance and security related applications.

Keywords Face detection · Occlusion · Human computer interaction · Illumination

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S. No. 57

Soft Computing https://doi.org/10.1007/s00500-021-05586-8

FOCUS

Detection of shilling attack in recommender system for YouTube video statistics using machine learning techniques

Shalli Rani[1] · Manpreet Kaur[1] · Munish Kumar[2] · Vinayakumar Ravi[3] · Uttam Ghosh[4] · Jnyana Ranjan Mohanty[5]

Abstract

Literature survey shows that the recommendation systems have been largely adapted and evaluated in various domains. Due to low performances from various cyber attacks, the adoption of recommender system is in the initial stage of defense systems. One of the most common attacks for recommender system is shilling attack. There are some existing techniques for identifying the shilling attacks built in the user ratings patterns. The performance of ratings on target items differs between the attack user profiles and actual user profiles. To differentiate the certain profiles, the affected profiles are known as attack profiles. Besides the shilling attacks, real cyber attacks are taking place in the community which are being solved by Petri Net methods. These attacks can be falsely predicted (shilling attacks) by the users which can raise security threats. For identifying various shilling attacks without a priori knowledge, Recommendation System suffers from low accuracy. Basically, recommendation attack is split into nuke and push attack that encourage and discourage the recommended target item. The strength of shilling attack is usually measured by filler size and attack size. An experiment over unsupervised machine learning algorithms with filler size 3% over 3%, 5%, 8% and 10% attack sizes is presented for Netflix dataset. Furthermore, we conducted an experiment on data of 26 K videos on the Trending YouTube Video Statistics, to predict the user preferences for a particular genre of videos using Machine Learning Algorithms. Based on the results, it observed that the Boosted Decision tree performs the best with an accuracy of 99 percent.

Keywords Recommender system · Shilling attack · Collaborative filtering · YouTube video statistics · Machine learning · Cyber attacks · Security threats · Defense systems · Soft computing

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S. No. 58

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Hybrid local phase quantization and grey wolf optimization based SVM for finger vein recognition

Kanika Kapoor [1] · Shalli Rani [2] · Munish Kumar [3] · Vinay Chopra [1] · Gubinder Singh Brar [4]

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Abstract

As a novelist and the most secure biometric method, finger vein recognition has gained substantial significance and various pertinent researches have been reported in literature. However, it is difficult to extract a more reliable and accurate finger vein pattern due to the random noise, poor lighting, illumination variation, image deformation and blur. Furthermore, improper parameter settings of SVMs lead to poor classification accuracy and apparently, not much relevant research has been conducted on its optimal parameter setting. To alleviate these problems, this paper proposes an efficient finger vein recogni-tion framework consisting of the hybrid Local Phase Quantization (LPQ) for robust feature extraction and Grey Wolf Optimization based SVM (GWO-SVM) to compute the best parameter combination of SVM for optimal results of binary classification. Finger vein features are first extracted by integrating LPQ, which is invariant to motion blur and deformation, with Local Directional Pattern (LDP), which is robust to random noise and illumination variation, to augment the recognition performance and reduce the computational time. Then, GWO-SVM is used for classification in order to maximize the classification accuracy by determining the optimal SVM parameters. The extensive experimental results indicate remarkable performance and significant enhancements in terms of recognition accuracy by the proposed framework compared to the existing techniques and prove the effectiveness of the proposed framework on four tested fingervein datasets. It has outperformed the typical SVM approach and kNCN-SRC two-stage methodology via achieving the recognition accuracy of 98% and equal error rate as low as 0.1020%.

Keywords Biometric · Finger vein · Support vector machines (SVM) · Local directional pattern (LDP) · Local phase quantization (LQP) · Grey wolf optimization (GWO)

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METHODOLOGIES AND APPLICATION

Recognition of online handwritten Gurmukhi characters using recurrent neural network classifier

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Abstract
Handwriting recognition is one of the challenging tasks in the area of pattern recognition and machine learning. This paper presents the recognition of Online handwritten basic characters of Gurmukhi, an Indian script used by more than 100 mil- lion individuals. There are 41 basic characters (i.e., *Consonants*) in Gurmukhi and we have used a primary dataset of 52,570 Gurmukhi words, written by 175 different individuals. A total of 81 stroke-classes have been identified to repre- sent the 41 basic characters. The handwritten data is stored and annotated at stroke-level. In order to train the classifier, we have taken 150–170 average samples of each identified stroke-class. After performing the training/testing experiments, an accuracy of 98.67% has been achieved for stroke classification using RNN classifier and 90.93% obtained as testing accuracy.

Keywords Online handwriting recognition Gurmukhi script Strokes classification Recurrent neural network Post-processing

1 Introduction

Research in the area of online handwriting recognition systems has become more prevalent due to the rapid advance- ments in the Information Technology sector. In the online handwriting recognition environment, the handwritten sam- ple is being captured using the smart devices such as PDA, Tablet-PC, digitizer, and touch-based mobile. Online handwriting recognition (OHR) involves the transformation

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Gait recognition based on vision systems: A systematic survey

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ABSTRACT

With the growing popularity of biometrics technology in the pattern recognition field, especially identification of human has gained the attention of researchers from both academia and industry. One such type of biometric technique is Gait recognition, which is used to identify a human being based on their walking style. Generally, two types of approaches are adopted by any algorithm designed for gait recognition, namely model based and model free approaches. The key reason behind the popularity of gait recognition is that it can identify a person from a considerable distance while other biometrics has failed to do so. In this paper, the authors have conducted a survey of extant studies on gait recognition in consideration of gait recognition approaches and phases of a gait cycle. Moreover, some aspects like floor sensors, accelerometer based recognition, the influences of environmental factors, which are ignored by exiting surveys, are also covered in our survey study. The information of gait is usually obtained from different parts of silhouettes. This paper also describes different benchmark datasets for gait recognition. This study will provide firsthand knowledge to the researchers working on the gait recognition domain in any real-world field. It has been observed that work done on the gait recognition with sufficiently high accuracy is limited in comparison to research on various other biometric recognition systems and has enough potential for future research.

1. Introduction

The technology of biometric recognition is getting an immense popularity from both academia and industry as it is used to verify the identity of a person using human behavioral characteristics. There are numerous methods of identification out of which some popular ones are iris scan, face recognition, voice recognition, and so on. However, all these methods have one common deficiency that they can only recognize a human being from a short distance margin. But the results obtained by a gait recognition technology shown that it is better than its counterparts while recognizing a human from a considerably long distance. Gait recognition is a process to identify a person using his/her walking style. Different individuals have different gait cycle or walking cycle. It can provide an efficient security infrastructure such as in airports, railway stations shopping malls, and so on [41]. Basically, the gait cycle is a quantification of the time period between two successive hitting by the same foot of an individual. In the case of a normal person, walking happens simultaneously, i.e., it happens smoothly without losing the balance, but this simple walking involves many complex events.

Normally, any Gait cycle can be segregated into two separate phases as per research studies conducted by different researchers (Fig. 1). The first phase is the stance phase, which accounts for the period for which the foot of an individual is in contact with the ground from any aspect. In contrast to this, the swing phase accounts for the period for which the leg is in the air, i.e., no contact between the foot and floor. In the swing phase, the moment of leg swing is in the forward direction and this phase starts immediately after the completion of the stance phase.

A stance phase of a person's walking style can be further segregated into five more parts:

- Heel strike: Heel is striking the floor.
- Foot Flat: The posture in which a foot and ground is in complete contact.
- Mid-Stance: It is just the mid of the stance phase.
- Heel Off: It is a component when the heel is leaving the ground.
- Toe Off: It is a component when the toe leaves the ground.

Similarly, to the stance phase, the swing phase is also further

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2D object recognition: a comparative analysis of SIFT, SURF and ORB feature descriptors

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Abstract

Object recognition is a key research area in the field of image processing and computervision, which recognizes the object in an image and provides a proper label. In the paper,three popular feature descriptor algorithms that are Scale Invariant Feature Transform (SIFT), Speeded Up Robust Feature (SURF) and Oriented Fast and Rotated BRIEF (ORB) are used for experimental work of an object recognition system. A comparisonamong these three descriptors is exhibited in the paper by determining them individually and with different combinations of these three methodologies. The amount of the features extracted using these feature extraction methods are further reduced using a feature selection (k-means clustering) and a dimensionality reduction method (Locality Preserv- ing Projection). Various classifiers i.e. K-Nearest Neighbor, Naïve Bayes, Decision Tree, and Random Forest are used to classify objects based on their similarity. The focus of this article is to present a study of the performance comparison among these three feature extraction methods, particularly when their combination derives in recognizing the object more efficiently. In this paper, the authors have presented a comparative analysis view among various feature descriptors algorithms and classification models for 2D object recognition. The Caltech-101 public dataset is considered in this article for experimentalwork. The experiment reveals that a hybridization of SIFT, SURF and ORB method withRandom Forest classification model accomplishes the best results as compared to otherstate-of-the-art work. The comparative analysis has been presented in terms of recogni-tion accuracy, True Positive Rate (TPR), False Positive Rate (FPR), and Area Under Curve (AUC) parameters.

Keywords ORB · SIFT · SURF · K-means · LPP · PCA
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An efficient method of multicolor detection using global optimum thresholding for image analysis

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Abstract
Image segmentation is a key step in the image analysis, pattern recognition, low-level vision, medical data analysis, objects tracking, recognition task and grasping of things from the field of robotics. Being a problematic and demanding chore in image processing, it governs the eminence of absolute outcomes of image analysis. The method aims to improve color detection using formulations in RGB arrays. First targeted color is selected and identified the desired color location by sliding window techniques. Then threshold has been calculated using the summation of within and between the class variance of the selected color. Proposed method overcomes the limitation of complex, the dearth incorrectness, and steadiness of conventional multilevel thresholding for image segmentation. This work is tested on a different kind of images such as two-dimensional images, low-quality images, complex images, blur images, and medical images. The simulated results designate the maximum accuracy and minimum computational time over other methods.

Keywords Multi color detection · RGB color space · Optimum thresholding · Efficiency · Computational time · Image segmentation

1 Introduction

To identify the variety of colors, present in the scene, color-based image segmentation became an essential step. Image segmentation is an essential stepping stone for extraction of key image features which helps in various pattern recognition and object detection activities. An issue arises in image segmentation involves the division of a given image in different regions in such a way, that each region remains homogenous but not the two adjacent ones. Color has been maintained as an intuitive feature, so that it is easier to utilize an effective representation through it. Thus, color similarity can be established by evaluating the homogeneity creation

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REVIEW ARTICLE

A Systematic Review on Physiological-Based Biometric Recognition Systems: Current and Future Trends

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Abstract

Biometric deals with the verification and identification of a person based on behavioural and physiological traits. This article presents recent advances in physiological-based biometric multimodalities, where we focused on finger vein, palm vein, fin- gerprint, face, lips, iris, and retina-based processing methods. The authors also evaluated the architecture, operational mode, and performance metrics of biometric technology. In this article, the authors summarize and study various traditional and deep learning-based physiological-based biometric modalities. An extensive review of biometric steps of multiple modalities by using different levels such as preprocessing, feature extraction, and classification, are presented in detail. Challenges and future trends of existing conventional and deep learning approaches are explained in detail to help the researcher. Moreover, traditional and deep learning methods of various physiological-based biometric systems are roughly analyzed to evalu- ate them. The comparison result and discussion section of this article indicate that there is still a need to develop a robust physiological-based method to advance and improve the performance of the biometric system.

