ALLIANCE UNIVERSITY
CENTRE for RESEARCH
DSIR RECOGNIZED SIRO
DEPARTMENT OF SCIENTIFIC & INDUSTRIAL RESEARCH GOVT. OF INDIA

ALLIANCE RESEARCH CHRONICLES

SEPTEMBER 2025
Volume 9

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C/ Patents

ABOUT ALLIANCE UNIVERSITY

Alliance reimagines the idea of the university by creating a community that leads the charge against the complex challenges of the 21st century. The university conceives research to be the essence of all teaching and learning practices. A unity between research and teaching is promoted to extend the frontiers of knowledge in order to solve real world problems at the local, national, and global scale. For this purpose, the university seeks to be the nerve centre of interaction between the industry, the government, the civil society, and the community at large.

In times when technological and social change is transforming the very idea of employability, the university embraces the increasing diversity of specializations while retaining the impulse to unify all knowledge.

A designed convergence of the business, engineering, law and liberal arts units precipitates transdisciplinarity as the core academic philosophy.

Freely working across divergent streams of knowledge like psychology and data science, technology and law, physics and philosophy or businesses and rhetoric, transdisciplinarity nurtures a dynamic foundation for the spirit of collaboration, inquiry, and enterprise.

VISION

Alliance University's vision is to be a world-class University that nurtures talent and catalytically transforms the lives of millions through excellence in teaching, research, service and community development. To uphold a commitment to shaping lives through scholarly teaching and learning, and that which contributes to an equitable and holistic transformation of society at large.

MISSION

The mission of the University is to create and sustain a community of lifelong learners in an environment that emphasizes literacy, critical thinking, and humanistic and scientific inquiry.
The University provides a dynamic, challenging and ethical environment for pursuing high quality teaching, research, learning and service across all areas of University, where students, faculty and other key constituents can interact, collaborate and partner with the global community for creation and dissemination of knowledge and transform lives of people through innovation and excellence in higher education.

ABOUT CENTRE *for* RESEARCH

The Centre for Research of Alliance University has been established to oversee the doctoral program and promote quality research through various Centres of Excellence (COEs) and publications.

The Centre for Research will be the nodal research center for Alliance University and will be committed to facilitating and promoting all academic research related activities. The Centre seeks to focus on providing a platform to Researchers and Academicians for thought provoking research on new and emerging fields and revolves around advancing knowledge and innovation within specific fields or interdisciplinary areas.

VISION

To pioneer transformative research initiatives that propel Alliance University to the forefront of global academia, driving innovation, societal advancement, and contributing to global progress and well-being.

MISSION

1. **Knowledge and Innovation:** Conduct cutting-edge research across disciplines to expand the frontiers of knowledge and drive innovation that addresses global challenges.
2. **Foster Collaborative Partnerships:** Cultivate partnerships with academic institutions, industries, and organizations worldwide to facilitate knowledge exchange, collaboration, and impactful research outcomes.
3. **Empower Research Scholars:** Provide a supportive environment, resources, and mentorship to empower researchers to pursue ambitious research agendas, develop critical skills, and become leaders in their fields.
4. **Address Global Challenges:** Tackle pressing global challenges such as climate change, healthcare disparities, food security, and technological advancement through interdisciplinary research that generates actionable solutions.
5. **Promote Societal Impact:** Translate research findings into real-world applications and policies that positively impact society, foster sustainable development, and contribute to the betterment of humanity and the planet.

