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Shri Vishnu Engineering College for Women

FOREWORD

Dr. P. S. Brahmanandam
(Anand)

We are delighted to present the proceedings of the First International Online Conference on Recent Advances in Applied Sciences and Engineering (ICRAAE-2023), held on December 22-23, 2023. This inaugural event has been a resounding success, bringing together researchers, scholars, and practitioners from around the globe to share their latest findings and innovations in the fields of applied sciences and engineering.

The ICRAAE-2023 conference provided a dynamic platform for the exchange of ideas, fostering collaborations and networking opportunities among participants from diverse backgrounds. Despite being held in a virtual format, the conference maintained a high level of engagement, with attendees actively participating in discussions, presentations, and workshops.

The success of this event is attributed to the hard work and dedication of many individuals and organizations. We extend our heartfelt gratitude to the keynote speakers for their insightful presentations, to the authors for their high-quality contributions, and to the reviewers for their meticulous evaluations. We also thank the organizing committee for their tireless efforts in planning and executing this event.

We hope that the knowledge shared and the connections made during ICRAAE-2023 will inspire future research and collaborations, advancing the frontiers of applied sciences and engineering. We look forward to seeing the continued growth and success of the ensuing conference i.e. ICRAAE-2024 to be held during the last week of November, 2024.

Sincerely,

Organizing Committee Chair
ICRAAE-2023
(http://icraae.svecw.edu.in/)

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DESIGN OF A 2.45 GHZ COMPACT WEARABLE ANTENNA FOR WIRELESS BODY AREA NETWORKS AND INDUSTRIAL WIRELESS APPLICATIONS

D. Ramesh Varma
M. Murali
M. Vamshi Krishna
M. Venkata Subbarao[1]

Keywords:

Wireless Body Area Network; Wearable Antenna; Flexible substrate material; Compact; Surface Currents.

A B S T R A C T

This paper presents designing and optimizing a compact wearable antenna in Wireless Body Area Networks (WBANs) and Industrial Wireless Applications. The antenna is specifically developed to operate at a frequency of 2.45GHz, which is commonly used in wireless communication systems. By leveraging a flexible substrate material with a dielectric constant of 2.2, the antenna achieves compactness while maintaining efficient performance. The design process involves meticulous optimization to maximize the antenna's bandwidth, enabling fast and reliable wireless data transmission within the WBAN network. The antenna's characteristics, such as radiation pattern, gain, and impedance matching, are thoroughly evaluated through extensive simulations using specialized software. The results demonstrate the effectiveness of the proposed design, highlighting its capability to facilitate high-bandwidth communication in WBANs. The optimized wearable antenna offers improved real-time data transmission, enabling the enhanced performance of wearable devices in healthcare, sports, and other relevant applications.

1. INTRODUCTION

Wireless body area networks (WBAN) have become a promising technology for several uses, including measuring well-being, analyzing sports performance, and monitoring illness. WBANs are made up of tiny, low-power wireless devices that are worn on the body to gather and communicate crucial information including movement, temperature, and heart rate. Athletes, people looking to better their health and well-being, and medical professionals can all benefit from the seamless and real-time monitoring made possible by these networks.

The effectiveness of the wireless communication antennas is crucial to the success of WBANs. To provide reliable and effective data transmission throughout the network, antennas play a critical role in signal transmission and reception. For smooth and real-time communication in WBANs to be possible, tiny wearable antennas that can function at high bandwidths must be designed and optimized. In this study, the

[1]Corresponding author: M. Venkata Subbarao
Mail ID: mvsubbarao@svecw.edu.in

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NOVEL MICROWAVE SENSOR FOR ENHANCED BIOCHEMICAL DETECTION AND PREDICTION THROUGH MACHINE LEARNING FOR INDUSTRIAL APPLICATIONS

G. Challa Ram[1]
M. Venkata Subbarao
K. Padma Satya Sri
Naveen Kumar Maurya
D. Ramesh Varma
M. Prema Kumar

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UDC – XXX

Keywords:

Bio-sensing, Complementary split ring resonator (CSRR), Regression, Sensor

A B S T R A C T

This paper presents a novel sensor design that incorporates a microstrip patch antenna accompanied by a ground plane integrating a complementary split-ring resonator (CSRR). Integration of a circular CSRR into the microchip antenna has the potential to significantly improve radiation characteristics. The designed sensor operates at a frequency of 2.45 GHz, achieving an attenuation level of -27 dB. This design proposes the sensor's potential to function as a highly sensitive sensor by utilizing changes in the dielectric constant of biological samples. The changing dielectric constant of the analyte induces a frequency shift, allowing for the identification of different materials. Additionally, various regression algorithms based on machine learning have been employed to accurately assess the analyte's dielectric constant by studying the sensor's frequency response. Performance analysis indicates that exponential regression outperforms other approaches, showcasing a minimal root mean squared error of 0.0013. Machine learning techniques bring about substantial enhancements in sensor performance, thereby creating pathways for sophisticated applications in biochemical sensing.

1. INTRODUCTION

In recent times, there have been notable advancements in the field of biochemical sensing, driven by the increasing demand for precise, rapid, and non-intrusive detection methods across various domains, including healthcare, environmental monitoring, and food safety. Among the array of available sensor technologies, microwave sensors have emerged as a promising solution for biochemical sensing due to their distinctive

[1] Corresponding author: G. Challa Ram
Email: challaram.grandhi@svecw.edu.in

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EXPLORING THE POTENTIAL OF FEDERATED LEARNING TO EMPOWER CREDIT CARD FRAUDULENT TRANSACTION DETECTION WITH DEEP LEARNING TECHNIQUES

Chandra Sekhar Kolli [1]
Venkata Naga Raju D
Pavan Kumar V
Srinivasa Rao D
Vinay P
GAKS Rajeev Kumar

Keywords:

Federated Learning, Credit Card fraud detection, Optimization.