1 Introduction

Person identification system relies on knowledge-based (What he knows?) method and token-based (What he pos- sess?) way to deal with perceive the people. In knowledge- based and token-based methods, an individual needs to recall the secret password (secret text) or keep the cards or both passwords and cards to authenticate his or her identity [69]. Both of these schemes are not secured, reliable and not user-friendly because passwords or ID cards can be eas-ily forgotten/lost, guessed or shared. In those techniques, a user can conceal his or her original identity by providing duplicate identification records. Besides, these identification techniques were not offered any evidence at the crime scene for the identification of the suspect person. Therefore, token- based and knowledge-based methods are not adequate for stable identity management. Due to the drawbacks of knowl- edge and possession-based approaches, a rapid increase in the electronically linked user community, there is a need for accurate, simple, convenient user identification by automatic means for Human–Computer Interaction (HCI) approaches [149]. By computer algorithms, modeling the behavioural

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S. No. 64

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Face mask detection using YOLOv3 and faster R-CNN models: COVID-19 environment

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Abstract

There are many solutions to prevent the spread of the COVID-19 virus and one of the most effective solutions is wearing a face mask. Almost everyone is wearing face masks at all times in public places during the coronavirus pandemic. This encourages us to explore face mask detection technology to monitor people wearing masks in public places. Most recent and advanced face mask detection approaches are designed using deep learning. In this article, two state-of-the-art object detection models, namely, YOLOv3 and faster R-CNN are used to achieve this task. The authors have trained both the models on a dataset that consists of images of people of two categories that are with and without face masks. This work proposes a technique that will draw bounding boxes (red or green) around the faces of people, based on whether a person is wearing a mask or not, and keeps the record of the ratio of people wearing face masks on the daily basis. The authors have also compared the performance of both the models i.e., their precision rate and inference time.

Keywords COVID-19 · YOLO v3 · Faster R-CNN · Face mask detection · Deep learning

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DeepNetDevanagari: a deep learning model for Devanagari ancient character recognition

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Abstract

Devanagari script is the most widely used script in India and other Asian countries. There is a rich collection of ancient Devanagari manuscripts, which is a wealth of knowledge. To make these manuscripts available to people, efforts are being done to digitize these documents. Optical Character Recognition (OCR) plays an important role in recognizing these documents. Convolutional Neural Network (CNN) is a powerful model that is giving very promising results in the field of character recognition, pattern recognition etc. CNN has never been used for the recognition of the Devanagari ancient manuscripts. Our aim in the proposed work is to use the power of CNN for extracting the wealth of knowledge from Devanagari handwritten ancient manuscripts. In addition, we aim is to experiment with various design options like number of layes, stride size, number of filters, kenel size and different functions in various layers and to select the best of these. In this paper, the authors have proposed to use deep learning model as a feature extractor as well as a classifier for the recognition of 33 classes of basic characters of Devanagari ancient manuscripts. A dataset containing 5484 characters has been used for the exper-imental work. Various experiments show that the accuracy achieved using CNN as a feature extractor is better than other state-of-the-art techniques. The recognition accuracy of 93.73% has been achieved by using the model proposed in this paper for Devanagari ancient character recognition.

Keywords Devanagari handwritten character dataset · Devanagari ancient · Deep learning · Deep convolutional neural network · Optical character recognition

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ORIGINAL ARTICLE

2D-human face recognition using SIFT and SURF descriptors of face feature regions

Surbhi Gupta[1] · Kutub Thakur[2] · Munish Kumar[3]

Abstract

Face recognition is the process of identifying people through facial images. It has become vital for security and surveillance applications and required everywhere including institutions, organizations, offices, and social places. There are a number of challenges faced in face recognition which includes face pose, age, gender, illumination, and other variable condition. Another challenge is that the database size for these applications is usually small. So, training and recognition become difficult. Face recognition methods can be divided into two major categories, appearance-based method and feature-based method. In this paper, the authors have presented the feature-based method for 2D face images. speeded up robust features (SURF) and scale- invariant feature transform (SIFT) are used for feature extraction. Five public datasets, namely Yale2B, Face 94, M2VTS, ORL, and FERET, are used for experimental work. Various combinations of SIFT and SURF features with two classification techniques, namely decision tree and random forest, have experimented in this work. A maximum recognition accuracy of 99.7% has been reported by the authors with a combination of SIFT (64-components) and SURF (32-components).

Keywords Face recognition · SURF · SIFT · Decision tree · Random forest

1 Introduction

Face is a very important human trait. It is the most significant biological trait which differentiates one person from others. Whenever we want to authorize someone manually, we sim-ply recognize the face and authorize it. When an intelligent system/machine mimics this human behavior, it is known as face detection. Face recognition is a science of recogniz-ing the human face from a number of images/database. It is a very significant area of research as it has wide applica- tions in various domains. There are enormous applications of face recognition. Major applications include the authentica-tion of users for various applications and devices. It includesunlocking of laptops, mobiles, and other software-based sys-

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ORIGINAL PAPER

2D Object Recognition Techniques: State-of-the-Art Work

Monika Bansal[1] · Munish Kumar[2] · Manish Kumar[3]

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Abstract

Object recognition is one of the research area in the field of computer vision and image processing because of its varied applications in surveillance and security systems, biometrics, intelligent vehicle system, content based image retrieval, etc. Many researchers have already done a lot of work in this area, but still there are many issues like scale, rotation, illumination, viewpoint, occlusion, background clutter among many more that draw the attention of the researchers. Object recognition is the task of recognizing the object and labeling the object in an image. The main goal of this survey is to present a comprehen- sive study in the field of 2D object recognition. An object is recognized by extracting the features of object like color of the object, texture of the object or shape or some other features. Then based on these features, objects are classified into various classes and each class is assigned a name. In this paper, various feature extraction techniques and classification algorithms are discussed which are required for object recognition. As the deep learning has made a tremendous improvement in object recognition process, so the paper also presents the recognition results achieved with various deep learning methods. The survey also includes the applications of object recognition system and various challenges faced while recognizing the object. Pros and cons of feature extraction and classification algorithms are also discussed which may help other researchers during their initial period of study. In this survey, the authors have also reported an analysis of various researches that describes the techniques used for object recognition with the accuracy achieved on particular image dataset. Finally, this paper ends with concluding notes and future directions. The aim of this study is to introduce the researchers about various techniques used for object recognition system.

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ORIGINAL PAPER

A Study on Source Device Attribution Using Still Images

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Abstract

Images are acquired and stored digitally these days. Image forensics is a science which is concerned with revealing the underlying facts about an image. The universal approaches provide a general strategy to perform image forensics irre- spective of the type of manipulation. Identification of acquisition device is one of the significant universal approach. This review paper aims at analyzing the different types of device identification approaches. All research papers aiming camera and mobile detection using image analysis were acquired and then finally 60 most suitable papers were included. Out of these, 32 states of art papers were critically analyzed and compared. As every research starts with the literature review such analysis is significant. This is the first attempt for source camera and source mobile detection evaluation as per the authors knowledge. The authors have concluded that the Accuracy rate of Lens Aberration based detection techniques deteriorates when the different source camera from same brand were under consideration. The performance of color filter array Based Detection techniques dropped when the post processing operation were used on images. These techniques were vulnerable to high compression rate for JPEG images.

1 Introduction to Image Forgeryand Forensics

An image is a grouping of pixels. These pixels are arranged in rows and column to depict an image in a 2-dimensional structure. Each pixel has some area and intensity value associated with it as exhibited in Fig. 1. Intensity values at respective areas constitute an image. An image processing operation will result in the modification of intensity value ofpixels in an image. The amount of change in pixel intensity depends on the image processing procedure. For example,if the brightness of an image needs to be increased or con- trast needs to be enhanced; the intensity value of the pixels needs to be altered slightly. While if one object needs to be translated or rotated in the image, then the intensity values of the pixels need to be changed altogether. An image is characterized by its color depth and resolution. The color depth of an image is controlled by the quantity of bits (k) requiredto represent an image pixel. Generally, a pixel is representedby 24 bits; 8-bit for each Red, Green and Blue (R, G andB) plane, thus resulting in color depth of 2^{24} colors in the image. Another significant attribute of an image is its reso- lution. It is equivalent to the quantity of pixels present inan image. It is determined as the product of the number of rows (m) and number of columns (n) of pixels present in animage, i.e. 'm × n'. Resolution and color depth of an image has a direct impingement on the image size. The image sizeis determined as 'm × n × k'. The image size increases wheneither number of pixels, orthe color depth increases. A good quality image, having high resolution and high color depth, would have a larger image size as compared to a poor-qual-

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S. No 69

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ORIGINAL ARTICLE

Text and graphics segmentation of newspapers printed in Gurmukhi script: a hybrid approach

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

Abstract

Newspapers are always a standard medium to convey important information to masses of people in recent time as well asin old time. An automated system is required to convert information into a processable form so that information could be searchable. Many efforts have been done on Gurmukhi script documents in typed or written form, but very few articles are present on Gurmukhi script newspaper text recognition or text and image segmentation. Image/graphics segmentation of text is mandatory before feeding newspaper text to OCR for accurate results. In the literature, many techniques have been proposed for segmenting images and text, but many are complex in nature. In this article, the authors have proposed a very simple and effective hybrid approach based on run length smoothing algorithm and projection profile to segment an image from text in Gurmukhi script newspaper articles. Both horizontal and vertical run length smearing algorithm is used for labeling the regions. Logical AND operator is applied to resultant images to identify the text and image regions. To segmentthe image region among the labeled regions, projection profile technique is implemented. The combination of these two techniques has produced very good results.

Keywords Segmentation · Gurmukhi · RLSA · Projection profiles

1 Introduction

Newspapers contain information in various forms like text, images, maps, etc. Paper can get decay with the advent of timeand due to stains, spotting, etc. Digital copy of the news canpreserve very important information of some historical events. But only digital copy does not serve the purpose. However, to make the most benefit of the sharable information in the digital copy, the digital content must be searchable and rec-ognizable through an optical character recognition (OCR) system. Most of the optical character recognition systems perform recognition of text only; OCRs that could recognize mixture of text and graphics are in progress. Many OCRs aredeveloped worldwide at large scale to recognize the text of old newspapers. NDNP program made online the digitized version of newspapers of USA from 1836 to 1922 (http://www.loc.gov/ndnp/); a project was initiated by Marriott library in university of Uttah around 2001 to made available the US newspapers from 1982 (http://www.neh.gov/us-ne://wspaper-program). Newspapers from Canada, US, etc., have been madefreely available by Google Archive (https://news.google.com/newspapers/?hl=en); a program 'Trove' is running to provideaccess of 20 million Australian newspaper pages from 1803 tomid-twentieth (http://www.nla.gov.au/content/newspaper-digitisation-program). If we need to convert newspaper information into a computer understandable form, then it is necessary toanalyze the layout of the document so that we could segmenttext regions from non-text regions because text regions consist of the major part of the information. Page layout analysis is

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METHODOLOGIES AND APPLICATION

Offline handwritten Gurumukhi word recognition using eXtreme Gradient Boosting methodology

Harmandeep Kaur[1] · Munish Kumar[1]

Abstract

Handwritten word recognition is undoubtedly a challenging task due to various writing styles of individuals. So, lots of efforts are put to recognize handwritten words using efficient classifiers based on extracted features that rely on the visual appearance of the handwritten text. Due to numerous real-time applications, handwritten word recognition is an important research area which is seeking a lot of attention from researchers for the last 10 years. In this article, the authors have proposed a holistic approach and eXtreme Gradient Boosting (XGBoost) technique to recognize offline handwritten Gurumukhi words. In this direction, four state-of-the-art features like zoning, diagonal, intersection & open-end points and peak extent features have been considered to extract discriminant features from the handwritten word digital images. The proposed approach is evaluated on a public benchmark dataset of Gurumukhi script that comprises 40,000 samples of handwritten words. Based on extracted features, the words are classified into one of the 100 classes based on XGBoost technique. Effectiveness of the system is assessed based on several evaluation parameters like CPU elapsed time, accuracy, precision, recall, F1-score and area under curve (AUC). XGBoost technique attained the best results of accuracy (91.66%), recall (91.66%), precision (91.39%), F1-score (91.14%) and AUC (95.66%) using zoning features based on 90% data as the training set and remaining 10% data as the testing set. The comparison of the proposed approach with the existing approaches has also been done which reveals the significance of the XGBoost technique comparatively.