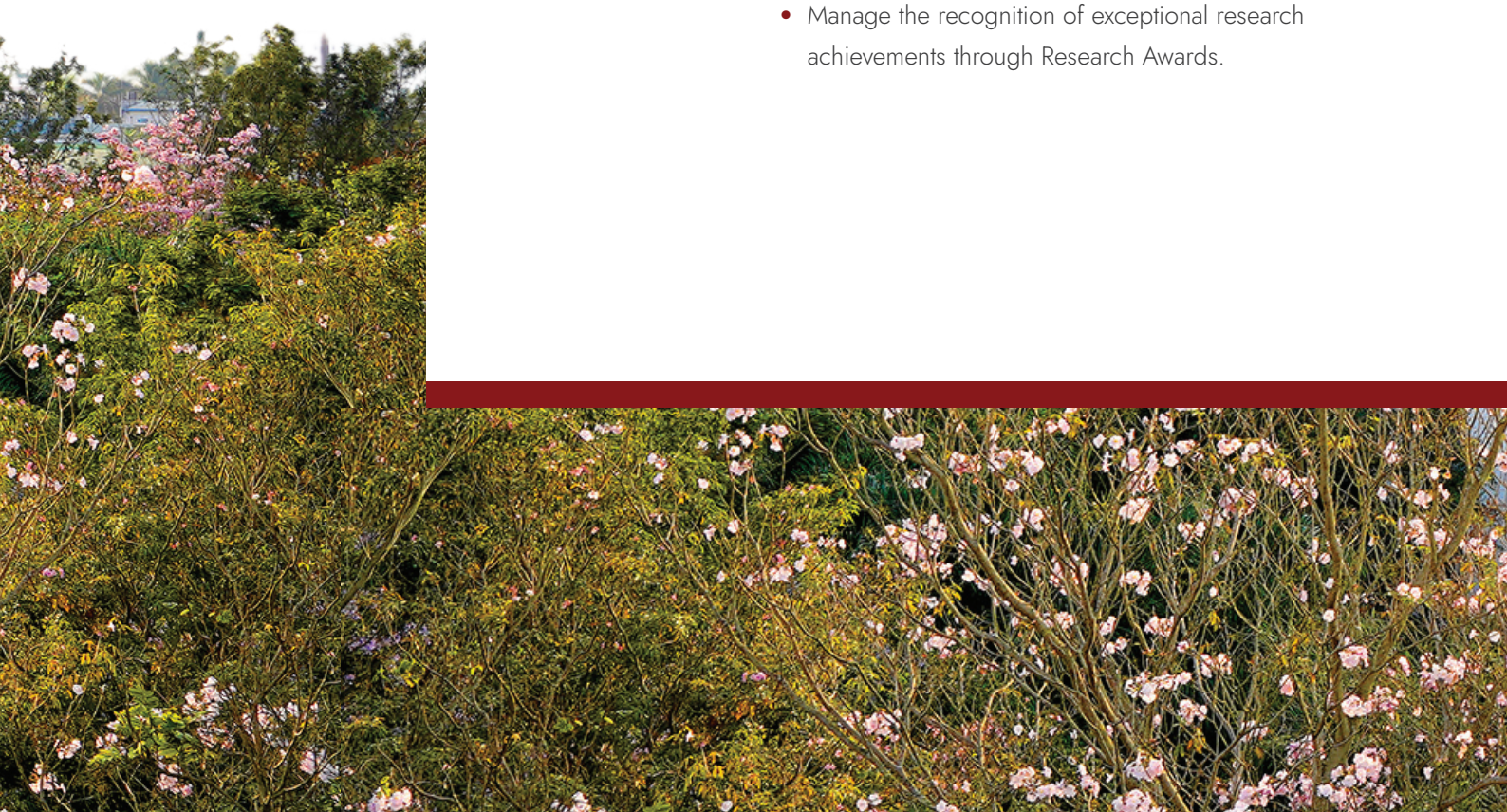
ABOUT CENTRE *for* RESEARCH (Contd.)

CORE VALUES

- **Collaboration:** Foster a culture of collaboration, inclusivity, and openness, recognizing the value of interdisciplinary teamwork and partnerships in addressing complex global challenges.
- **Innovation:** Embrace creativity, curiosity, and innovation, encouraging bold and unconventional approaches to research that lead to breakthrough discoveries and advancements.
- **Integrity:** Uphold the highest ethical standards in all research activities, demonstrating honesty, transparency, and accountability in the conduct and dissemination of research.
- **Agility:** Embrace agility and adaptability in response to evolving research landscapes and emerging challenges, fostering a culture of flexibility, innovation, and continuous improvement.
- **Diversity and Inclusion:** Value and celebrate diversity in perspectives, backgrounds, and experiences, fostering an inclusive research environment where all voices are heard, respected, and valued for their contributions.

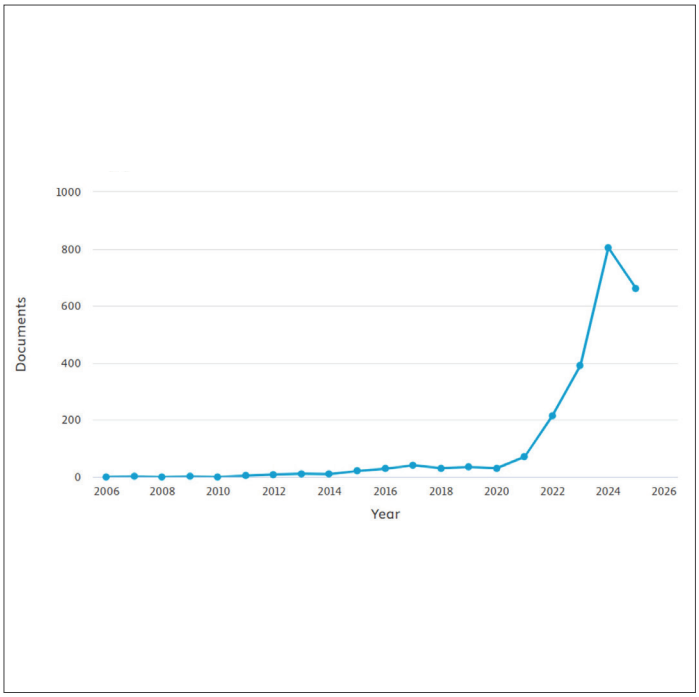
OBJECTIVES

- Support the Ph.D. Admission process and facilitate the Ph.D. Program across all academic units of Alliance University.
- Providing resources and support for faculty, students, and visiting/full-time scholars engaged in research activities.
- Contributing to the advancement of knowledge through publications, presentations, and other forms of dissemination.
- Fostering collaboration among researchers within and outside the institution.
- Conducting cutting-edge research in specific fields or interdisciplinary areas.
- Addressing societal challenges and promoting solutions through research and innovation.
- Enhancing the reputation and impact of the institution through high-quality research outputs.
- Supporting the professional development of researchers and students through training, mentorship, and networking opportunities.
- Serving as a hub for intellectual exchange, seminars, workshops, and conferences to promote interdisciplinary collaboration and knowledge sharing.
- To oversee the working of Academic Integrity bodies which includes the Department Academic Integrity Panel (DAIP) and Institution Academic Integrity Panel (IAIP).
- Manage the recognition of exceptional research achievements through Research Awards.