A B S T R A C T

The rapid expansion of communication systems and computing technology has led to a significant increase in both traditional and online credit card transactions. Unfortunately, this surge has also resulted in a corresponding rise in fraudulent activities, posing a serious challenge for organizations such as banking and financial institutions. To address this issue, the implementation of precise and secure transaction techniques, as well as effective fraud detection methods, becomes imperative. In this article, a novel approach utilizing a hybrid algorithmic optimization-based deep learning technique is proposed. Specifically, the Jellyfish Namib Beetle Optimization Algorithm-SpinalNet (JNBO-SpinalNet) is developed for the purpose of detecting fraudulent credit card transactions. The input data undergoes pre-processing using quantile normalization, followed by the selection of pertinent features employing diverse distance measures. To enhance the selected features, the Bootstrapping method is employed. Subsequently, the SpinalNet model is employed to identify instances of credit card fraud. The JNBO-SpinalNet model surpasses traditional detection models. The obtained results clearly demonstrate the outstanding effectiveness and efficiency of the proposed approach in identifying instances of credit card fraud.

1. INTRODUCTION

Federated learning, a learning paradigm that addresses privacy concerns and governance issues without the need for data exchange, has gained significant attention McMahan et al. (.2017) Kairouz et al. (2021). By

[1] Corresponding author: Dr. Chandra Sekhar Kolli
Email: kcsit@svecw.edu.in

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AREA AND POWER EFFICIENT LEAST MEAN SQUARE ADAPTIVE FILTER USING APPROXIMATE ARITHMETIC

G. R. L. V. N. Srinivasa Raju[1]
Doondi Kumar Janapala
J. Naga Vishnu Vardhan
Chinnaiah M C
Praveen Kumar Nalli
Jannu Teja Sri

Keywords:

Finite Impulse Response (FIR); Rounding Based Approximate Multiplier (ROBA); Least Mean Square (LMS); Adaptive Filter (AF); Weight Update Block (WUB); Digital Signal Processing (DSP); Multiply and Accumulate (MAC).

A B S T R A C T

The efficiency of a digital signal processing system heavily relies on the performance of multipliers, which are crucial arithmetic functional units. Approximate arithmetic techniques have emerged as a promising approach to significantly reduce circuit complexity, latency, and energy consumption. This paper presents a rounding-based approximate multiplier, grounded in approximate arithmetic principles, to execute a Least Mean Square (LMS) adaptive filter. Within the LMS adaptive filter, conventional multipliers are replaced with approximate arithmetic-based multipliers. These approximations simplify the multiplication operations, resulting in reduced area and power consumption. The LMS adaptive filter adjusts filter coefficients based on the LMS algorithm. This proposed system is realized using the Verilog hardware description language, and its performance is validated through simulation and synthesis using Xilinx ISE 14.7 simulator and Vivado design suite. Simulation results showed that implementing the LMS adaptive filter algorithm with rounding-based approximate multipliers yields a substantial reduction in area, latency, and power consumption.

1. INTRODUCTION

Digital filters play a pivotal role in modern digital signal processing (DSP) applications. These filters are essential devices employed to shape and manipulate the spectral characteristics of a signal while rejecting unwanted or undesirable components. In DSP, one innovative category of filters is Adaptive Filters (AF), which holds a crucial position due to their ability to automatically adjust their coefficients based on adaptive algorithms, thereby enhancing their performance. Adaptive filters, in contrast to conventional linear filters, are nonlinear in nature, allowing them to adapt dynamically to changing input signals. One widely used algorithm for adapting filter coefficients is the Least Mean Squares (LMS) algorithm. LMS adaptive filters

[1] Corresponding author: Dr. G.R.L.V.N. Srinivasa Raju
Email: grlvnsr@svecw.edu.in

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SOME ASPECTS OF FRICTION AND ANISOTROPIC RATIOS ON THE WORK HARDENING BEHAVIOR IN THE UPSETTING TESTS

Harikrishna Chirala[1]
Varun Chandra C
Murahari Kolli
Srinivasaraju pericherla
N Malleswararao Battina
Srinivasarao Gajula

Keywords:

AA2014; upsetting; anisotropy; friction; strain hardening; Finite element simulation;

A B S T R A C T

Metal upsetting is a primary mechanical working operation to reduce the cross-section of the billets, and there are few challenges that are to be solved. When the billets undergo severe plastic deformation, the friction prevailing at the die/billet interface causes differential strain hardening and anisotropy in the metallic billets. The current work focuses on the effect of friction and anisotropy on the strain hardening behavior and hardness. AA2014 cast alloy were machined to an outer diameter of 24 mm, and an inner diameter of 12 mm with a thickness of 8 mm. Friction calibration curves were plotted from the ring compression test. Another set of solid cylindrical billets of the same composition with a height and diameter of 24 mm were compressed between the rigid dies. A distortion in the shape solid cylinders caused by friction, anisotropy, and their effect on strain hardening was studied after deformation. An equation was developed to predict he strain hardening behavior to investigate the effect anisotropy ratios on the strain hardening behavior. A novel approach to identify the effect of anisotropy ratios on the strain hardening behavior and hardness was proposed.

1. INTRODUCTION

AA2014 is a high-strength heat-treatable aluminum alloy primarily composed of aluminum (Al), copper (Cu), and small amounts of other elements. The alloy is known for its excellent strength-to-weight ratio , good machinability and for this reason , this alloy is widely used in automotive and aerospace industries. Bulk metal forming process, such as upsetting, aids in improving the strength and hardness of the material. Upsetting being the primary operation to reduce the cross-section of the billets draws the attention of researchers to work on the strain hardening behavior and friction. It is always challenging to improve the hardness of the material to a large extent with homogeneity. Because friction is one of the major process parameters that influence the upsetting process, a quantification technique by name Male and Cockroft calibration curves has been used over the decades to determine the magnitude of the friction at the die/billet interface. The

Corresponding author: Dr. Harikrishna Ch
Email: harinitw@gmail.com

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Non-linearity parameter B/A and available volume Va of binary liquid mixtures: thermo-acoustical approach

Srinivasu J.V.[1]
Narendra K.
Kavitha Ch.
Srinivasa Krishna T.