Keywords Handwritten word recognition · Feature extraction · Holistic approach · Gradient boosting · XGBoost

1 Introduction

Document image analysis and recognition is one of the significant progressions toward making society paperless. Handwritten word recognition is an emerging field in the domain of document analysis and recognition, which has been a subject of deep research over the past 10 years (Gader et al. 1996; Senior and Robinson 1998; Steinherz et al. 1999; El-Yacoubi et al. 1999; Plamondon and Srihari 2000; Arica and Yarman-Vural 2001; Koerich et al. 2003; Vinciarelli et al. 2004). Handwritten word recognition is the process to recognize handwritten words (which may be written using any natural language) by the machine. Words can be written using two modes, namely online mode and offline mode. In online mode, words are written using a penon a digital tablet where the pen tip directions are noted to recognize the written word, whereas in an offline mode, thehandwritten word samples are written on a sheet of paper using pen/pencil and then the paper sheet is fed to the scanner to get a digitized image of the document. For recognizing handwritten words, two approaches, namely segmentation-based approach and segmentation free approach, are considered. The segmentation-based approach is also known as analytical approach, which considers the word as a collection of individual characters. Thus, to recognize, initially the word is divided into its individual units (characters) and then the individual char- acters are recognized using recognition algorithms. Sometimes, there is existence of overlapping characters in a word which leads to an issue in its segmentation. This issue can be solved by the segmentation free approach to

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METHODOLOGIES AND APPLICATION

An efficient technique for object recognition using Shi-Tomasi corner detection algorithm

Monika Bansal[1] · Munish Kumar[2] · Manish Kumar[3] · Krishan Kumar[4]

Abstract

An efficient feature detection algorithm and image classification is a very crucial task in computer vision system. There are various state-of-the-art feature detectors and descriptors available for an object recognition task. In this paper, the authors have compared the performance of Shi-Tomasi corner detector with SIFT and SURF feature descriptors and evaluate the performance of Shi-Tomasi in combination with SIFT and SURF feature descriptors. To make the computations faster, authors have reduced the size of features computed in all cases by applying locality preserving projection methodology. Features extracted using these algorithms are further classified with various classifiers like K-NN, decision tree and randomforest. For experimental work, a public dataset, namely Caltech-101 image dataset, is considered in this paper. This datasetcomprises of 101 object classes. These classes have further contained many images. Using a combination of Shi-Tomasi, SIFT and SURF features, the authors have achieved a recognition accuracy of 85.9%, 80.8% and 74.8% with random forest, decision tree and K-NN classifier, respectively. In this paper, the authors have also computed true positive rate, falsepositive rate and area under curve in all cases. Finally, the authors have applied the adaptive boosting methodology to improve the recognition accuracy. Authors have reported improved recognition accuracy of 86.4% using adaptive boostingwith random forest classifier and a combination of Shi-Tomasi, SIFT and SURF features.

Keywords Decision tree · LPP · k-NN · Random forest · Shi-Tomasi · SIFT · SURF

1 Introduction

Nowadays, object recognition is a hot research area in the domain of image processing and computer vision where an object is recognized from an image. This system works just like a child learned in school. A child is trained in school by learning various shapes and object names. When he learned all objects, he can determine all similar objects that he has already learned. The machine must be fully trained with various machine learning algorithms by adding all the object names just like a child learn. The training process is done by storing all the features of similar objects in adatabase. Then, an input image is to be tested by matching the features of the input image with the stored featuredataset of the images. An efficient object recognition sys- tem will output the name of the object correctly and in less time. An object can have many features as texture, color, shape, etc. A database of these extracted features is maintained and matched with the features of the queryimage to recognize an object. In this paper, the authors have used a corner detection algorithm, i.e., Shi-Tomasi corner detector to identify the object in an image. Based on experimental work, authors have noticed that this algorithm alone is not enough to achieve efficient results in terms of accuracy. So, the authors further used SIFT and SURF feature descriptors with Shi-Tomasi corner detector in combination to improve the object recognition results.

Authors have depicted the individual results of all these three feature detectors and descriptors by using K-NN

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S. No 72

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DATA ANALYTICS AND MACHINE LEARNING

Improved recognition results of offline handwritten Gurumukhi characters using hybrid features and adaptive boosting

Munish Kumar[1] · M. K. Jindal[2] · R. K. Sharma[3] · Simpel Rani Jindal[4] · Harjeet Singh[5]

Accepted: 12 July 2021 / Published online: 25 July 2021

Abstract
Offline handwritten character recognition is a part of the arduous area of research in the domain of document analysis and recognition. In order to enhance the recognition results of offline handwritten Gurumukhi characters, the authors have applied hybrid features and adaptive boosting approach in this paper. On feature extraction stage, zoning, diagonal, centroid, and peak extent-based features have been taken into account for extracting the meaningful information about each character. On the classification stage, three classifiers, namely decision tree, random forest, and convolution neural network classifier, are used. For experimental work, the authors have collected 14,000 pre-segmented samples of Gurumukhi characters (35-class problem) written by 400 writers where they have used 70% data as training set and remaining 30% data as testing set. The authors have also explored fivefold cross-validation technique for experimental work. The AdaBoost approach along with the fivefold cross-validation strategy outstands the existing techniques in the relevant field with the recognition accuracy of 96.3%.

Keywords Character recognition · Classification · Decision tree · CNN · Random forest tree · Adaptive boosting

S. No 73

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APPLICATION OF SOFT COMPUTING

PCA-based gender classification system using hybridization of features and classification techniques

Shaveta Dargan[1] · Munish Kumar[1] · Shikha Tuteja[2]

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Abstract
Gender classification system is an automated, challenging, and efficacious system due to the analogous vision of males and females with handwriting. Gender classification is a binary problem that is based on physiological and behavioral biometric traits. It is widely used for forensic-based investigations, autopsy determination, suspected areas, and questioned documents. The proposed study has been considered for the behavioral biometric trait, i.e., handwriting in the Gurumukhi script. The novelty of this study can be seen from the three perspectives, i.e., hybridization of feature extraction techniques, principal component analysis (PCA) for dimensionality reduction, and hybridization of classification techniques. Zoning, Diagonal, Transition, and Peak Extent-based feature extractions were implemented followed by their hybridization. The classification techniques such as Decision Trees, Random Forest, and Extreme Gradient Boosting classifiers were experienced with the hybridized approach using a majority voting scheme. Also, the comparison and critical analysis of gender classification accuracy with CPU elapsed time has also been presented before and after implementing PCA. There are many novel ideas for the researchers such as gender classification through online handwriting, prediction of age, personality, state, nationality, and stress prediction through handwriting, and further gender classification problem can be enhanced to third or trans-gender too using handwriting as a biometric modality. The system can be implemented with many other Indic scripts and presenting novel track in the handwriting-based researches.

Keywords Handwriting recognition · Biometric · Feature extraction · Dimensionality reduction · Hybridization techniques

S. No 74

Soft Computing (2021) 25:9731–9763
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FOUNDATIONS

Machine learning and deep learning methods for intrusion detection systems: recent developments and challenges

Geeta Kocher[1] · Gulshan Kumar[2]

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Abstract
Deep learning (DL) is gaining significant prevalence in every field of study due to its domination in training large data sets. However, several applications are utilizing machine learning (ML) methods from the past several years and reported good performance. However, their limitations in terms of data complexity give rise to DL methods. Intrusion detection is one of the prominent areas in which researchers are extending DL methods. Even though several excellent surveys cover the growing body of research on this subject, the literature lacks a detailed comparison of ML methods such as ANN, SVM, fuzzy approach, swarm intelligence and evolutionary computation methods in intrusion detection, particularly on recent research. In this context, the present paper deals with the systematic review of ML methods and DL methods in intrusion detection. In addition to reviewing ML and DL methods, this paper also focuses on benchmark datasets, performance evaluation measures and various applications of DL methods for intrusion detection. The present paper summarizes the recent work, compares their experimental results for detecting network intrusions. Furthermore, current research challenges are identified for helping fellow researchers in the era of DL-based intrusion detection.

Keywords Intrusion detection system · Deep learning · Deep belief network · Recurrent neural network · Network intrusion detection system

S. No 75

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Intrusion detection techniques in network environment: a systematic review

Maruthi Rohit Ayyagari[1] · Nishtha Kesswani[2] · Munish Kumar[3] · Krishan Kumar[4]

Accepted: 17 December 2020 / Published online: 2 January 2021

Abstract
The entire world relates to some network capabilities in some way or the other. The data transmission on the network is getting more straightforward and quicker. An intrusion detection system helps distinguish unauthorized activities or intrusions that may settle the confidentiality, integrity, or availability of a resource. Nowadays, almost all institutions are using network-related facilities like schools, banks, offices, etc. Social media has become so popular that nearly every individual belongs to a new nation called 'Netizen.' Several approaches have been implemented to incorporate security features in network-related issues. However, vulnerable attacks are continuous, so intrusion detection systems have been proposed to secure computer systems and networks. Network security is a piece of the most fundamental issues in Computer Network Management. Moreover, an intrusion is considered to be the most revealed dangers to security. With the evolution of the networks, intrusion detection has emerged as a crucial field in networks' security. The main aim of this article is to deliver a systematic review of intrusion detection approaches and systems that are used in various network environments.

Keywords HIDS · NIDS · Network security · Intrusion detection

S. No 76

Multimedia Systems
https://doi.org/10.1007/s00530-021-00786-6

REGULAR PAPER

Music mood and human emotion recognition based on physiological signals: a systematic review

Vybhav Chaturvedi[1] · Arman Beer Kaur[1] · Vedansh Varshney[1] · Anupam Garg[1] · Gurpal Singh Chhabra[1] · Munish Kumar[2]

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Abstract

Scientists and researchers have tried to establish a bond between the emotions conveyed and the subsequent mood perceived in a person. Emotions play a major role in terms of our choices, preferences, and decision-making. Emotions appear whenever a person perceives a change in their surroundings or within their body. Since early times, a considerable amount of effort has been made in the field of emotion detection and mood estimation. Listening to music forms a major part of our daily life. The music we listen to, the emotions it induces, and the resulting mood are all interrelated in ways we are unbeknownst to, and our survey is entirely based on these two areas of research. Differing viewpoints on this issue have led to the proposal of different ways of emotion annotation, model training, and result visualization. This paper provides a detailed review of the methods proposed in music mood recognition. It also discusses the different sensors that have been utilized to acquire various physiological signals. This paper will focus upon the datasets created and reused, different classifiers employed to obtain results with higher accuracy, features extracted from the acquired signals, and music along with an attempt to determine the exact features and parameters that will help in improving the classification process. It will also investigate several techniques to detect emotions and the different music models used to assess the music mood. This review intends to answer the questions and research issues in identifying human emotions and music mood to provide a greater insight into this field

S. No 77

Archives of Computational Methods in Engineering
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SURVEY ARTICLE

A Systematic Survey on CAPTCHA Recognition: Types, Creation and Breaking Techniques

Mohinder Kumar[1] · M. K. Jindal[1] · Munish Kumar[2]

Received: 12 April 2021 / Accepted: 19 May 2021

Abstract

CAPTCHA stands for Completely Automated Public Turing Test to Tell Computers and Human Apart. CAPTCHA is used for internet security. A few CAPTCHA schemes are available today like, text-based, audio-based, video/animation-based, puzzle based etc. In this paper, all these types are collaborating at single place to analyze. The main aim of this article is to present a literature to identify and recognize CAPTCHA, its types, the creation and breaking techniques. It is a systematic and complete analysis of all available CAPTCHA types. In this paper, 16 text-based CAPTCHA's generation methods are discussed with usability and security ranges from 3 to 100 and 65 to 100%, respectively. The security and usability measures are not calculated/sustained using some known English schemes. Out of 16 reviewed CAPTCHAs, 12 are based on English language, 1 on Arabic language, 1 on Chinese language, 1 on Devanagari language and 1 on Gurumukhi script. The designs are made segment proof with overlapping random shapes, overlapping characters, clasping, different colors and different shades. For making recognition proof many techniques are used like image masking, local and global warping; broken characters, random rotation, arcs, jaws, etc. Approximately 50 schemes, especially based on the English language, are successfully broken with a success rate that ranges from 2 to 100%. The techniques that are used to break these schemes include shape context matching, distortion estimation, Log Gabor 2D filter, horizontal and vertical projection (for a segment the letters) are used. For recognition CNN, KNN, DNN and MCDNN are used. Almost 15 images based CAPTCHAs are

S. No 78

Journal of Ambient Intelligence and Humanized Computing
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ORIGINAL RESEARCH

Signature identification and verification techniques: state-of-the-art work

Harmandeep Kaur[1] · Munish Kumar[2]

Received: 23 October 2020 / Accepted: 22 June 2021

Abstract

Signature identification and verification are some of the biometric systems used for personal identification. Signatures can be considered as authentication of an individual by the analysis of handwriting style, subjected to inter-personal and intra-personal variations. This paper presents an extensive systematic overview of online and offline signature identification and verification techniques. In offline signature verification, surveys related to two approaches, namely, writer-dependent, and writer-independent approaches are presented. Moreover, the compiled study of feature extraction and classification techniques used for signature identification and verification process has also been incorporated. Several databases introduced in the literature are considered to evaluate different signature identification and verification techniques and corresponding results are reported in this article. The entire survey is further summarized in the form of a table for comparisons. In order to reveal the superiority of the present survey, the comparison of the present survey with the existing recent survey works has also been presented. Finally, future directions are provided for further research.