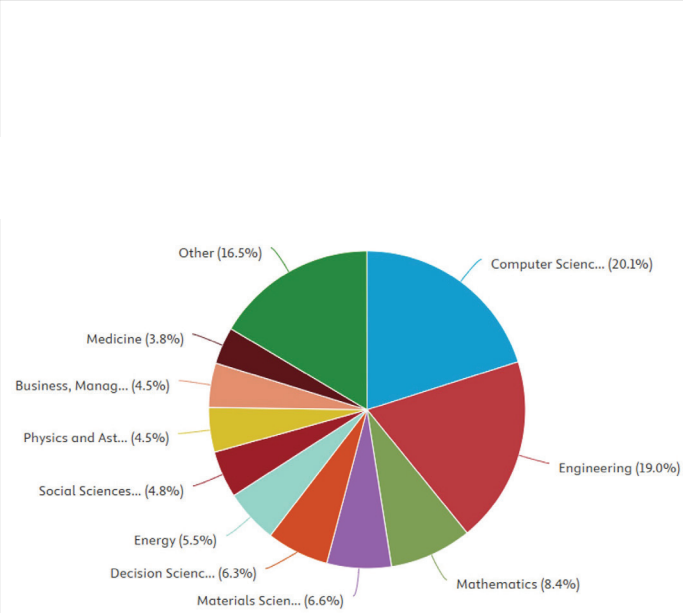


2385	909
Documents	Authors

Documents by Year



Documents by Subject Area

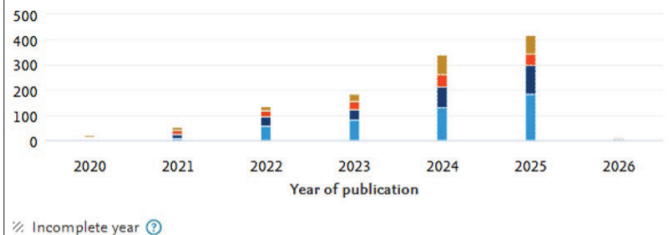


Summary

2385	909	11567	6.4	1.93	46
Scholarly Output	Authors	Citation Count	Citations per Publication	Field-Weighted Citation Impact	H-index

Note: Scholarly output, Authors and Citation Count are Taken from SCOPUS, and other Metrics are taken from SCIVAL.

Publication by Journal Quartile



Quartiles	Publications	Publication share (%)
Q1 (top 25%)	479	41.0
Q2 (26% - 50%)	292	25.0
Q3 (51% - 75%)	177	15.2
Q4 (76% - 100%)	219	18.8

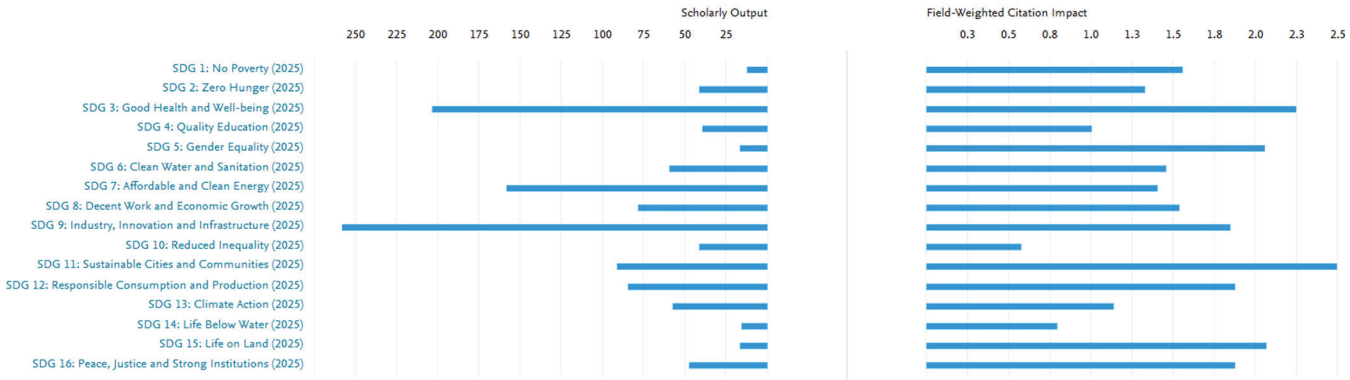
Cumulative shares	Publications	Publication share (%)
Q1 to Q2 (top 50%)	771	66.1
Q1 to Q3 (top 75%)	948	81.2

Geographical Collaboration Overall

national and institutional collaboration by Alliance University in the selected year range.