Keywords:

Available volume; thermoacoustical parameter; 1,4-butanediol; cresol; non-linearity parameter..

A B S T R A C T

When high amplitude sound waves propagate through liquid mixtures, various non-linear phenomena can occur, and ultrasonic research in these systems can reveal important details about their structure and interaction. Thermoacoustical parameters have been calculated for a binary system containing 1,4-butanediol(1,4-BD) + o-cresol(OC) or m-cresol (MC) or p-cresol(PC) at varying concentrations and temperatures ranging from 303.15 to 318.15 K. These parameters have been used to calculate available volume by using two different approaches. The results of both methods are used to examine the existence and intensity of interactions between the molecules in the systems under study. Additionally, several methods have also been used to derive the non-linearity parameter, or B/A. The excess values of B/A have also been calculated. In order to determine whether molecular interactions exist, a comparison analysis was conducted.

1. INTRODUCTION

When researching various thermodynamic properties and intermolecular interactions, the quantity known as accessible volume, or Va, is highly helpful. It is simply estimable using the characteristics of thermos-acoustics. The B/A parameter can reveal information about the medium's structural characteristics and calculates the nonlinear adjustment to velocity resulting from nonlinear effects brought on by the propagation of a finite amplitude wave (Hartman 1979; Beyer 1960; Sehgal 1995; Thakur 1978; Bjorno 2002; Duck 2002). A review of the literature indicates that there have been fewer attempts to use thermos-acoustical characteristics in pure liquids and liquid mixtures to determine Va, the non-linearity parameter, and B/A. There are two principal methods for determining the nonlinearity parameter B/A: The measurement of the amplitude of the second harmonic produced by the propagating sinusoidal wave's distortion is the basis of the finite amplitude approach. (Krishna et al., 2021; Aditi Prabhune et al., 2022; Nain 2022). Density, sound velocity, absolute temperature, specific heat capacity at constant pressure, and volume coefficient of thermal expansion are the foundations of the thermodynamic approach. Many scholars have estimated the non-linearity parameter of binary and multicomponent liquid mixtures (Bhatia et al., 2011; Pandey et al., 2000; Anjali et al., 2017). This encourages us to continue our study in order to use thermos-acoustical characteristics to compute Va and B/A in pure liquids and liquid mixtures at different temperatures and link the results with those derived from thermodynamic relations. The

[1] Corresponding author: Srinivasu J.V.
Email: srinivas.jaddu@gmail.com

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NAMED ENTITY RECOGNITION FOR MEDICAL DATA EXTRACTION USING BIOBERT

Kayal Padmanandam*
Nikitha Pitla
Yeshasvi Mogula
P.S. Brahmanandam

Keywords:

Natural Language Processing; Named Entity Recognition; Scispacy; BioBERT; Science; Medicine Data

A B S T R A C T

Technological advancements have caused widespread shifts in the medical industry. A vast quantity of information may be found in the medical literature publications released by researchers. Natural language processing innovations have made it simple to extract information on drugs, illnesses, symptoms, routes doses, species, and routes of administration from a documented source. This proposed research is used to identify the named entities from the medical literature. The BioBERT model is used to train the corpus that has been annotated. The proposed framework can outperform many state-of-the-art baselines and provide state-of-the-art results for BioNER. When compared to the existing model, the accuracy provided by the proposed system is satisfactory. The BioBERT is used for the extraction of medical entities like drugs, chemicals, genes, etc and to train the corpus that has been annotated. The BioBERT has in-built data of the medical entities, that will identify all the medical-related data or entities from the given statement. More entities can be found by this method than by the current standard model.When compared to the existing model, the accuracy provided by the trained version is satisfactory.The proposed system comes with a GUI for users to type the clinical words or components for analysis.

1. INTRODUCTION

Subsequent words in a sentence can be predicted and generated with the help of Natural Language Processing by analyzing and learning from the previous words in the sentence. Like many NLP processes, Named Entity Recognition (NER) extracts important entities like people, places, organizations, and medical terminology from the given text or document. Python libraries like Spacy, SciSpacy, and *BioBERT* are used for NER practices. Medical Information on drugs, illnesses, and symptoms can be extracted from the textual source using the SciSpacy or the *BioBERT* model. However, there is a limitation that users cannot create user-defined entities. To overcome this, the BlankSpacy model can be used to train the user-defined annotated entities (Alam, Tanvir et al, 2021). Many clinical Natural Language Processing (NLP) tools and systems have been published (Amogh Kamat Tarcar et al, 2019; Xiaodong Liu et al, 2019). The growing quantity of textual biomedical information allows for the pre-training of language (Noha S Tawfik et al, 2020), which may then be used for a wide range of

*Corresponding author: Kayal Padmanandam
Email: kayalpaddu@gmail.com

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STRUCTURE BASED DRUG DESIGN METHOD: MOLECULAR DOCKING STUDY ON ANDROGENIC RECEPTOR AND PROSTATE SPECIFIC ANTIGEN WITH POTENTIAL LEAD MOLECULES

K Ganesh Kadiyala[1]
K. Jagadeesh
Ch. Geetika
I. Lakshmi Lavanya
B. Kanaka Durga
J. Suresh Kumar
Bachina Kiran
B. N. Suresh Varma Dendukuri

Keywords:

Androgenic Receptor, Prostate Specific Antigen, Docking, Enzalutamide, Abiraterone, Apalutamide, Galeterone, Ligands, Van der Waals interactions.