Keywords Signature identification · Signature verification · Handwritten signature · Biometric

S. No 79

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Research Article

A Survey of Load Balancing and Implementation of Clustering-Based Approach for Clouds

Author(s): Anju Sharma, Rohit Pandey, Simar P. Singh*, Rajesh Kumar

Journal Name: Recent Advances in Computer Science and Communications

Formerly Recent Patents on Computer Science

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Journal Home

S. No 80

Journal of Ambient Intelligence and Humanized Computing
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ORIGINAL RESEARCH

A comprehensive survey on machine translation for English, Hindi and Sanskrit languages

Sitender[1,2] · Seema Bawa[1] · Munish Kumar[3] · Sangeeta[2]

Received: 24 October 2020 / Accepted: 1 September 2021

Abstract
Transforming text from one language to another by using computer systems automatically or with little human interventions is known as Machine Translation System (MTS). Divergence among natural languages in a multilingual environment makes Machine Translation (MT) a difficult and challenging task. The purpose of this paper is to present a comprehensive survey of MTS in general and for English, Hindi and Sanskrit languages in particular. The state-of-the-art MT approach is Neural Machine Translation (NMT) which has been used by Google, Amazon, Facebook and Microsoft but it requires large corpus as well as high computing systems. The availability of MT language modeling tools, parsers data repositories and evaluation metrics has been tabulated in this article. The classification of MTS, evaluation methods and platforms has been done based on a well-defined set of criteria. The new research avenues have been explored in this survey article which will help in developing good quality MTS. Although several surveys have been done on MTS but none of them have followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach including tools and evaluation methods as done in this survey specifically for English, Hindi and Sanskrit languages.

Keywords Artificial intelligence · BLEU · Knowledge representation · Machine translation · NIST · Natural language processing · Systematic survey · Statistical machine translation

S. No 81

Journal of Ambient Intelligence and Humanized Computing
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ORIGINAL RESEARCH

Transfer learning for image classification using VGG19: Caltech-101 image data set

Monika Bansal[1] · Munish Kumar[2] · Monika Sachdeva[3] · Ajay Mittal[4]

Received: 7 April 2021 / Accepted: 31 August 2021

Abstract

Image classification is getting more attention in the area of computer vision. During the past few years, a lot of research has been done on image classification using classical machine learning and deep learning techniques. Presently, deep learning-based techniques have given stupendous results. The performance of a classification system depends on the quality of features extracted from an image. The better is the quality of extracted features, the more the accuracy will be. Although, numerous deep learning-based methods have shown enormous performance in image classification, still due to various challenges deep learning methods are not able to extract all the important information from the image. This results in a reduction in overall classification accuracy. The goal of the present research is to improve the image classification performance by combining the deep features extracted using popular deep convolutional neural network, VGG19, and various handcrafted feature extraction methods, i.e., SIFT, SURF, ORB, and Shi-Tomasi corner detector algorithm. Further, the extracted features from these methods are classified using various machine learning classification methods, i.e., Gaussian Naïve Bayes, Decision Tree, Random Forest, and eXtreme Gradient Boosting (XGBClassifier) classifier. The experiment is carried out on a benchmark dataset Caltech-101. The experimental results indicate that Random Forest using the combined features give 93.73% accuracy and outperforms other classifiers and methods proposed by other authors. The paper concludes that a single feature extractor whether shallow or deep is not enough to achieve satisfactory results. So, a combined approach using deep learning features and traditional handcrafted features is better for image classification.

S. No 82

Pattern Analysis and Applications
https://doi.org/10.1007/s10044-021-01031-6

INDUSTRIAL AND COMMERCIAL APPLICATION

LineSeg: line segmentation of scanned newspaper documents

Rupinder Pal Kaur[1] · M. K. Jindal[2] · Munish Kumar[3] · Simpel Rani Jindal[4] · Shikha Tuteja[5]

Received: 28 May 2021 / Accepted: 23 September 2021

Abstract
Segmentation is a significant stage for the recognition of old newspapers. Text-line extraction in the documents like newspaper pages which have very complex layouts poses a significant challenge. Old newspaper documents printed in Gurumukhi script present several forms of hurdles in segmentation due to noise, degradation, bleed-through of ink, multiple font styles and sizes, little space between neighboring text lines, overlapping of lines, etc. Because of the low quality and the complexity of these documents, automatic text line segmentation remains an open research field. Very few researches are available in the literature to segment news articles in Gurumukhi script. This is one of the first few attempts to recognize Gurumukhi newspaper text. The goal of this paper is to present a new methodology for text-line extraction by integrating median calculation and strip height calculation techniques. Non-suitability of existing techniques to segment newspaper text lines have also been discussed with results in the article. The efficiency of the proposed algorithm is demonstrated by experimentation directed on two diverse own made datasets: (a) on the data set of single-column documents with headlines block (b) on the dataset of multi-column documents with headlines block.

Keywords Newspaper segmentation · Line segmentation · Headline detection · Gurumukhi script

S. No 83

Multimedia Tools and Applications
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Prediction of the mortality rate and framework for remote monitoring of pregnant women based on IoT

Shalli Rani[1] · Munish Kumar[2]

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Published online: 07 April 2021

Abstract
To save the risk during the pregnancies in remote areas (where women cannot approach the doctors in the urban areas for proper check-ups), the authors have proposed an IoT based remote monitoring of pregnant ladies where the data is collected at the cloud server. Machine learning techniques will be applied on the trimesters' attributes to find out the reasons of mortality rate of the babies. The use of these advanced technologies in pregnant women care environment can absolutely eradicate the pregnancy complications and harmful incidents. An initial work towards this study is to assess mortality risk prediction in pregnant ladies using machine-learning algorithms for proper prediction and treatment on time. A dataset of 10,000 pregnant women is analysed in this study. Classification algorithms are used to check the death rate of new born babies based on the mother's age. The survival ratio is presented by applying the various algorithms. Two class SVM model is presented as the most accurate prediction model which outperformed over boosted decision tree, average perceptron, decision forest, locally deep SVM, Bayes

S. No 84

Archives of Computational Methods in Engineering
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ORIGINAL PAPER

Automatic Speech Recognition System for Tonal Languages: State-of-the-Art Survey

Jaspreet Kaur[1] · Amitoj Singh[1] · Virender Kadyan[2]

Received: 25 June 2019 / Accepted: 10 February 2020

Abstract

Natural language and human–machine interaction is a very much traversed as well as challenging research domain. However, the main objective is of getting the system that can communicate in well-organized manner with the human, regardless of operational environment. In this paper a systematic survey on Automatic Speech Recognition (ASR) for tonal languages spoken around the globe is carried out. The tonal languages of Asian, Indo-European and African continents are reviewed but the tonal languages of American and Austral-Asian are not reviewed. The most important part of this paper is to present the work done in the previous years on the ASR of Asian continent tonal languages like Chinese, Thai, Vietnamese, Mandarin, Mizo, Bodo and Indo-European continent tonal languages like Punjabi, Lithuanian, Swedish, Croatian and African continent tonal languages like Yoruba and Hausa. Finally, the synthesis analysis is explored based on the findings. Many issues and challenges related with tonal languages are discussed. It is observed that the lot of work have been done for the Asian continent tonal languages i.e. Chinese, Thai, Vietnamese, Mandarin but little work been reported for the Mizo, Bodo, Indo-European tonal languages like Punjabi, Latvian, Lithuanian as well for the African continental tonal languages i.e. Hausa and Yoruba.

S. No 85

Expert Systems with Applications
Volume 169, 1 May 2021, 114485

Theoretical and empirical analysis of filter ranking methods: Experimental study on benchmark DNA microarray data

Kushal Kanti Ghosh [a], Shemim Begum [b], Aritra Sardar [a], Sukdev Adhikary [a], Manosij Ghosh [a], Munish Kumar [c] ✉, Ram Sarkar [a]

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DEPARTMENT OF PHYSICS

S. No. 86

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Investigation of switching dynamics by fitting FGM and NLS models to PVA based $NaNO_2$-$CsNO_3$ composite transients

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ABSTRACT

Finite Grain Model (FGM) introduces the concept of grain boundaries lying adjacent to two or more grains in a given ferroelectric crystal. The grain boundaries obstruct the domain growth and hence domain size that may be expected on the basis of Infinite Grain Model. Under the effect of alternating voltage, domains alter their sizes regularly and polarities after specific time intervals that can be correlated with domain switching time. In domain switching studies, the research interest remains in estimation of microscopic parameters like nucleation rate, characteristic time, dimensionality, domain size etc. and besides that to know how the nucleation process progresses. FGM is a statistical model which is successfully used here for investigation of switching dynamics of PVA based $NaNO_2$-$CsNO_3$ mixed system composites optimized for ferroelectric response. This mixed system was formed with $CsNO_3$ mole percent x = 0.09 in optimized equal wt% $NaNO_2$-PVA ferroelectric composite. FGM assumes that nuclei cannot grow unrestrictedly in those ferroelectric thin films which are constituted by elementary regions containing only a few nucleation centers; the switching in one region does not necessarily lead to the switching in another neighbouring region. This is the underlying sense of Nucleation Limited Switching (NLS) model which assumes that switching is carried independently in different regions and it is accomplished in a time depending on the history of growth of that region. The NLS fit over whole range of switching times suggests that composite film can be considered an ensemble of elementary regions individually characterized by independent relaxation times.

1. Introduction

There are various models proposed by various research groups [1–5] to understand and explain the phenomenon of domain switching under external field in the ferroelectric samples. These models are useful to obtain microscopic information about domain structure in the form of intrinsic parameters like dimensionality, nucleation rate, domain growth rate; characteristic time etc. The nature of nucleation by which domains grow can also be explored. The domain switching models are based upon the pattern of nucleation and growth of a specific phase i.e. a state of polarization; these are developed by treating domain switching as a statistical process wherein the new nuclei formations take place under a natural statistical law. In this paper microscopic parameter estimation results are reported on the basis of investigations by fitting Finite Grain Model (FGM) and Nucleation Limited Switching Model (NLS) models on transients of PVA based $NaNO_2$-$CsNO_3$ mixed system composites optimized for ferroelectric response. The results based on direct estimation methods and based on IGM fitting on the same ferroelectric sample fabricated under optimized conditions have been reported in our previous publication [6,7].

2. Mathematical analysis of finite grain model (FGM) and nucleation limited switching (NLS) model

The mathematical analysis of Infinite Grain Model (IGM) is reported in one of our previous published research work [7]. The theories of Finite Grain Model (FGM) and Nucleation Limited

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Fitting IGM, FGM and NLS switching models to $NaNO_2$-PVA composite transients for its microscopic parameter estimation

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ABSTRACT

Domain switching process is a complex process and is not as simple in occurrence as appears from conceptual framework. Fortunately, the theories of nucleation and crystal growth successfully applied to switching domains help in understanding switching kinetics in ferroelectric samples. Direct methods of parameter estimation can provide only the local information of the target region while the 'universal integrating methods' provide domain kinetic parameters with their response proportional to the fraction of the phase grown at that time. Besides being statistical, the later is much simpler and popular in delivering more credible results. In this paper, an indirect estimation of significant microscopic parameters of optimized $NaNO_2$-PVA ferroelectric composites is made by fitting their current transients with IGM, FGM and NLS switching models The fitting of these models into the experimental switching transient helps (i) in finding dimensionality*n*, characteristic timet_o, nucleation rate R and domain size L and (ii) to identify whether a thin film can be considered to be an ensemble of a number of independent elementary regions switching their states independently with exponential distribution of their relaxation times. IGM model suggests that polarization switching proceeds through a continuous nucleation process. The results of FGM fitting the transients supports the points that with increase in signal-amplitude, new regions are nucleated leading to reduction of adjacent relative distance between the domains The excellent NLS fit over whole range of switching times suggests that composite film can be considered an ensemble of elementary regions individually characterized by independent relaxation times.