Metric	Publication share	Scholarly Output	Citations	Citations per Publication	Field-Weighted Citation Impact
International collaboration	30.9%	630	4,826	7.7	2.09
Only national collaboration	48.7%	992	3,437	3.5	2.28
Only institutional collaboration	14.6%	297	342	1.2	1.02
Single authorship (no collaboration)	5.9%	120	131	1.1	0.44

Publication by SDG



* The Publication metrices and the author affiliations are taken from SCOPUS/SciVal as on Aug 15, 2025


NON SOLUS
Scopus
JOURNALS


Clarivate™
Web of Science

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**82nd**	**4.3**	12 RESPONSIBLE CONSUMPTION AND PRODUCTION

ISOLATION OF MICROCRYSTALLINE CELLULOSE FROM VEGETABLE WASTE BIOMASS AND ITS POTENTIAL AS A HIGH-PERFORMANCE GREEN REINFORCEMENT IN BIOCOMPOSITES

Suyambulingam, I.; Somasundaram, R.; Divakaran, D.; Senthil Kumar, S.; **Senthamaraikannan, P.**; Ayrilmis, N.; Handayani, M.

Bioresource Technology Reports Article 2025

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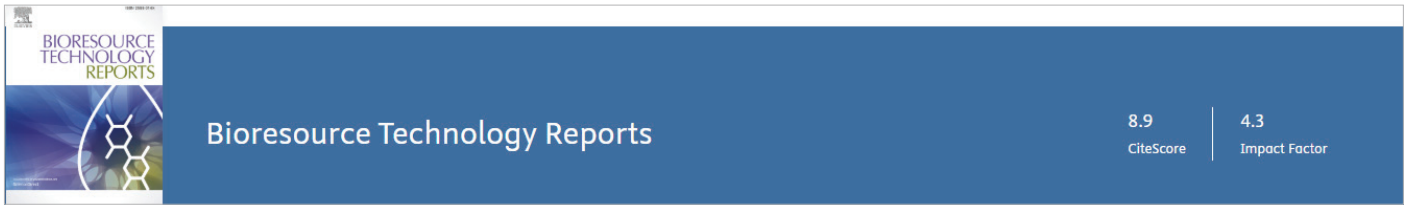

Abstract

Global problems on waste disposal and sustainable material production require an innovative concept for recycling and utilization of waste materials. This work was centred toward isolation and comprehensively characterizing of microcrystalline cellulose from a market waste. High purity microcrystalline cellulose was obtained through a chemical process that uses tetraethylenetetramine, tartaric acid, sulfamic acid and sodium percarbonate in sequence. The extracted microcrystalline cellulose had a yield of 38 %, density of 1.491 g/cm3 and an impressive cellulose content of 95.19 %. Characterization analysis such as Fourier-transform infrared spectroscopy, X-ray diffractometer, ultraviolet-visible spectroscopy, thermal analysis, and morphological analysis showed that the synthesized material was highly crystalline with crystallinity index of 73.8 % and average particle size of 103.696 μm. The microcrystalline cellulose had a good thermal stability with a thermal degradation temperature of 228.56 °C and energy of activation of 74.16 kJ/mol. The scanning electron microscopy analysis revealed a rough and porous surface with distinct crystal bundles and average particle size of 103.696 μm which were beneficial in improving interfacial adhesion in composites. Additional surface roughness parameters determined by atomic force microscopy scans yielded negative skewness values, and higher kurtosis to support the material's applicability for mechanical reinforcement. The findings revealed that the microcrystalline cellulose derived from agricultural waste disposal was a sustainable and effective reinforcement for advanced composites. In addition, the microcrystalline cellulose supports the circular bioeconomy and achievement of sustainable development goal (SDG 12) established by the United Nations in 2015, which focuses on responsible consumption and production. © 2025 Elsevier Ltd

Author keywords- Biomass waste; Microcrystalline cellulose; Polymer composites; Responsible consumption and production; SDG 12; Sustainability

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	58th	3.0	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

IMPROVING ROUTING IN WIRELESS SENSOR NETWORKS TECHNOLOGY ON DATA AGGREGATION USING FUSED CLUSTER ROUTING ALGORITHM

Ghantasala, G.S.P.; Atlas, L.G.; Sathiyaraj, R.; Ponmaniraj, S.; Vidyullatha, P.; Arvindhan, M.

Discover Sustainability Article Open Access 2025

Dr. Ghantasala Gnana Sudha Pradeep
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Alliance School of Advanced Computing

Abstract

A crucial challenge in wireless sensors networks (WSNs) is effective communication with tolerable power depreciation of sensor nodes. A bottleneck in the transmission of superfluous data is inevitable in every large network. Energy, latency, and data redundancy are the three identified challenges; to increase existing effectiveness, a trade-off must be made. Existing methods in the literature either employ a distributed or centralized strategy to select a sensor node. The paper proposes a fused clustering-based model with a routing algorithm. In this paper, a dedicated energy-efficient Fused Cluster Routing Algorithm (FCRA) intends to improve data aggregation in WSNs. With applications such as environmental monitoring, catastrophe management, smart agriculture, and urban planning being deployed, a need for low-energy communication protocols breeds more essential. The proposed FCRA integrates hierarchical clustering to optimize routing, thereby reducing transmit redundancy and conserving node energy. This directly contributes to the longevity and reliability of sensor networks in the domains of sustainability. The ideal routing technique for Cluster-Head (CH) identification is dependent on every sensor node's processing capability, and it also assists in handling the intermediaries in the communication path. To enable efficient communication, data from both clusters is gathered utilizing location and temporal correlation, then aggregated. While related to the earlier suggested methods, the proposed method efficacy is shown to be higher, indicating its effectiveness. The efficacy of the proposed algorithm is assessed using modelling criteria such as aggregation, packet transfer percentage, throughput, packet delay, and used energy. This tremendous finding lays emphasis on optimized routing of WSNs which aids in sustainable infrastructures, resilient ecosystems, and informed environmental governance.