A B S T R A C T

Molecular docking simulations were conducted to analyze the interactions between eight lead molecules with AR and PSA proteins. The lead molecules included Enzalutamide, Abiraterone, Docetaxel, Apalutamide, Cabazitaxel, Bicalutamide, Curcumin, Galeterone, Resveratrol, and Darolutamide. For the Androgen Receptor (AR), Enzalutamide displayed the most favorable docking energy of -10.96Kcal/mol, followed by Galeterone (-10.52Kcal/mol) and Darolutamide (-9.97Kcal/mol). The binding affinities of these compounds to AR suggest potential inhibitors. On the other hand, resveratrol exhibited the strongest interaction with the AR protein (-8.02Kcal.mol) among the natural compounds studied (Resveratrol and Curcumin). In the case of Prostate Specific Antigen (PSA), Abiraterone showed a docking energy of -9.14 kcal/mol, indicating a potential interaction with PSA. The docking results suggest that Enzalutamide, Galeterone, and Darolutamide, hold promise as potential inhibitors for the Androgen Receptor in prostate cancer treatment. Abiraterone, Enzalutamide, Apalutamide ligands shown a significant interaction on Prostate Specific Antigen, hinting at its potential as a dual-target agent.

1. INTRODUCTION

Prostate cancer stands as one of the most prevalent and clinically challenging malignancies affecting men worldwide, with an estimated 1.4 million new cases diagnosed in 2020 alone (Bray et al. 2018). Despite significant advancements in diagnostic tools and therapeutic strategies, the quest for targeted and efficacious treatments remains an ongoing pursuit. This complex disease arises from its heterogeneous nature,

[1] K Ganesh Kadiyala, Department of Chemistry, Shri Vishnu Engineering College for Women, Bhimavaram-534202, Andhra Pradesh, India, E-mail: kganeshkadiyala@gmail.com

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A NOVEL ALU USING DISTRIBUTED ARITHMETIC FOR REAL TIME SIGNAL PROCESSING APPLICATION

M. Prasad[1]
K. Ajita Lakshmi
B. Jagadessh
Pokkuluri Kiran Sree
G. L N V S Kumar
A. V S M Ganesh
M. L Rekha
Ch. S. V. V. S. N. Murthy

Keywords:

Distributed Arithmetic (DA); OBC (Offset Binary coding); LUT (Look-Up Table); DA (Distributed Arithmetic).

A B S T R A C T

In the modern era, DSP is widely used in electronics, notably in mobile technology. It uses LUT-based schemes (SOP) and uses arithmetic and logical operations to reach the sum of products. A method known as distributed arithmetic is used to speed up complex calculations involving the sum of products. Any DSPs processing speed can be increased by employing Distributed Arithmetic to speed up the ALU computations. Modern DSPs require Distributed Arithmetic and OBC High-Speed ALU to increase computation efficiency. It is the ALU that helps perform accurate computations on real-time signals. Proposed study a novel in-site method for designing a Distributed Arithmetic and Offset Binary Coding-based ALU core for High-Speed DSP Processors. Due to its inverse symmetry, the Offset Binary Coding approach can reduce the area in half. When designing diverse ALU structures, structural or hierarchical modeling is preferred. Several LUT-based distributed arithmetic decomposition's are constructed and compared. Xilinx 14.7 ISE will also be used for performing performance assessments in terms of area, speed, and power.

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1. INTRODUCTION

At present, India is seeking to become a chip hub in designing chips for electronic devices and gadgets. Intel, Qualcomm, analog electronics, etc., intend to amp up the device growth of manufacturing chips that will be rolling out after 2025 and beyond years. The arithmetic and Logical Unit is an essential digital circuit comprised of two operations (Arithmetic and Logical Operations).

As shown in Figure 1, a conventional Arithmetic and Logic unit is a component of a central processing unit that performs arithmetic and logic operations on the operands based on opcode. In some processors, the CPU (Central Processing Unit), GPU (Graphics Processing Unit), and FPU (Floating Point Unit) all have multiple Arithmetic Logic Units (ALUs). The processor's internal calculations are carried out by the ALU, which applies mathematical and bit-wise operations to digital values.

Corresponding author: M. Prasad
Email: prasads.maddula@gmail.com

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OPTIMIZATION OF NEURAL NETWORK CLASSIFIERS BY LEVERAGING THE SEQUENTIAL FEATURE ENGINEERING FOR ROBUST WATER QUALITY PREDICTION SYSTEM

Maheswara Rao V V R[1]
Silpa N
Kranthi Addanki
Shiva Shankar Reddy
Ramachandra Rao Kurada
Pachipala Yellamma

Keywords:

Water Quality Prediction; Neural Networks; Feature Engineering; Data analytics; Predictive Modelling.

A B S T R A C T

Rapid population growth increases water demand, intensifying extraction from wells and rivers. The Water Quality Index (WQI) assesses water suitability for drinking based on multiple parameters. Accurate assessment of pollution in water is imperative for effective management of water quality. The present research on the Neural Network-based Robust Water Quality Prediction System (NN-RWQPS) exploits the capabilities of neural networks and advances in feature engineering, positioning it at the forefront of WQI. Venturing into the new world of predictive modelling armed with four different neural network classifiers: Wide, Bilayer, Trilayer, and an Optimized Neural Network. Further the study harness the power of feature selection, deploying four distinct methods. A champion feature selection method is scientifically validated for each neural network, and then the neural networks are fine-tuned by training them across a range of feature dimensions, unveiling an empirically supported set of optimal features. Study advances water quality prediction using neural networks and feature engineering.

1. INTRODUCTION

In the ever-evolving landscape of environmental science and data analytics, the research is poised at the forefront, where the pursuit of optimizing water quality prediction and unlocking the potential of neural networks and sequential feature engineering takes center stage. Water, the elixir of life, presents an intricate puzzle encapsulated within a vast dataset brimming with its subtleties, a puzzle that continues to challenge even the most adept scientists and researchers.