1. Introduction

Ferroelectric materials belong to an important class of dielectric materials from the point of view of their practical application in memory storage devices [1]. Their utility to act as a potential source of memory devices is attributed to their 'peculiar nature' which enables them to reverse their electric polarization state when an electric field of magnitude more than a threshold field is applied in a direction opposite to that of electric polarization [2]; it implies that the ferroelectric system is characterized by two energetically equivalent thermodynamically stable states. The two stable-states are marked by some energy barrier which hinders the ferroelectric system to switch 'on-its-own' from one state to another or vice-a-versa [3]. Actually, these two states brought-in by forward and reverse fields characterize positive and negative 'electric polarization states' respectively and act as a 'signature of the ferroelectric system' because they could be used to identify the system as well as to trigger the system to oscillate between these states. Under the influence of an alternating electric field, a ferroelectric system is constrained to switch continuously between these two states of electric polarization and further these states are characterized by some minima in their free energy. So, below curie temperatureT_c, the sample acquires ferroelectric phase; a ferroelectric domain in the absence of external electric field would be characterized by two 'energetically equivalent states' in the temperature range$T < T_c$ [4,5]. Under the influence of 'external electric field', the equally-probable, equally-stable

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Quantification of radon contamination in drinking water of Rajasthan, India

Amit Kumar Singla[1] · Sandeep Kansal[1] · Rohit Mehra[2]

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Abstract
The current investigation represents the annual effective dose received due to ingestion and inhalation of radon present in drinking water. As radon itself contributes 3–14% towards the total proportion of lung cancer (WHO in Handbook on indoor radon. A public health perspective, World Health Organization, Geneva, 2009). The samples were taken from Sri Ganganagar region of Rajasthan province in India to calculate radon concentration and thereby to study the health risk. Total 100 water samples were taken from different sources of water which have been classified into two different categories as underground water and surface water sources. In-situ measurements of Rn-222 concentration was carried out using scintillation based radon monitor. The values of Rn-222 concentration were found to lie between 0.13 ± 0.04 and 3.74 ± 0.26 BqL^{-1} with mean value of 0.92 ± 0.12 BqL^{-1}. These values are far below the maximum contamination level of 100 BqL^{-1}, recommended by WHO, 2004 (Guidelines for drinking-water quality, WHO, Geneva, 2004). The ingestion and inhalation doses have been calculated for infants, children and adults from the derived radon concentration. The calculated doses are below the recommended level of 100 μSvy^{-1} (World Health Organisation in Guidelines for drinking water quality. Health criteria and other information, WHO Press, Geneva, 2003).

Keywords Rn-222 · Groundwater · Risk-assessment · Scintillation detector · Radiation-dose

Introduction

Water, a basic component of life used for various purposes in daily life processes, can be contaminated due to diffusion of radioactive radon through rocks and soil. Presence of dissolved Rn-222 concentration in the natural water due to presence of U-238 in soil and rocks [4]. The exposure of alpha radiations emitted from unstable radon has significant ability to impose enough damage towards DNA of the cell if inhaled, which ultimately shows stochastic effect in the form of cancer [1]. UNSCEAR report reveals that radon and its progenies itself contributes towards more than 50% dose received by local population among all the natural occurring and artificial radiations and it possess adverse health risk effects [5–8]. On average people receive an estimate dose of 0.3 mSvy^{-1} due to ingestion of naturally occurring radionuclides such as U-238, Th-232, their daughter products and K-40 in their diet. But drinking water contributes approximately 0.01 mSv of this total dose [9]. Radon is a radioactive inert gas having three main isotopes namely Rn-219 (actinon) having a half-life of 3.96 s, Rn-220 (thoron) with a half-life of 55.6 s and Rn-222 (radon) having a half-life of 3.82 days are progeny of U-235, Th-232 and U-238 radioactive decay series, respectively. Out of these three isotopes, only Rn-222 is of utmost significance. Owing to a half-life of 3.82 days, Rn-222 accumulates in the indoor environment, thereby causing an increase in its concentration in indoor air [10]. Hence, is of major concern for study. Po-214 ($t_{1/2}$ = 160 μs) and Po-218 ($t_{1/2}$ = 3 minutes) are the daughter products of Rn-222 gas which put up 90% of the total radiation emitted due to radon gas [11, 12]. These progenies can remain for longer time in air and can be inhaled and trapped in the lungs and clings to the surface of epithelial tissues within the lung and decay shortly [13–16]. Radon and its progenies have a tendency to attach with aerosol presence in atmosphere, when inhaled for longer period causes pathological effects like changes in respiratory functions and lung

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S. No. 89

Dose distribution to individual tissues and organs due to exposure of alpha energies from radon and thoron to local population of Hanumangarh, Rajasthan, India

- Amit Kumar Singla,
- Sandeep Kansal &
- Rohit Mehra

Journal of Radioanalytical and Nuclear Chemistry **volume 327**, pages1073–1085(2021)Cite this article

Abstract

The purpose of the present study is to assess dose received by individual tissues or organs of human beings from the exposure of indoor radon (Rn-222), thoron (Rn-220) and their progeny concentrations using single entry pinhole dosimeters and deposition based progeny sensors (DRPS/DTPS). The deployment of dosimeters were carried out in 75 dwellings across Hanumangarh district of Rajasthan, India. Annual and seasonal activity concentrations were monitored based on which dose distribution to various tissues and organs were assessed. The estimated average annual effective dose of the study area is 0.8 $mSvy^{-1}$, which is lower than the ICRP recommended limit of 4 $mSvy^{-1}$ (at work place) and 14 $mSvy^{-1}$ (for residential buildings) (International Commission on Radiological Protection (ICRP) in Radiological protection against radon exposure, ICRP, Stockholm, 2018). Consequently, indoor radon may pose no health risk to the local population of the studied area.

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Springer Link

Original Research Article | Published: 08 July 2021

Dielectric Properties and Phase Stabilization of PVDF Polymer in (1–*x*)PVDF/*x*BCZT Composite Films

Tarun Garg, Venkateswarlu Annapureddy, K. C. Sekhar, Dae-Yong Jeong, Navneet Dabra ✉ & Jasbir S. Hundal

Journal of Electronic Materials **50**, 5567–5576 (2021) | Cite this article

191 Accesses | Metrics

Abstract

Polyvinylidene fluoride (PVDF) is a semi-crystalline ferroelectric polymer which can be stabilized in its distinct electroactive polymorphs α and γ by selective processing techniques. In this article, to study the effect of processing temperature and barium calcium zirconium titanate (BCZT) ceramic-doping on PVDF phase stabilization, the pure PVDF and PVDF/BCZT composite films were fabricated by solution-casting and melt-pressing. The Fourier-transform infrared spectroscopy and x-ray diffraction studies showed that the pure PVDF and PVDF/BCZT composite films fabricated by solution-casting possessed the characteristic γ-

S. No. 91

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Radon mapping in groundwater and indoor environs of Budgam, Jammu and Kashmir

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Abstract
Radiation exposure, an inescapable share of our everyday life, primarily arises from terrestrial or cosmic sources. A small fragment of the total dose is also contributed by our own bodies. Humans receive an average radiation of 2.4 mSv y^{-1} as natural background radiation. In the present study, an attempt to quantify groundwater radon-222 and indoor radon, thoron and their progeny was made using both active as well as passive techniques. Solid state nuclear track detectors (LR-115 type-II films) were employed for long-term passive measurements while as scintillation based radon monitor was used for active short-term measurements.

Keywords Indoor ^{222}Rn · Indoor ^{220}Rn · Groundwater · SSNTDs · Lung-cancer · Budgam

Introduction

Inhalation dose due to radon (^{222}Rn), thoron and their decay products is the major contributor (~50%) to the total background radiation dose to the populace. It is considered as the second most leading cause of lung cancer next to smoking soil grains to environment by two fundamental processes. The first being the *emanation* and the second is *exhalation* from the matrix through different transport processes [3, 4]. In emanation, the radon atoms escape from the solid mineral grains to the air-filled pores while as in exhalation, the radon gas is transported from air-filled pores to the atmosphere

S. No. 92

Radiological risk assessment due to attached/unattached fractions of radon and thoron progeny in Hanumangarh district, Rajasthan

Amit Kumar Singla, Sandeep Kansal, Supriya Rani & Rohit Mehra

Journal of Radioanalytical and Nuclear Chemistry **330**, 1473–1483 (2021) | Cite this article

Abstract

Present study has been carried out for dose estimation from attached/unattached progeny fractions of radon and thoron using wiremesh capped DTPS/DRPS. The measured annual average attached radon/thoron progeny concentration ($EERC_A$ and $EETC_A$) in the dwellings has been found to be 5.93 Bqm^{-3} and 0.43 Bqm^{-3} respectively. The calculated inhalation dose due to unattached fractions of radon progeny has been found to vary from 0.01 to 40.54 $mSvy^{-1}$ with mean value of 5.48 $mSvy^{-1}$ due to mouth breathing and from 0.01 to 9.42 $mSvy^{-1}$ with mean value of 1.5 $mSvy^{-1}$ for nasal breathing and the annual effective dose due to radon and thoron progeny has been found to vary from 0.17 to 1.11 $mSvy^{-1}$and from 0.06 to 0.47

S. No. 93

JOURNAL ARTICLE

Dosimetry of a 6 MV flattening filter-free small photon beam using various detectors

Shekhar Dwivedi, Sandeep Kansal, Vinod Kumar Dangwal, Avinav Bharati, Jodi Shukla

Biomedical Physics & Engineering Express 2021 May 11, 7 (4)

The present study aimed to dosimetrically evaluate the small-fields of a 6 MV flattening filter-free (FFF) photon beam using different detectors.The 6 MV FFF photon beam was used for measurement of output factor, depth dose, and beam profile of small-fields of sizes 0.6 cm × 0.6 cm to 6.0 cm × 6.0 cm. The five detectors used were SNC125c, PinPoint, EDGE, EBT3, and TLD-100. All measurements were performed as per the International Atomic Energy Agency TRS 483 protocol. Output factors measured using different detectors as direct reading ratios showed significant variation for the smallest fields, whereas after correcting them according to TRS 483, all sets of output factors were nearly compatible with each other when measurement uncertainty was also considered. The beam profile measured using SNC125c showed the largest penumbra for all field sizes, whereas the smallest was recorded with EDGE. Compared with that of EBT3, the surface dose was found to be much higher for all the other detectors. PinPoint, EBT3, TLD-100, and EDGE were found to be the detector of choice for small-field output factor measurements; however, PinPoint needs special attention when used for the smallest field size (0.6 cm × 0.6 cm). EDGE and EBT3 are optimal for measuring beam profiles. EBT3, PinPoint, and EDGE can be selected for depth dose measurements, and EBT3 is suitable for surface dose estimation.

DEPARTMENT OF CHEMISTRY

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Reactions of MoO_2Cl_2 and $MoOCl_4$ with 2-Mercaptopyridine, 4-Phenylimidazole-2-thiol and 6-Mercaptopurine monohydrate

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ABSTRACT

MoO_2Cl_2/$MoOCl_4$ have been reacted with 4-phenylimidazole-2-thiol/6-mercaptopurine monohydrate/2-mercaptopyridine in acetonitrile solvent in unimolar/bimolar proportions at room temperature. The products thus obtained are: $MoOCl_3(C_9H_8N_2S)$,[1]; $Mo_2O_3Cl_6(C_9H_7N_2S)(CH_3CN)_2$,[2]; $Mo_2O_3Cl_8(C_9H_7N_2S)_2(CH_3CN)_2$,[3] and $Mo_2O_4Cl_4(C_5H_4NS\text{-}SN_4C_5)$,[4]. These products were studied by various techniques: infrared, proton NMR, liquid/gas chromatography-mass spectrometry, elemental analyses. Owing to the sensitivity of the products to air and moisture, the reactions and work ups were performed in vacuum line purged with oxygen by flushing dry nitrogen in it. Ions observed in mass spectrum are concurrent with the depicted formulae.