Author keywords- Correlated routing; Data aggregation; Energy consumption; Fused clustering; Wireless sensor networks

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**86th**	**7.9**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

RELAY NODE SELECTION USING FUTURE MOVEMENT PREDICATION FOR OPPORTUNISTIC NETWORK

C. P., Koushik, J. P. , **Shritharanyaa, R.** , Roselinkiruba, K. B. , Ajeyprasaath

Results in Engineering Article Open Access 2025

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Abstract

Opportunistic Networks (OppNets) function effectively in environments where stable connectivity and traditional networking infrastructure are lacking or inconsistent. Due to the highly dynamic nature of these networks, accurately predicting node movement and selecting appropriate relay nodes are essential for improving routing efficiency and resource management. This work introduces a protocol named Relay Node Selection using Future Movement Prediction (RNSFMP), which combines mobility forecasting through Artificial Neural Networks (ANNs) with a Connecting Table-based Relay Node Selection (CT-RNS) mechanism. The mobility prediction model employs ANNs to analyze past movement patterns and estimate future node positions. Based on this foresight, the CT-RNS algorithm uses locally maintained routing data to identify optimal relay candidates for forwarding data toward the destination. To evaluate its performance, the proposed RNSFMP protocol was tested against established routing schemesMaxProp, Epidemic, and PRoPHET. Metrics such as packet delivery ratio, end-to-end delay, and transmission overhead were used in the comparison, and the results indicate that RNSFMP offers improved data delivery efficiency in intermittently connected environments.

Author keywords- Mobility prediction; Opportunistic network; Opportunistic network environment (ONE) simulator; Relay node selection

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	**69th**	**2.8**	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

INVESTIGATION OF UP-CONVERSION LUMINESCENCE PROPERTIES AND OPTICAL TEMPERATURE SENSING BEHAVIOR IN CaMoO4: Pr3+/ Yb3+ PHOSPHORS

Nogueira, F.E.A.; Do Nascimento, J.P.C.; do Carmo, F.F.; Abreu, T.O.; da Silva, M.A.S.; da Silva, R.S.; **Singh, Charanjeet;** Sombra, A.S.B.

Physica B: Condensed Matter Article 2025

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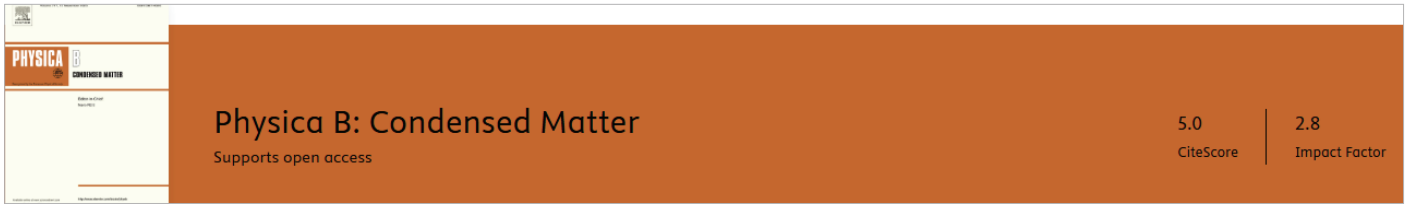

Abstract

CaMoO4:Pr3+/Yb3+ phosphors were synthesized employing the solid-state reaction, whereas the temperature dependence of up-conversion (UC) luminescence properties under 980 nm excitation and the potential application as an optical temperature sensor were investigated. X-ray diffraction (XRD) analysis demonstrated the absence of secondary phase, confirming the formation of a single phase for the materials investigated and that co-doped samples have the same structure as CaMoO4. Phosphors were excited at 980 nm demonstrating blue, green, red emissions correlated to transitions from Pr3+ ions. Moreover, optical temperature-sensing properties were analyzed employing the Fluorescence Intensity Ratio (FIR) technique, whereas relative (SR) and absolute (SA) sensitivities were calculated from Thermally Coupled Levels (TCL) and Non-Thermally Coupled Levels (NTCL) from Pr3+ ions. The highest sensitivity values were obtained for NTCL 600 nm/650 nm, with SA = 14.81 × 10−3 K−1 and SR = 1.93 % K−1 demonstrating that the CaMoO4:Pr3+/Yb3+ system could be employed as optical temperature sensors in the high-temperature region. © 2025 Elsevier B.V.

Author keywords- CaMoO4:Pr3+/Yb3+; Fluorescence intensity ratio (FIR); Optic temperature sensor

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**89th**	**3.9**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

VARNET-6G WITH FIERO MODEL FOR ANOMALY DETECTION AND ENHANCING NETWORK STABILITY IN FUTURE-READY COMMUNICATION SYSTEMS

Ganesh, S.S.; Abdelhaq, M.; **Palanisamy, S.**; Subbiah, S.