A neural-network classifier emulates the human brain's decision-making process. The system as depicted in Figure 1 consists of three essential layers: the input layer receives data, hidden layers process information, and the output layer produces results. The input layer receives and preprocesses data, transmitting it to the

[1] Maheswara Rao V V R
Email: mahesh_vvr@yahoo.com

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MACHINE LEARNING ALGORITHMS FOR ERYTHEMATO-SQUAMOUS DISEASE CLASSIFICATION: FEATURE RANKINGS AND PERFORMANCE ANALYSIS

M. Venkata Subbarao[1]
S. Lakshmi Praveena
T. Naga Sharmila
Praveen Kumar Nalli
G. Challa Ram
D. Ramesh Varma
Srinivasarao Alluri
Tabassum Nazeer Syed

Keywords:

Dermatology; psoriasis; Seborrheic dermatitis; Lichen planu; Pityriasis rosea; Chronic dermatitis; Pityriasis rubra pilari; ML classifiers; Kruskal-Wallis feature ranking.

A B S T R A C T

Erythemato-squamous diseases (ESDs), also known as erythrodermas, are a group of dermatological disorders characterized by both redness (erythema) and scaling (squamous) of the skin. These conditions can have various causes and implications. The implications of ESDs vary depending on the specific condition and its severity. While some may cause mild symptoms and have minimal impact on daily life, others can be chronic, recurrent, and significantly affect a person's physical and emotional well-being. Treatment options for these conditions may include topical medications, oral medications, phototherapy, and lifestyle modifications. In this paper, state of art machine learning (ML) algorithms is implemented for classification of ESD. To classify the disease a set of 11 clinical features and 23 histopathological features are considered. The performance of the ML classifiers is analyzed with individual sets of features and combination of both. Further, the performance of the ML classifiers is analyzed at different training rates to know the superior classifier for ESD classification. Furthermore, the study is extended to investigate the effectiveness of the Kruskal-Wallis algorithm in ranking the importance of features in the dataset used for disease classification. An investigation depicts that Ensemble and SVM classifiers outperformed the other ML classifiers in terms of accuracy and F1-score.

[1] Corresponding author: M. Venkata Subbarao
Email: mandava.decs@gmail.com

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ON STEREOGRAPHIC SEMICIRCULAR ERLANG DISTRIBUTION WITH APPLICATION

Radhika A. J. V.
Phani Yedlapalli
Peddi Raju, Ch.
Kishore, G.N.V
Sri Krishna, A
Pradeep Kumar, R. L. N

Keywords:

Semicircular data, inverse stereographic projection, trigonometric moments, simulation, estimation.

A B S T R A C T

In this research paper, we present an innovative investigation into a novel two parameter semicircular distribution, termed the "stereographic semicircular Erlang distribution," which is constructed using the inverse stereographic projection (ISP) technique. This distribution serves as advancement over the existing stereographic semicircular exponential distribution. We delve into essential mathematical properties of this distribution and execute a simulation study to estimate its parameter values. Furthermore, we perform an empirical analysis utilizing a dataset comprising posterior corneal curvature measurements extracted from the eyes of 23 patients. This empirical assessment is designed to evaluate the adaptability and potential applicability of the proposed distribution within the realm of ophthalmology in medical science.

1. INTRODUCTION

Circular data find widespread applications across various disciplines such as geology, meteorology, biology, earth science, political science, economics, and computer science, among others. Full circular models are extensively documented in seminal texts, including Fisher (1993), Mardia and Jupp (2000), and Jammalamadaka and Sen Gupta (2001). Nevertheless, it is essential to recognize that modeling circular data across the entire circle may not always be necessary, as acknowledged by Jones (1968), Guardiola (2004), Byoung et al. (2008), Phani et al. (2013, 2016, 2017, 2017a, 2019, 2020), and Girija et al. (2013). Noteworthy contributions have been made by Dattatreya Rao et al. (2007), Phani et al. (2011, 2012, 2023), Sakthivel et al. (2022), Oleiwi et al. (2022), and Salah Hamza Abid (2022, 2023) have introduced various circular and semicircular models through the application of inverse stereographic projection, a technique that maps point from the real line to the unit circle based on known probability distributions on real line. Further enriching this field Pramesti et al. (2015, 2016, 2017, and 2018) have explored and analyzed novel semicircular and circular distributions. Recent research by Rambli et al. (2015), Ali (2017) and Iftikhar et al. (2022) has introduced half circular distributions and discussed their applicability to real-world data sets.

[1] Corresponding author: Phani Yedlapalli
Email: phani.maths@svecw.edu.in

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Improving Realism in Face Swapping using Deep Learning and K-Means Clustering

S. Siva Rao[1]
J.N.V.R. Swarup Kumar
T.M.N. Vamsi
T. Ravi Kumar
K Rajendra Prasad
K Vijaya Kumar
P. S. Brahmanandam

Keywords:

Face swapping, Deep learning, Convolutional neural network (CNN), Computer vision, Accuracy..

A B S T R A C T

Facial swapping technology is a rapidly growing area of research with a wide range of applications, including entertainment, security, and healthcare. In this project, a deep learning approach was used to achieve highly accurate and realistic face swaps. Specifically, a CNN encoder and decoder network was trained using a large dataset of facial images, and facial clusters were generated using k-means clustering. Computer vision methodologies were also employed to accurately detect and align facial landmarks. The resulting model achieved impressive accuracy of 97% to 99.48% in different epochs, demonstrating its potential for various applications. The system configuration for executing the project included an 11th generation Intel Core i7 processor and 16GB RAM, which provided sufficient computational resources for the task at hand. Overall, this project highlights the power and potential of deep learning techniques for generating highly accurate and realistic facial swaps.

1. INTRODUCTION

In recent years, face swapping technology has become increasingly popular for a variety of applications, including surveillance, entertainment, and protection. The ability to automatically detect and replace faces in images and videos is a crucial component of this technology, and requires sophisticated machine learning algorithms and computer vision methodologies.