Keywords: MoO_2Cl_2, $MoOCl_4$, 2-mercaptopyridine, 4-phenylimidazole-2-thiol, 6-mercaptopurine monohydrate, Acetonitrile solvent, Infrared, proton NMR, DMSO-d_6, Liquid/gas chromatography-mass spectrometry.

INTRODUCTION

6-Mercaptopurine ring system may be considered as if a pyrimidine ring has been fused to an imidazole ring. Electrons of 6-mercaptopurine are highly delocalized. The ring is susceptible to both electrophilic and nucleophilic attacks. 6-Mercaptopurine[1-2] is used as chemotherapy drugs for treatment of autoimmune diseases and cancer like leukemia, ulcerative colitis and Crohn's disease. Mercaptopurine is sold as purinethol. It is a class of medication known as purine antagonists and works by stopping the growth of cancer cells. Many transition metal complexes of 6-mercaptopurine are reported[3-4]. Some of transition metal complexes of 6-mercaptopurine have higher anticancer activity than that of 6-mercaptopurine[5-8]. Divalent transition metals coordinate[5,7,9] through S and N atoms of 6-mercaptopurine.

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Reactions of $MoOCl_4$ and MoO_2Cl_2 with Heterocyclic Thioamides

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ABSTRACT

$MoOCl_4$/MoO_2Cl_2 were reacted with 2-mercaptopyridine (IUPAC: pyridine-2-thiol)/4-phenylimidazole-2-thiol (IUPAC: 4-phenyl-1,3-dihydroimidazole-2-thione)/6-mercaptopurine (IUPAC: 1,7-dihydro-purine-6-thione) in acetonitrile medium using equal/twice molar concentrations at normal temperature. The reactions yielded products: $MoOCl_3(C_5H_4NS\text{-}SNH_4C_5).2HCl$,[1]; $Mo_2O_3Cl_{12}(C_5H_4NS\text{-}SNH_4C_5)(CH_3CN)_2$,[2]; $Mo_2OCl_6(C_9H_7N_2S)_4$,[3] and $Mo_2O_2Cl_8(C_5H_4N_4S)(CH_3CN)$,[4]. The various techniques used for characterization of compounds are: Fourier transform infrared, protron nuclear magnetic resonance, ^{13}C nuclear magnetic resonance, liquid/gas chromatography, mass proton spectrometry and C, H, N, S, Mo, Cl analysis. The products are prone to oxidation/hydrolysis by air/moisture, so all procedures were executed in vacuum line using dry nitrogen atmosphere. Elemental analysis and fragments recorded in mass spectrometry are in tune with the formulae proposed.

Keywords: 2-mercaptopyridine (IUPAC: pyridine-2-thiol), 4-phenylimidazole-2-thiol (IUPAC: 4-phenyl-1,3-dihydroimidazole-2-thione), 6-mercaptopurine (IUPAC: 1,7-dihydro-purine-6-thione), $MoOCl_4$, MoO_2Cl_2, FTIR, ^1H NMR, ^{13}C NMR, DMSO-d_6, liquid/gas chromatography-mass spectrometry, Acetonitrile medium.

INTRODUCTION

6-Mercaptopurine (IUPAC: 1,7-dihydro-purine-6-thione)

Pyrimidine ring and imidazole ring are fused in purine. 6-mercaptopurine (mpH) has delocalized π-electrons. Nucleophiles can attack at positions 2,6 and 8. Electrophiles can attack at positions 3 and 7.

Purine ring system represents skeleton for nucleic acid bases guanine and adenine. 6-Mercaptopurine[1-2] is used as chemotherapy drugs to treat various types of cancers. This drug is also used to cure autoimmune diseases. 6-Mercaptopurine is marketed as purinethol. Purine is antagonists drug because it stops the growth of cancer cells.

6-Mercaptopurine reacts with many transition metals[3-4]. Some transition metal complexes of the ligand are more potent against cancer than the ligand itself[5-8]. 6-Mercaptopurine coordinates[5, 7,9] via sulphur and nitrogen atoms with divalent transition metals. 6-Mercaptopurine (mpH) reacts with various transition metal ions in different coordination ways: mpH^+, mp^-, mp^{2-} and intramolecular proton transfer.

DEPARTMENT OF MATHEMATICS

S. No. 96

Afrika Matematika
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Analysis of a linear and non-linear model for diffusion–dispersion phenomena of pulp washing by using quintic Hermite interpolation polynomials

Satinder Pal Kaur[1] · Ajay Kumar Mittal[2] · V. K. Kukreja[3] · Archna Kaundal[3] · N. Parumasur[4] · P. Singh[4]

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Abstract
Pulp washing is a prime activity in the process industry that involves diffusion–dispersion phenomena. A huge amount of cost, time, and ecological issues are entailed in waste-water management. To reduce this environmental load and to achieve higher efficiency, the mathematical models are developed and solved with different techniques by the various researchers. In the present study, quintic Hermite interpolating polynomials are used to approximate the trial function for solving the mathematical model of diffusion–dispersion phenomena. The purpose behind this study is to derive an accurate result with less CPU time and effect for some important parameters such as Peclet number, cake thickness, and interstitial velocity of the pulp washing process. Two problems, first with the constant coefficient and second with the variable coefficient are worked out by the proposed scheme. After getting the desired results for the linear model, the method is applied to the nonlinear model. The results indicate that the Peclet number plays a leading role in the pulp washing process whereas, the cake thickness and interstitial velocity both are having a lesser effect. The efficiency, accuracy, and applicability of the method is derived using $\|L\|_2$ norm, $\|L\|_\infty$ norms, and rate of convergence. The suitability of the proposed technique is well weighed up when compared with the earlier published results and displays a wider scope of industrial applicability.

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UBS

S. No. 97

The nexus between risk factor disclosures and short-run performance of IPOs – evidence from literature

Krishan Lal Grover , Pritpal Singh Bhullar

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Article publication date: 29 April 2021

Abstract

Purpose

The main purpose of the present study is to stretch the theoretical framework of existing stock of literature with reference to Risk Disclosures in IPO Prospectus and IPO performance. The systematic literature review study endows easy and quick access to researchers as well as categorization of the available literature.

Design/methodology/approach

Fifty research papers, which has been published or presented from 2000 to 2019 and are related to IPO risk disclosures and IPO performance, have been finalized. Further, these research papers were categorized based upon the five different variables to identify the probable research gap in the selected topic.

Findings

This review provides a coherent summary of past studies related to topic and develop a comprehensive evidence on relationship between disclosure of risk factors and IPO underpricing in short run. It shows the existing research gap that needs to be fulfilled to expand the research horizon of future research studies.

Research limitations/implications

The sole limitation of the study is that being a systematic literature review study, it does not carry any empirical results.

Practical implications

The investors will be able to identify the key risk factors, disclosed in IPO prospectus, that may have probable dent on the short-term return from IPO. The findings will further help the investors and financial analyst to identify the degree of impact of risk disclosures that are listed in IPO prospectus.

Originality/value

The paper is a first of its kind to stretch the existing literature and develop theoretical framework in the context of risk factor disclosures

S. No. 98

Vilnius University Press

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Is CSR Expenditure Relevant to the Firms in India?

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Abstract. *The present study examines the relevance of Corporate Social Responsibility (CSR) expenditure to the firms in the mandatory regime in India. The paper has its theoretical basis from the instrumental aspect of the Stakeholder theory, which assumes a positive influence of CSR over financial performance. Therefore, the study hypothesizes that the firms which fulfil the CSR expenditure requirement will exhibit higher stock returns and lower systematic risk. Since India mandated CSR in the year 2014, the data of four years (2016-2019) for the sample of 426 National Stock Exchange (NSE) listed Indian firms are taken to employ the OLS regression method. The CSR expenditure in the mandatory regime was not found to be relevant to the firms because of an insignificant positive impact of mandatory CSR expenditure on stock returns. Thus, the instrumental aspect is not supported by the findings. However, the findings indicate a decrease in the systematic risk of the firms. Only a few studies in India investigated this phenomenon in the mandatory regime. Further, the contributions of the study to the CSR literature are fairly useful from the perspective of firms, investors, policy-makers, regulators, scholars, and countries that are planning for legislating CSR.*

Keywords: *CSR expenditure, DuPont equation, financial performance, stakeholder theory, stock returns, systematic risk*

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S. No. 99

Higher Education Quarterly

ARTICLE

Quality of work life and job performance: A study of faculty working in the technical institutions

Agyapal Singh, Jiwan Jyoti Maini

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Abstract

EN DE

The study examines the relationship between Quality of work life (QWL) and job performance among the faculty of technical institutions in the state of Punjab, India. Data collected from a sample of 445 respondents through a structured questionnaire have been put to data analysis with the help of the Statistical Package for the Social Sciences (SPSS 20). Four factors that are associated with QWL (i.e., management policies, fair pay, work environment, and job design & social space) have been identified through Exploratory Factor Analysis (EFA). Subsequently, the relationship between the identified factors of QWL and job performance is modelled through Partial Least Squares Structural Equation Modelling (PLS-SEM). The results infer that all four factors of QWL have a substantial association with job performance of the faculty. The study puts forward improvement in the level of existing institutional measures to ensure a superior QWL and improved performance of faculty in the technical education sector.

S. No. 100

Annals of Operations Research
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ORIGINAL RESEARCH

Supply chain vulnerability assessment for manufacturing industry

Satyendra Kumar Sharma[1] · Praveen Ranjan Srivastava[2] · Ajay Kumar[3] · Anil Jindal[4] · Shivam Gupta[5]

Accepted: 8 June 2021

Abstract
In today's business, environment natural and manmade disasters like recent event (Covid 19) have increased the attention of practitioners and researchers to Supply chain vulnerability. Purpose of this paper is to investigate and prioritize the factors that are responsible for supply chain vulnerability. Extant literature review and interviews with the experts helped to extract 26 supply chain vulnerability factors. Further, the relative criticality of vulnerability factors is assessed by analytical hierarchy process (AHP). Critical part supplier; location of supplier; long supply chain lead times; Fixing process owners and misaligned incentives in supply chain are identified as the most critical factors among twenty-six vulnerability factors. Research concludes that not only long and complex supply chain but supply chain practices adopted by firms also increase supply chain vulnerability. Relative assessment of vulnerability factors enables professionals to take appropriate mitigation strategies to make the supply chains more robust. This research adds in building a model for vulnerability factors that are internal to supply chain & controllable.

Keywords Supply chain · Vulnerability · Drivers · AHP · Sensitivity analysis

ECE

S. No. 101

SNO-53

Multimedia Tools and Applications (2021) 80:7749–7769
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Image steganography for securing secret data using hybrid hiding model

Sumeet Kaur[1] · Savina Bansal[2] · Rakesh Kumar Bansal[2]

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Published online: 30 October 2020

Abstract
Image steganography is the process of concealing the confidential message in digital images. The purpose of this research is to secure the transmission of an image from attackers. This research introduced an innovative Image Hiding Encryption and Decryption (IHED) for encrypting and decrypting images. Moreover, the encoding process is performed on the Mid-frequency (MF) values are identified by a novel Mid Search African Buffalo Model (MSABM). The efficiency of the proposed model is validated by applying some attacks such as a novel White Floor Square Attack (WFSA), RS steganalysis, Chi-square attack, and visual attack. Furthermore, the proposed methodology showed that the embedded image has high Peak Signal to Noise Ratio (PSNR), embedding rate, Structural Similarity Index Metric (SSIM) and reduced Mean Square Error (MSE). Finally, the proposed strategy is compared with existing approaches and achieved better results by increasing the security of embedded secrets in the steganography system.