Scientific Reports Article Open Access 2025

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scientific reports

Abstract

The world is moving toward communication networks of 6G, so security will become a very essential aspect for the integrity and reliability of the system. Advanced anomaly detection and dropout rate estimation techniques are required due to the exponential rise in network traffic, diversity in applications, and interconnectivity of devices. Most of the anomaly detection models until now are encumbered with the issues of scalability, being adaptable to new types of attacks, and the capability of processing large, dynamic network data efficiently. In order to address these challenges, this paper proposes two new techniques: the Variational Autoencoder and Recurrent Transformer Network for 6G (VARNet-6G) for anomaly detection and the Flamingo-Infused Evaporation Rate Optimizer (FIERO) for dropout rate estimation. VARNet-6G deals with sequential data in an efficient way to achieve robust real-time anomaly detection by combining variational auto-encoders with recurrent transformers. On the other hand, FIERO introduces a new optimization technique inspired by natural phenomena for the estimation of dropout rate, which provides highly accurate network performance estimates and ensures network resilience. The proposed schemes have improved by large margins over the existing models, addressing the limitations of traditional techniques in both anomaly detection and dropout rate estimation. The novelty of this work lies in the hybrid approach in combining deep learning with nature-inspired optimization, which guarantees more accurate, scalable, and adaptive solutions to secure 6G networks.

Author keywords- 6G communication networks; Anomaly detection; Classification; Deep learning; Feature analysis; Security

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	89th	3.9	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

A LIGHTWEIGHT DEEP LEARNING METHOD FOR MEDICINAL LEAF IMAGE CLASSIFICATION USING FEATURE FUSION

Gautam, V.; Kaur, G.; **Pradeep Ghantasala, G.S.P.**; Vidyullatha, P.; Allabun, S.; Othman, M.; Zheleznyak, A.

Scientific Reports Article Open Access 2025

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scientific reports

Abstract

Medicinal plants offer a wealth of essential nutritional properties, yet identifying their leaves is a compound and time-consuming task which often challenges human observers. An automated computer vision system is essential to support researchers and farmers in accurately and efficiently identifying these leaves. This study introduces a novel federated learning-based Feature Fusion deep learning model for classifying medicinal plant leaves (https://data.mendeley.com/datasets/nnytj2v3n5/1). The proposed approach employs an NCA-CNN (Neighborhood Component Analysis-Convolutional Neural Network) framework to integrate features effectively. Using RGB images, the model extracts hybrid handcrafted features, such as Local Binary Patterns (LBP) and Histogram of Oriented Gradients (HOG), collective with deep features. These features were fused into a cohesive feature vector through canonical correlation analysis (NCA), enhancing key characteristics while reducing noise. A CNN classifier then categorizes the medicinal leaf images. The model efficiently processes diverse image features to train and evaluate a client-side model across multiple resolutions. The proposed method accomplished an exceptional accuracy of 98.90% on the test dataset. The proposed approach demonstrated superior performance, underscoring its robustness and potential for advancing both academic research and agricultural applications.

Author keywords- Classification; CNN; Deep learning; Detection; Feature fusion; Global average pooling (GAP); Image processing; Medicinal plant

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**89th**	**3.9**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

PREDICTION OF SUITABLE DRUG FOR KELOID THROUGH ANALYTIC HIERARCHY PROCESS AND TOPOLOGICAL INDICES

Janagi, K.; **Usha, A.**; Ismail, R.; Shanmukha, M.C.

Scientific Reports Article Open Access 2025

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Department of Pure and Applied Mathematics
Alliance School of Sciences

scientific reports

Abstract

The aim of the study is to identify the most suitable drug in treating Keloid, from the considered drugs using Multi Criteria Decision Making (MCDM) technique, Analytic Hierarchy Process (AHP) via degree-based topological indices. Topological indices play a vital role in predicting the biological and physicochemical properties of chemical compounds by deriving them from the molecular structure using specific rules. Given the growing prevalence of keloid cases, there is an increasing need for safer and more effective drugs. This study investigates 12 keloid drugs by applying the QSPR technique with respect to their physicochemical properties. The drugs are ranked using the AHP with specific criteria, allowing for the identification of the most effective drug combinations to help in the development of improved treatments for keloids. From the analysis, it is observed that the most effective and suitable drug is Doxorubicin while the least effective drug is 5-Fluorouracil.

Author keywords- AHP; Complexity; Keloid; Molecular weight; Non-hydrogen atom count (heavy atom count); Topological indices

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	83rd	5.1	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

BIOMASS-ENGINEERED RGO COUPLED WITH YTTERBIUM DOPED COBALT PYROVANADATE: A SUSTAINABLE ELECTRODE MATERIAL FOR SUPERCAPACITOR AND OER ACTIVITY

Vinoth, S.K.; Alhamzani, A.G.; Abou-Krisha, M.M.; Abdelrahman, E.A.; Aljlil, S.A.; Varghese, A.; Raghu, M.S.;
Yogesh Kumar, K.