Cao et al. (2023) research study presents an approach to automatic face recognition and detection using a trained cascade. By optimizing the performance of the detector to minimize false positives and targeting each object, such as a person or vehicle, at least once in the environment, the system is able to accurately identify faces and people in cluttered scenes with minimal errors.

However, the high-resolution images captured by face replacement datasets can be complex and difficult to analyse without the right processing methods Tsai et al. (2023). Therefore, this study focuses on developing efficient techniques for detecting and classifying faces with a high level of accuracy and reliability. To achieve this, a multi-resolution algorithm is employed for object-dependent classification and segmentation, with the accuracy of the classification process being cross-checked against reference data. Yoo et al. (2023) research presented insights into the development of advanced face swapping technology and the use of

[1] Corresponding author: S. Siva Rao
Email: sivaturi@gitam.edu

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Smart Hybrid Models for Improved Breast Cancer Detection

Nageswara Rao Gali[1], Panduranga Vital Terlapu [2,*], Yasaswini Mandavakuriti[1], Sai Manoj Somu[1], Madhavi Varanasi[1], Vijay Telugu[1], Maheswara Rao V V R[3]

Keywords:

Breast Cancer, Deep learning, CNN, SVM, Random Forest, VGG-16, XGBOOST

A B S T R A C T

Breast cancer (BC) ranks the second most prevalent cancer among women globally and is the leading cause of female mortality. The conventional method for BC detection primarily relies on biopsy; this might be time-consuming and error prone. The substantial lives lost due to BC underscores its significant threat. Mitigating this threat focuses on early detection and prevention by adopting novel techniques. Many researchers have turned to Machine Learning algorithms to develop prognosis systems. We employ a combination of deep learning (DL) and machine learning (ML) algorithms for BC identification. Our approach is a hybrid Convolutional Neural Network (CNN) model, which performs better than other experimental and existing models. This model effectively categorizes histopathological images into either benign or malignant classes. We explored various methodologies, including CNN, CNN in conjunction with Support Vector Machine (SVM), CNN with Random Forest, and VGG-16 combined with XGBOOST. This research seeks to enhance the accuracy and efficiency of BC diagnosis. It contributes to more effective early detection and improved patient outcomes.

1. INTRODUCTION

Breast Cancer (BC) is a medical condition characterized by the uncontrolled growth of cells within the breast. There are various types of breast cancer, with the specific subtype determined by the type of cells that have undergone malignant transformation. BC can originate in the epithelial cells of the breast's lobules (15%) or ducts (85%), which are part of the glandular tissue (Lukong 2017; Kim et al., 2018). This cancer typically remains confined to the lobule or duct, often exhibiting no noticeable symptoms and minimal potential for metastasis (spreading to other body parts). BC will be diagnosed in approximately twenty-three billion women globally in 2020, resulting in 685,000 deaths (Khosasi, et al., 2023). By the end of 2020, about 78 million women would have been cancer-free for more than five years. BC may afflict women at any point of their lives and in any nation. Mortality rates for BC experienced fluctuations throughout the 1930s within the 1970s but began making improvements in the 1980s. These improvements can be attributed to early detection programs and a diverse range of treatment strategies aimed at eradicating invasive diseases (PanduRanga et al., 2019).

[2,*]Panduranga Vital Terlapu, [1] Nageswara Rao Gali
Email: vital2927@gmail.com, gnraoaitam@gmail.com

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NUMERICAL EXPLORATION OF VISCOUS FLOW REGIMES: INSIGHTS FROM POISEUILLE, COUETTE AND TAYLOR-COUETTE FLOWS

Venkat Rao Kanuri
K. V. Chandra Sekhar
P. S. Brahmanandam*
M. S. R. Murthy

Keywords:

Analytical and numerical solutions, Poiseuille flow, Couette flow, Pressure gradient force, Flow around a circular cylinder, Velocity profile.

A B S T R A C T

We present a numerical study for Poiseuille and Couette as well as Taylor-Couette swirling flows. The governing equations of momentum and energy are transformed into coupled and nonlinear ordinary differential equations using similarity transformation and then solved numerically. We critically evaluate the effect of dimensionless pressure gradients on fluid velocity and observed that the velocity increases as the dimensionless pressure gradient increases. Couette flows are simulated in different scenarios, including top plate moving, bottom plate moving, and top plate moving in adverse pressure gradient conditions. In a third scenario, the flow velocity profile revealed a backflow regime (BFR). A simple schematic model is, therefore, proposed to explain the presence of BFR in the flow's profile. Numerical and analytical solutions around the circular cylinder are presented. The marginal discrepancy between the analytical and numerical profiles is maximum at ~ 90^0 and 270^0 degrees, which indicates that the chosen method is suitable and capable of reproducing engineering problems. Velocity magnitude and vector diagrams show that the cylinder shape was found to have a significant effect on the flow field. The velocity at the top and bottom of the cylinder is twice the velocity that seen away from the cylinder.