Keywords Image steganography · Encryption · Decryption · Whitefloor Square Attack · Mid-frequency · RS Steganalysis

1 Introduction

Steganography is the technique for hiding a document, text, image, or video in another document, text, image, or video [11]. Generally, steganography is hiding a confidential

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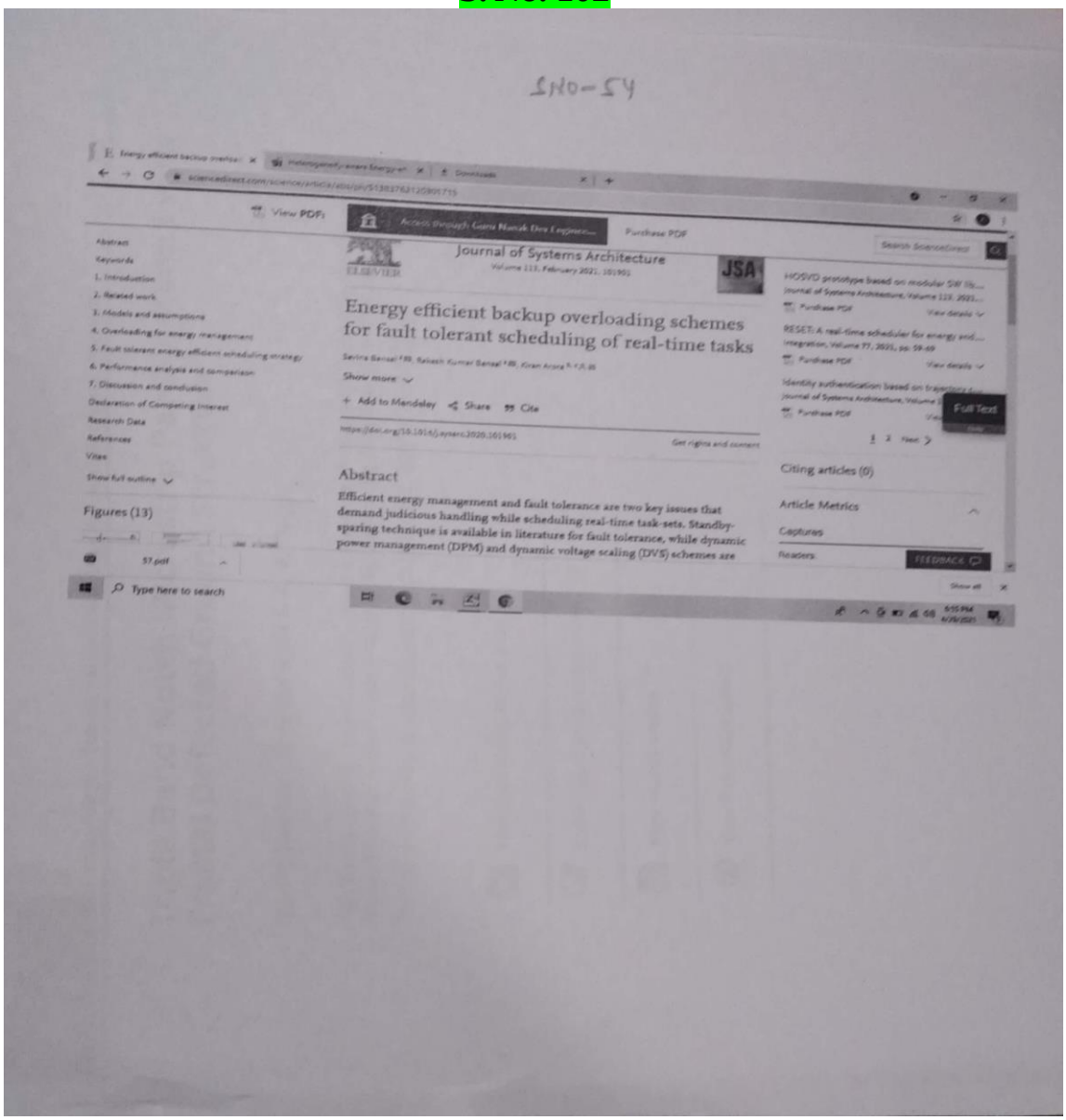
S. No. 102


SNO-54
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Abstract
Keywords
1. Introduction
2. Related work
3. Models and assumptions
4. Overloading for energy management
5. Fault tolerant energy efficient scheduling strategy
6. Performance analysis and comparison
7. Discussion and conclusion
Declaration of Competing Interest
Research Data
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Energy efficient backup overloading schemes for fault tolerant scheduling of real-time tasks
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Abstract
Efficient energy management and fault tolerance are two key issues that demand judicious handling while scheduling real-time task-sets. Standby-sparing technique is available in literature for fault tolerance, while dynamic power management (DPM) and dynamic voltage scaling (DVS) schemes are
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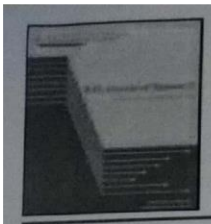
S. No. 103



SNo-55

IETE Journal of Research

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Triple Band Notch Microstrip Patch Antenna with Fractal Defected Ground Structure

Sushil Kakkar , Shweta Rani & A. P. Singh

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ORIGINAL RESEARCH

Improved hepatocellular carcinoma fatality prognosis using ensemble learning approach

Manoj Sharma[1] · Naresh Kumar[2]

Received: 19 September 2020 / Accepted: 29 March 2021

Abstract
Hepatocellular Carcinoma (HCC) is the most common type of liver cancer which accounts for around 75% of all liver cancer cases. From statistical data, it has been found that fatality due to liver cancer is higher regardless of improved screening and discoveries in medicines, HCC escalate fatality rate. This paper presents an ensemble learning model for HCC survival prediction. The input predictors for the proposed model consist of geographical information, risk factors and clinical trial information of HCC patients. Fifteen different models are presented to evaluate the prediction. These models present data pre-processing, feature reduction/elimination and survival classification phase. For feature evaluation, LASSO Regression (L-1 penalization), Ridge Regression (L-2 penalization), Genetic Algorithm (GA) Optimization and Random Forest (RF) are proposed for weight valuation of features wherein features with significant weights are selected for prediction. With the aid of feature evaluators, L-1 penalized Nu-Support Vector Classification (Nu-SVC) model, L-2 penalized Nu-SVC model, GA optimized Nu-SVC model, RF-NuSVC model, L-1 penalized RidgeCV (RCV) model, L-2 penalized RCV model, GA optimized RCV model, RF-RCV model, L-1 penalized Gradient Boosting Ensemble Learning (GBEL) model, L-2 penalized GBEL model, GA optimized GBEL model and RFGBEL model are presented for survival prediction. The prediction performances of models were measured in terms of accuracy, recall/sensitivity, F-1 score, Log-Loss score, Jaccard score and Area Under Receiver Operating Curves (AUROC). The results indicate that RFGBEL model shows excellent performance in contrast to other proposed models. The proposed RFGBEL model achieves an accuracy of 93.92%, sensitivity of 94.73%, F-1 score of 0.93, Log-Loss/Cross entropy score of 5.89 and Jaccard score of 0.72. RFGBEL estimates value of area under the curve as 0.932. Comparison of RFGBEL model with other existing state of the art models are presented for performance assessment. Overall, the RFGBEL model has a capability to predict the result with more accuracy and sensitivity by means of machine learning and data mining approach.

Keywords Hepatocellular carcinoma · Tree based ensemble learning · Supervised learning and liver cancer

1 Introduction

HCC is the second prominent reason for cancer related fatality globally and is fifth most common cancer type (Galle et al. 2018; Njei et al. 2015). It is also categorized as fifth most common cause of cancer in men and the seventh most common cause in women (Fitzmaurice et al. 2018). In studies, it was found that probability of occurring of HCC is more frequent in males as compared to females (2.4:1) (Ferlay et al. 2010). HCC is typical category of primary liver cancer and accounts for around 75% of all liver cancer cases. Intrahepatic Cholangiocarcinoma (ICC) is another classification of liver cancer and comprises around 12–15% of all liver cancer cases (Petrick and McGlynn 2019). The liver cancer incidence and mortality vary from Europe to Eastern Asia due to its wide geographical variations. Figure 1 shows the incidence and mortality (both sexes) for liver cancer globally (Ferlay et al. 2018). In 2018, total 841,080 new incidences and 781,631 mortality was reported globally. Its incidence varies from Asia (609,596 new cases) to Europe (82,466 new

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RESEARCH ARTICLE

WILEY

Designing of 2-degree of freedom load frequency controller for power system using novel improved pole clustering and genetic method of reduced-order modelling

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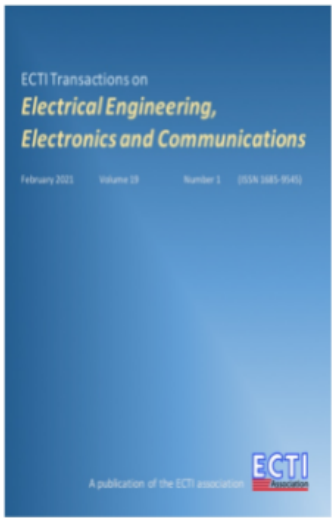
Handling Editor: Sharma Pawan

Summary

Load frequency controller (LFC) is required to eradicate the effect of disturbances occurring in the output of a power system due to conflicts in the applied load. The designing of these controllers may be tedious when the order of power system becomes higher. Here, model order reduction plays a vital role to reduce the order of higher-order systems by preserving the system characteristics. In the research paper, the reduced-order modeling of higher-order system is performed using proposed novel improved pole clustering and genetic technique. This technique employs a combination of newly developed form of pole clustering and genetic algorithm and has been tested for continuous and discrete time systems. The reduced model obtained from proposed technique is compared with the original system on the basis of errors including integral square error, integral time square error and integral absolute error and time and frequency domain performance metrics. The proposed reduced-order

S. No. 106

Modified Koch Fractal Antenna for Multi and Wideband Wireless Applications



PDF

Published: Jun 30, 2021

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Sushil Kakkar
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Abstract

This paper focuses on the design and development of modified Koch fractal antenna. Compared to traditional Koch curve antenna, the presented antenna possesses a greater number of frequency bands and better impedance matching. Furthermore, the bacterial foraging optimization (BFO) approach is implemented to enhance the impedance bandwidth. The developed technique has been verified by employing various numerical simulations. The design parameters generated from the optimization procedure have been utilized to manufacture the antenna and the respective experimental and simulated results compared. The measured results show that the designed antenna exhibits multi and wideband behavior, covering

S. No. 107

Sādhanā (2021)46:90
https://doi.org/10.1007/s12046-021-01613-4

A novel improved hybrid approach for order reduction of high order physical systems

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Abstract. The paper presents a novel hybrid approach for the simplification of higher order models to obtain the lower order model. The proposed method presented in this paper is used to reduce the single and multi-variable systems by amalgamation of pole clustering technique and genetic algorithm. The improved pole clustering technique is achieved by Lehmer measure which is used to obtain the denominator of reduced model and the coefficients of reduced order numerator are obtained by genetic algorithm approach. To compare the newly developed hybrid approach with the previous literature of model order reduction, relevant examples are illustrated here. Three examples of single variable and one example of multivariable physical systems are tested by using MATLAB 2017a software and its control system toolbox. The performance parameters like integral

DEPARTMENT OF CIVIL ENGINEERING

S. No. 108

Volume 43, Part 2, 2021, Pages 769-777

Experimental study on strength and microstructure of mortar in presence of micro and nano-silica

Author links open overlay panel Rishav Garg[a] Rajni Garg[b] Manjeet Bansal[c] Yogesh Aggarwal[d]

Cite

https://doi.org/10.1016/j.matpr.2020.06.167Get rights and content

Abstract

Sustainable construction practices require cementitious materials with high strength that is strongly dependent upon the nature of binding materials and pore structure. The physico-chemical properties of these materials can be tailored suitably by preferential substitution of cement by materials having comparatively small particle size resulting in improved pore structure. This study is aimed to investigate strength and microstructure of the preferentially substituted cement mortars with incorporation of microsilica (MS), nanosilica (NS) and their combined use at 3, 7 and 28 days of curing. The substituent MS (5.0–20%) and NS (0.5–1.25%) have been used at a water binder ratio of 0.5. The specimens were analyzed for the fresh (consistency, setting time, flow) and hardened (compressive and split tensile strength) properties and a correlation between compressive and split tensile strength was obtained. Mortar containing NS was found to develop better strength as compared to the mortar containing MS. The optimum usage of MS with incorporation of NS was further found to increase the strength of mortar significantly. SEM-EDX was used for the analysis of the microstructure of the specimens and the correlation between Ca and Si content was used to analyze the cement matrix. The findings show that the optimized usage of micro and nano silica can give beneficial effects to improve the fresh properties as well as strength with dense microstructure.