Diamond and Related Materials Article 2025

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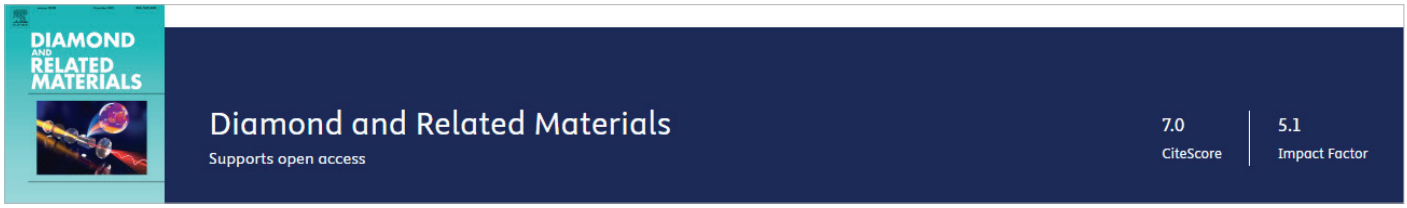

Abstract

The advancement of next-generation energy storage and conversion technologies depends on the fabrication of high-performance sustainable electrode materials. The current work explores the environmentally benign method for the synthesis of reduced graphene oxide (rGO) from activated carbon generated from waste mango seeds. Ytterbium-doped cobalt pyrovanadate (Yb@$Co_2V_2O_7$:CoV) nanoparticles were anchored to rGO through the solvothermal method to generate Yb@CoV-rGO nanocomposite. The materials were used as electrode material for supercapacitor applications and observed a specific capacitance (Csp) of 128, 413 and 769 F/g at a scan rate of 2 mV/s using the cyclic voltammetry technique. An asymmetric device was also fabricated using synthesized activated carbon as the negative electrode and Yb@CoV-rGO nanocomposite as the positive electrode, resulting in a specific capacitance (Csp) of 414.5 F/g at a current density of 1 mA/g in 0.1 M H_2SO_4. In addition, oxygen evolution reaction (OER) studies were conducted and observed overpotentials of 320 mV and 510 mV in the presence of Yb@CoV-rGO and Yb@CoV, respectively, at 10 mA/cm2current density. The Tafel slope for Yb@CoV-rGO and Yb@CoV was found to be 196 and 394 mV/dec. Under both the electrochemical studies, Yb@CoV-rGO showed enhanced electrochemical performance compared to the other two pristine materials. The enhanced conductivity, superior redox behavior, effective OH−adsorption and oxygen release could be reasons for enhanced activity in the Yb@CoV-rGO nanocomposite. The obtained results justify Yb@CoV-rGO's dual electrochemical activity for energy storage and conversion. The conversion of waste into energy-generating value-added products aims to address environmental and energy sector issues.

Author keywords- Electrochemistry; OER; Supercapacitor; Waste to wealth; Yb@CoV-rGO

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q1	**83rd**	**5.1**	

UPCYCLING WASTE PLASTICS INTO rGO-Yb@$NiFe_2O_4$ HYBRID ELECTRODES FOR HIGH-PERFORMANCE SUPERCAPACITORS AND HYDROGEN EVOLUTION

Vinoth, S.K.; Alhamzani, A.G.; Abou-Krisha, M.M.; Abdelrahman, E.A.; Aljlil, S.A.; Varghese, A.; Raghu, M.S.; **Yogesh Kumar, K.**

Diamond and Related Materials Article 2025

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Diamond and Related Materials
Supports open access
7.0 CiteScore
5.1 Impact Factor

Abstract

It is essential to reduce and upcycle the waste for energy conversion and storage for sustainability. Plastic milk pouches have been converted into a value-added carbon source for the facile synthesis of reduced graphene oxide (rGO). The obtained rGO was anchored with Yb-doped spinel $NiFe_2O_4$ and Yb@$NiFe_2O_4$/rGO nanocomposite was obtained. The morphological and structural characterization shows the uniform dispersion of spherical Yb@$NiFe_2O_4$ over rGO sheets and mixed valence states of metals with oxygen defects. The synthesized materials were used as electrode materials for supercapacitors and the calculated specific capacitances are 151, 413, and 926 F/g at a scan rate of 2 mV/s, respectively, for Yb@$NiFe_2O$, rGO and Yb@$NiFe_2O_4$/rGO. The Yb@$NiFe_2O_4$/rGO electrode showed a maximum power density of 109.3 W/kg at an energy density of 750 Wh/Kg. Asymmetric supercapacitor device was fabricated using Yb@$NiFe_2O_4$/rGO nanocomposite as the positive electrode and activated carbon as the negative electrode and the observed specific capacitance was found to be of 345.1 F/g at a current density of 1 mA/g. Electrochemical hydrogen evolution reaction (HER) was examined using linear sweep voltammetry (LSV) studies and the observed overpotentials of Yb@$NiFe_2O_4$ and Yb@$NiFe_2O_4$/rGO nanocomposite at 10 mA/cm2current density are 136 and 107 mV, respectively. The Tafel slopes for the platinum electrode, Yb@$NiFe_2O_4$/rGO, and Yb@$NiFe_2O_4$ composites were calculated to be 101, 182, and 225 mV/dec, respectively. The higher conductivity, surface area, diverse oxidation states, and quick electron mobility in Yb@$NiFeO_4$/rGO could be the reasons for the superior activity as compared to pristine materials. The robust stability of Yb@$NiFe_2O_4$/rGO in various electrochemical applications for energy conversion and storage presents an opportunity for further investigation into ferrite-based carbon materials.