1. INTRODUCTION

Analytical solutions are generally preferred to study the simple contour conditions of systems. For instance, analytical solutions are the most sought-after options when the modeling leads to a linear differential equation. Nevertheless, analytical solutions cannot obtain exact solutions when the presence of non-linear differential equations is imminent. On the other hand, numerical methods may provide approximate solutions even if the boundary conditions become complex and the fluid flow become transient. With the advent of the most powerful computers capable of performing calculations at relatively higher speeds, there is a rapid development that enabled several researchers to use different numerical methods in fluid flow engineering. Alexandre Joel Chorin introduced the first numerical method for

[1] Corresponding author: Brahmanandam P S
Email: dranandpotula@svecw.edu.in

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HIGH ACCURACY CLASSIFICATION OF PARKINSON'S DISEASE DETECTION USING RNN-GRAPH-LSTM

Phaneendra Varma Ch[1]
Gurujukota Ramesh Babu
Pokkuluri Kiran Sree
Padma Bellapukonda
K. Satish Kumar
Ch.Venkata Ramana

Keywords:

Parkinson's Disease, Dimensionality Reduction, Recurrent Neural Network

A B S T R A C T

Parkinson's disease is a progressive disorder that affects the nervous system and the parts of the body controlled by the nerves. In order to begin neuro protective treatments and effectively manage Parkinson's disease (PD), early detection is essential. In clinical use, the rapid finger tap test is commonly used to detect dyskinesias in Parkinson's disease, while physicians depending on their clinical expertise utilizing the PD uniform grading scale, swiftly evaluate the symptoms. This PD might be identified before physical symptoms appeared if Parkinson's patient's voices were monitored for improvements. In PD datasets, with non- overlapping samples, both the onset and offset of the energy content (voiced to unvoiced) were changed, dynamic feature evaluation was performed using 10-fold cross- validation. The accuracy, precision, and recall of the Recurrent neural network (RNN-GLSTM) smart PD detection approach has been statistically tested using persistent phonations, as well as the Matthew correlation coefficients. According to the analysis, effective and promising methods for collecting differentiating characteristics include shape analysis and surface fitting to create diagnostic models that might possibly support physicians in the diagnosis process. Accuracy, Precision, F1-Score, Recall are used parameters for performance analysis.

1. INTRODUCTION

The human brain's nerve cells are impacted by Parkinson's disease (PD), a neurodegenerative condition. It is a neurodegenerative ailment that affects the nerve cells in the human brain. 15% of occurrences of PD occur in people under the age of 50, while most individuals are diagnosed at 70 or above. There are two types of PD disease symptoms: motor and non-motor. Stiffness, slowness of motion, tremor, and some of the motor indications of Parkinson's disease include postural instability. Emotional problems, cognitive impairment, pain, sensory dysfunction, and this dysautonomia are one of the Parkinson's disease non-motor symptoms (Rana et al., 2015). The majority of PD patients have these two motor symptoms. In 90% of the cases (Naranjo et al., 2016) the PD detection approach based on phonation may detect vocal

[1] Corresponding author: Phaneendra Varma Ch
Email: chpvarmacse@svecw.edu.in

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A FIRST-TIME STUDY ON LONG-TERM PERFORMANCE ANALYSIS OF PHOTOVOLTAIC (PV) PLANTS AT BHIMAVARAM (LATITUDE- 16.54^0 N, LONGITUDE- 81.52^0 E, MSL 7 M), INDIA

K. Omkar
S. M. Padmaja
G. Anil Kumar
P. L. S. Pravallika
G. Durga Prasad
SSSR Sarathbabu Duvvuri

Keywords:

Solar power plants, Polycrystalline Solar Cells, V-I Characteristics

A B S T R A C T

This study evaluates the daily, monthly, and annual performance of roof-top 200 KWp grid-interactive solar PV power plants installed atop Sri Vishnu Educational Society buildings in India. This plant generated ~ 300,000 units/ year, with a maximum yielding of ~800 KWh/ day during summer (March-June) and a minimum during the rainy season (July-September, ~ 600 KWh/ day). 1237 ton of CO_2 emissions were avoided and $2,10,000 was made. As a result, the payback took 7-8 years to complete. The statistical study revealed a minimum (1%-15%) drop in power yielding, which indicates this plant used high-standard solar cells (polycrystalline), sophisticated inverters, top-quality molded case circuit breakers, and others. The optimal level of power output generation, V-I characteristics and power and economic graphs were predicted using a simulation study. Inter-institutional comparisons made with new 302.4 KWp power plants show an identical daily pattern, albeit 302.54 KWp power plant yieldings oftentimes show marginal magnitudes.

1. INTRODUCTION

Abundantly available solar energy, long-lasting and clean energy is a most effective alternative to non-renewable sources such as coal, oil, and natural gas. Photovoltaic (PV) cells will be made of semiconductor materials that let solar energy (in the visible spectrum and partially in the ultraviolet and infrared spectrum) be converted into electricity. Ever since the development of PV technology took place in Bell labs of USA in the year 1954, various technological advancements and highly encouraging government policies over the years have brought the prices of PV modules to affordable rates, and, hence, the production and utilization of solar energy have increased tremendously many folds even in under developing countries such as Kenya and Morocco (Abdullahi et al., 2017). On the flip side, solar power still only accounts for a mere 5% of capacity and 2.2% of electricity generation globally (Global Market Outlook for Solar Power, 2019-2023), which implies that still a lot of subsidiaries may be provided to encourage the effective usage of solar energy, and other appropriate measures need to be adopted. Secondly, proper quantification of output power generated from a PV power plant shall be done adequately to enhance the

[1] Corresponding author: P S Brahmanandam
Email: dranandpotula@svecw.edu.in

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IDENTITY-BASED PRIVACY-PRESERVING ANONYMOUS AUTHENTICATION ACCESS CONTROL FOR SECURE CLOUD COMPUTING

N. Praneetha
S. Srinivasa Rao[1]
V. V. R. Maheswara Rao
P. S. Brahmanandam
I. S. Siva Rao

Keywords:

Privacy-preserving cloud computing; Secure Data sharing; Identity-based Hierarchal Cryptographic, Access Control Policy; Secure Authentication

A B S T R A C T

The storage of data with access controllability in sharing data between multiple users in a dispersed environment is now the most pressing issue in cloud computing. Cloud computing's unique feature allows its subscribers to exchange and manage their data with one another safely. However, privacy is essential for all cloud users to communicate freely and openly, as data is accessed by unwanted parties in the cloud. Cloud services have employed numerous security-related techniques for efficient and safe user data exchange. These methods provide efficient, flexible, and reliable access control rules between users when exchanging data. But, they each have advantages and disadvantages concerning key generation and data security. To address the need for adaptable, scalable, and trustworthy access control while exchanging data across a dispersed network, this research proposes a novel access control-based privacy-preserving approach. In terms of cipher text and critical policy security, this method is an extension of attribute-based encryption and the only difference is that with cloud computing, users hierarchically share data, and access control policy amongst shared users is evaluated efficiently. Our method includes sophisticated security features like the revocation of users and access rights of users for outsourced data in the cloud. It also provides scalability and dependability in producing critical structures with dynamic qualities. Experimental results demonstrate that the suggested method improves the current system in terms of cloud data sharing efficiency, scalability, and dependability.