Keywords: Composites Cement Mortar Microstructure Micro silica Nano silica

Compressive Strength

S. No. 109

An overview of beneficiary aspects of zinc oxide nanoparticles on performance of cement composites

Mukesh Kumar, Manjeet Bansal,

Rishav Garg

Published: 24 August 2020
by Elsevier BV
in Materials Today: Proceedings
Materials Today: Proceedings , Volume 43, pp 892-898; https://doi.org/10.1016/j.matpr.2020.07.215

Show/hide abstract

Abstract: Nanotechnology provides an innovative approach at the interjection of science and technology especially in the concrete sector to solve the issues prevailing in the construction industry. The prime concern is related to the development of sustainable concrete with enhancement of performance in terms of strength and durability. On the parallel concern is related to decrease in cement use and production leading to reduced global carbon dioxide emissions. As per literature, various nanoparticles have been used in this context as a partial substituent for cement due to their small size, high surface area and pozzolanic action. This review highlights the beneficiary role of zinc oxide nanoparticles in improving the performance of cement composites. Zinc oxide (ZnO) nanoparticles have unique optic, antimicrobial and photocatalytic activity. These ultra-fine nanoparticles have a filler effect and have been found to impact the hydration reaction in the cement matrix. The introduction of ZnO nanoparticles has been found to impart photocatalytic properties in the cement structures. The impact of ZnO nanoparticles on setting time, microstructure and strength has been discussed in detail. Study reveals that with optimized dosage of these nanoparticles, mortars and concrete with increased mechanical strength and antimicrobial properties can be prepared. It provides an innovative pathway in construction industry to build self-cleaning, durable and eco-friendly structures.

Keywords: Nanotechnology / Zinc oxide nanoparticles / Compressive strength / Microstructure / Photocatalytic activity / Antimicrobial activity

DEPARTMENT OF MECHANICAL ENGINEERING

S. No. 110

RESEARCH PAPERS

Performance Evaluation of Surface Overlaid EN-42 Steel for Tillage Applications

Jagseer Singh, Sukhpal Singh Chatha, Buta Singh Sidhu

J. Tribol. Mar 2021, 143(3): 031202 (11 pages)
Paper No: TRIB-20-1183 https://doi.org/10.1115/1.4048165
Published Online: September 11, 2020 Article history

Abstract

Wear of tools is a key problem in the farming sector. The objective of this study was to evaluate the wear performance of untreated steel (EN-42) and two hardfacings, namely H1 and VB. Hardfacing H1 (0.86Cr0.22C) fall in the basic buildup iron–carbide alloy category and hardfacing VB (3.19Cr2.51C2.7Si) is categorized as martensitic alloy steel. Abrasive wear performance of untreated, as well as hardfaced steel specimens, was evaluated in the laboratory and actual field conditions. The tests

S. No. 111

Soil and Tillage Research
Volume 205, January 2021, 104771

Abrasive wear characteristics and microstructure of Fe-based overlaid ploughshares in different field conditions

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

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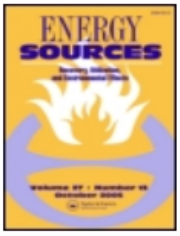
https://doi.org/10.1016/j.still.2020.104771

Highlights

- As received and hardfaced cultivator ploughshares can be used to characterize the wear resistance in actual field

S. No. 112



Taylor & Francis

Energy Sources, Part A: Recovery, Utilization, and Environmental Effects

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/ueso20

Effects of ternary fuel blends (diesel-biodiesel-*n*-butanol) on emission and performance characteristics of diesel engine using varying mass flow rates of biogas

Geetesh Goga, Varun Singla, Sunil Kumar Mahla, Bhupendra Singh Chauhan, Amit Dhir, Dhinesh Balasubramaniam & Neeru Singla

To cite this article: Geetesh Goga, Varun Singla, Sunil Kumar Mahla, Bhupendra Singh Chauhan, Amit Dhir, Dhinesh Balasubramaniam & Neeru Singla (2021): Effects of ternary fuel blends (diesel-biodiesel-*n*-butanol) on emission and performance characteristics of diesel engine using varying mass flow rates of biogas, Energy Sources, Part A: Recovery, Utilization, and Environmental Effects, DOI: 10.1080/15567036.2021.1910754

To link to this article: https://doi.org/10.1080/15567036.2021.1910754

Published online: 01 Apr 2021.

S. No. 113

ECCC-promoted

Systematic oxidation studies of dissimilar ferritic/austenitic welded joints

Rutash Mittal & Buta Singh Sidhu

Pages 275-291 | Received 18 Jan 2021, Accepted 04 May 2021, Published online: 08 Jun 2021

Download citation https://doi.org/10.1080/09603409.2021.1927415 Check for updates

ABSTRACT

A comparative analysis of different zones of T91/347 H, GTAW dissimilar welded joint exposed to simulated boiler conditions has been attempted. T91 HAZ region of the ferritic/austenitic dissimilar welding joint has been observed to develop higher oxide scale than other parts of joint by virtue of its higher oxidation. Material characterisation in as welded as well as in as corroded conditions was done with the help of optical microscopy, SEM/EDS, compositional mapping, XRD and weight change tests. The characterisation study has corroborated lower presence of oxidation resistant Cr in HAZ

DEPARTMENT OF TEXTILE

S. No. 114

Thermo-physiological Clothing Comfort of Wool-Cotton Khadi Union Fabrics

H C Meena, D B Shakyawar, R K Varshney & Vinod Kadam

Published online: 17 Aug 2021

Download citation https://doi.org/10.1080/15440478.2021.1958408

ABSTRACT

Khadi is a handspun and handloom woven textile fabric made up of natural textile fibers, predominantly cotton and wool. Khadi mainly intended for apparel purposes. Hence, the thermo-physiological properties of wool-cotton blended khadi fabric are crucial in studying fabric comfort. In this study, the 18 types of wool-cotton blended khadi fabrics are produced on a handloom by using wool-cotton blended yarn as warp; and woolen yarn comprised of three different mixes of Australian Merino (AM) wool and JK crossbred (JKC) as weft yarn. Two different weft yarns of 41.7 and 31.2 Tex were prepared using these mixes. The thermo-physiological properties of fabric viz. air permeability, water

S. No. 115

Title:	Performance of wool-nylon cut pile carpets in relation to their structural parameters
Authors:	Dauta, Alok Varshney, Rajeev
Keywords:	Compression;Cut pile;Pile yarn;Resilience;Tufted carpets;Wool-nylon carpet
Issue Date:	Jun-2021
Publisher:	CSIR-NIScPR, India
Abstract:	The change in performance parameters of hand-tufted cut-pile carpets has been studied with respect to variation in their constructional parameters. Carpet samples are prepared from 80/20 wool-nylon blended pile yarn by varying pile density and pile height. The influence on deformation, abrasion and tuft withdrawal force properties has been investigated. Carpet samples are evaluated for compression, abrasion and tuft withdrawal force. The experimental results are statistically analyzed using general linear model through regression analysis and analysis of variance. From the statistical analysis of test results, it has been established that the carpet structural parameters, such as pile height and pile density, have a significant influence on thickness loss, recovery under compression and durability properties of hand-tufted carpets.
Page(s):	182-185
URI:	http://nopr.niscair.res.in/handle/123456789/57636
ISSN:	0975-1025 (Online); 0971-0426 (Print)
Appears in	IJFTR Vol.46(2) [June 2021]

S. No. 116

MedCrave
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Journal of Textile Engineering & Fashion Technology

Research Article

Open Access CrossMark

To study the influence of mercerizing variation on the absorbency and whiteness test for the cotton woven fabrics

Abstract

The mercerization of cotton fabric is common practice in the preparation process that enhances dye uptake and facilitates uniform dyeing in addition to improving dimensional stability, strength, and luster. Changes in microstructure, morphology, and conformation of the cellulose chains also occur during mercerization. The extent of the changes that occur depends on the processing time, caustic concentration, temperature, degree of polymerization. The main objective of this research work is to analyze the whiteness index, absorbency test of the different fabric samples made of different cotton yarns. The count of these yarns was as under 32Ne, 35Ne, 40Ne, 45Ne, 50. These fabrics were treated at different temperatures of 20 30, 40, 50, 65˚C. It was found that mercerized cotton fabrics at low-temperature Mercerize is done only on the surface of the fabric but as the temperature is increased the mercerization & done on the core of the fabric. Absorbency is increased as the temperature is increased. Whiteness index is decreased as the temperature is increased.

Keywords: cotton woven fabrics, whiteness index, absorbency test

Volume 6 Issue 2 - 2020

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Email ramratan333@gmail.com, anup28298@yahoo.com

Received: March 21, 2020 | **Published:** April 21, 2020

Introduction

Various mechanical and chemical treatments that are routinely applied when processing cotton fibers are very important because matter for white program or dyeing.[5,6] Cotton fibers are subjected at different temperatures during growing, wet pretreatments, laundering and ironing, which alter their properties. Elevated temperature of drying has altered cotton fiber properties such as length strength

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

S. No. 117

Not secure | https://link.springer.com/article/10.1007/s00521-021-06144-x

Springer Link

Original Article | Published: 07 June 2021

UrduDeepNet: offline handwritten Urdu character recognition using deep neural network

Faisel Mushtaq, Muzafar Mehraj Misgar, Munish Kumar ✉ & Surinder Singh Khurana

Neural Computing and Applications **33**, 15229–15252 (2021) | Cite this article

Abstract

Handwritten Urdu character recognition system faces several challenges including the writer-dependent variations and non-availability of benchmark databases for cursive writing scripts. In this study, we propose a handwritten Urdu character dataset for *Nasta'liq* writing style covering isolated, positional characters as well as numerals. We also propose a convolutional neural network (CNN) architecture for the recognition of handwritten Urdu characters and numerals. CNN is a novel technique for image recognition that does not need explicit feature engineering and extraction and produces efficient results as compared to standard

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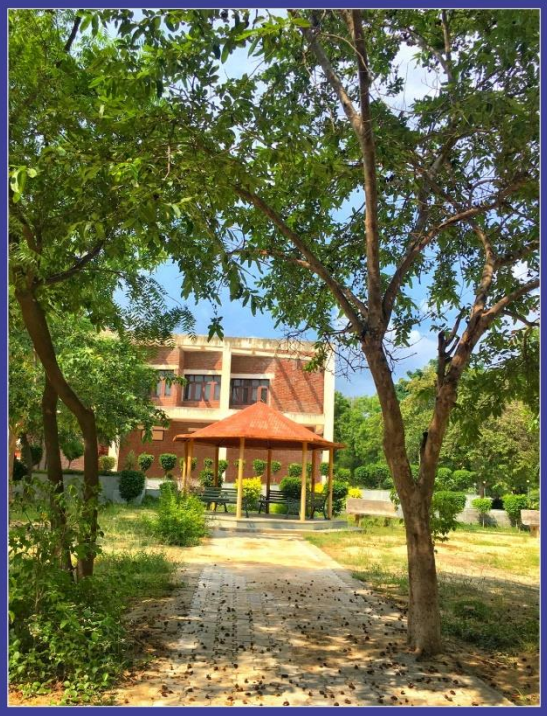

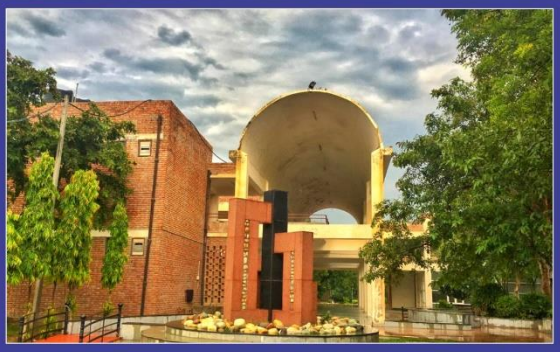

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