1. INTRODUCTION

Distributed computing is an innovative, constantly evolving science-related application that consists of interconnected data sets with shared adaptability, skill in sharing, and web-dependent client demands. In addition, it is a promising approach to determine capacity limits and should be used everywhere. It uses robust, flexible resources in the cloud to lessen the computational

[1] Corresponding author: Dr. S. Srinivasa Rao
srinu1479cse@kluniversity.in

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REVOLUTIONIZING FEATURE ENGINEERING FOR ROBUST ENSEMBLE MACHINE LEARNING BY HYBRIDIZING MRMR INSIGHT AND CHI2 INDEPENDENCE

Silpa N[1]
Sangram Keshari Swain
Maheswara Rao V V R

Keywords:

Feature Engineering, Minimum Redundancy Maximum Relevance, Chi square, Ensemble Machine Learning, Incremental feature selection.

A B S T R A C T

In the realm of data science, dealing with real-world datasets often presents a formidable challenge, primarily due to the sheer volume of features that significantly lack relevance or may be redundant. Effective feature engineering is vital in constructing robust ensemble ML models, where the choice of input features influences overall performance. Towards this, the present research presents a novel framework to feature engineering by hybridizing the MRMR insights and Chi2 independence techniques. MRMR emphasizes feature relevance and non-redundancy, while Chi2 quantifies the independence of features from the target variable. The hybrid framework adheres to the incremental feature engineering approach, with the goal of improving predictive accuracy, model robustness, and adaptability. Through extensive experimentation on employed water quality dataset, the framework illustrates the superiority of hybrid model over using MRMR and Chi2 independently. The results of the proposed HFE-EML exhibit substantial improvements, reaching approximately 99.10% in ensemble machine learning models' performance, reduced overfitting, and enhanced generalization.

1. INTRODUCTION AND RELATED WORK

The widespread use of real-world datasets from many areas has become commonplace in the present era of data-driven applications. The use of these datasets frequently presents a variety of obstacles, encompassing issues related to the quality and amount of data, as well as concerns regarding computing efficiency and the effectiveness of models (Cui et al., 2020; Kurada et al., 2023). Within a multifaceted context, the significance of proficient feature engineering becomes evident as a crucial element in achieving the aims of predictive modelling (Uddin et al., 2018; Silpa et al., 2023) The function of feature engineering might be compared to that of a proficient sculptor, who carefully molds and refines the unprocessed data in order to create the metaphorical masterpiece of ML models (Kumar and Pratap, 2023). The absence of this crucial stage can greatly impede the prediction capabilities of ML models (Wang et al., 2022; Rao et al., 2023).

[1] Corresponding author: Silpa N
Email: nrusimhadri.silpa@gmail.com

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New Chung-Li Meteor Radar in Taiwan – Preliminary Results

Ching-Lun Su
Po-Hsun Chiu
Ruey-Ming Kuong
Hsyang-Chan Chen[1]
Yen-Hsyang Chu
A. Narendra Babu
P. S. Brahmanandam

Keywords:

Meteor radar; Underdese Meteor Trail; Middle Atmosphere Neutral Wind Velocity; Interferometry.

A B S T R A C T

A new 39.9 MHz meteor radar was implemented in 2022 in Jhongli area, Taiwan, which is operated by National Central University in Taiwan and referred to as Chung-Li meteor radar. This radar is a bistatic radar with transmitter and receiver systems located at Bade City and Xinwu District, respectively, with a horizontal separation of about 22.3 km between them. The antenna array of the receiving system is composed of 5 cross-Yagi antenna elements for receiving circularly polarized radar returns from the meteor trails which is arranged in a cross shape with separations of 1.5¯ or 2.5¯ between different antenna pairs. In this article, detailed characteristics of the new Chung-Li VHF meteor radar will be introduced and the preliminary results of the meteor winds in height range from 80-110 km, which are estimated from the Doppler velocities of the echoes from under dense meteor trails, are presented. We find that the phases of observed meteor winds are in good agreement with those of Horizontal Wind Model (HWM). However, there are discrepancies in horizontal wind velocities between Chung-Li meteor radar observations and HWM model predictions. Plausible causes of the discrepancy are discussed.

1. INTRODUCTION

Middle atmosphere that situates in height range from 50 to 100 km is a critical zone connecting lower and upper atmospheres. Scientists have long been aware that many quasi-periodic oscillations in temperature and density of thermosphere and wave-like variations in ionospheric electron density are results from the gravity waves associated with disturbances in lower atmosphere propagate upward through middle atmosphere and eventually into upper atmosphere to produce the perturbation phenomena therein (Hines, 1959; Kelley, 1989; Fritts, 2003; Yu et al., 2017).

In light of its importance in the investigation of lower and upper atmospheric coupling, middle atmosphere has been observed and monitored globally not only in temporal, but also in spatial domains using different means, including in-situ measurement made with payloads on board sounding rockets (e.g., Chu et al., 2007), remote sensing using satellite payloads (e.g. Yee et al., 1999), optical all-sky imagery (Swenson and

[1] Corresponding author: Prof. Y H Chu & Dr. P S Brahmanandam
e-mail: yhchu@ss.jupiter.ss.ncu.edu.tw; dranandpotula@svecw.edu.in