Author keywords- HER; Supercapacitor; Waste to wealth; Yb@NiFe2O4/rGO

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**82nd**	**5.8**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

MODELING THIN-LAYER DRYING KINETICS OF JUSTICIA ADHATODA LEAVES USING DIFFERENT DRYING TECHNIQUES AND ITS QUALITY EVALUATION

Ramanathan, S.; **Dinesh Kumar, P.**; Pathak, S.S.

Heat Transfer Article 2025

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Abstract

Drying of medicinal herbs like Justicia adhatoda is essential to maintaining their bioactive constituents, but conventional methods tend to degrade quality by subjecting them to excessive heat for long periods. To overcome this, the current research compares and assesses the drying kinetics, phytochemical retention, and optical quality of J. adhatoda leaves under cabinet tray drying (CTD) and microwave drying (MD). Since the plant has pharmacological importance, the research seeks to select a drying process that guarantees efficiency and quality retention. Experimental drying was carried out at different temperatures (45°C–75°C) for CTD and microwave powers (200–700 W) for MD. Among the 11 thin-layer models, Page's model proved to be the most reliable in predicting drying behavior for both processes (R2 = 0.999) for CTD and (R2 = 0.996) for MD. MD under 360 W took the shortest time, whereas 200 W maintained the maximum total flavonoids and tannin contents. Antioxidant activity was maximum at 360 W, indicating maximum retention of functional constituents under optimal microwave power. Microwave-dried samples exhibited better color preservation, demonstrating its capability to retain sensory as well as commercial acceptability. The results of this study have important consequences for the herbal processing industries, allowing scalable, high-quality drying schemes to be developed that protect the therapeutic and cosmetic worth of medicinal crops. © 2025 Wiley Periodicals LLC.

Author keywords- cabinet tray drying; mathematical modeling; microwave drying; optical; phytochemicals

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**92nd**	**8.5**	07 AFFORDABLE AND CLEAN ENERGY

STUDIES ON THERMAL, MECHANICAL, AND SURFACE PROPERTIES OF AGRO-WASTE FILLERS ADDED WITH RATTAN PALM AND NATURAL OKRA–BASED PLA COMPOSITES

Chaudhary, V.; Ahlawat, C.; Dwivedi, S.P.; Gupta, P.; **Senthamaraikannan, P.**

International Journal of Biological Macromolecules Article 2025

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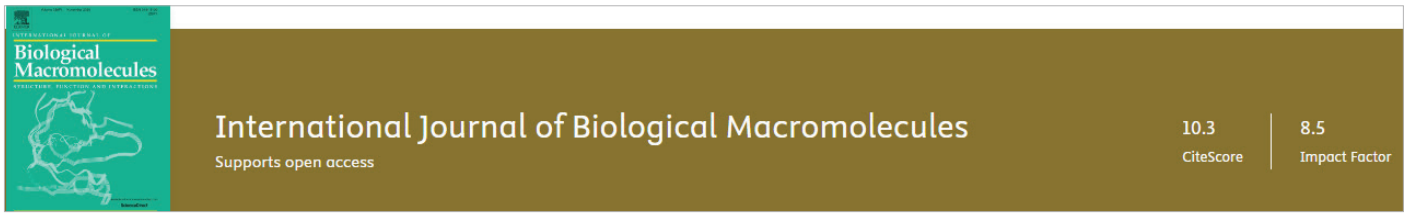

Abstract

This study shows the synthesis and analysis of the mechanical, chemical, and thermal characteristics of polylactic acid (PLA) composites filled with peanut/chickpea shell and reinforced with rattan palm/natural okra fibers. The combination of rattan palm and natural okra fibers with chickpea fillers in the rattan palm/natural okra/PLA/chickpea peel powder composite yields the highest mechanical performance. The hybrid rattan palm/natural okra/PLA/chickpea peel powder composite results in the highest tensile strength of 72.56 MPa, a Young's modulus of 878.12 MPa, and an elongation at break of 7.45 %. The highest flexural strength and flexural modulus of 84.38 MPa and 7.43 GPa were achieved by the rattan palm/PLA/peanut shell composite. The rattan palm/natural okra/PLA/chickpea peel powder composite reveals a superior impact strength of 23.2 J. Hardness results show that the hybrid rattan palm/natural okra/PLA/chickpea peel powder and rattan palm/natural okra/PLA/peanut shell powder composites specimen demonstrate similar and superior hardness values of 99 Shore-D. The hybrid rattan palm/natural okra/PLA/chickpea peel powder composite exhibits the highest surface roughness of 0.74 μm. The maximum creep strain of 0.045 was attained by rattan palm/PLA/peanut shell powder composite at 2000 s. The highest fluctuating stress was endured by the rattan palm/natural okra/PLA/chickpea peel powder composite, with the highest fatigue cycles of 4513, 4025, and 3412. Higher thermal rigidity was exhibited by the rattan palm/PLA/chickpea peel powder composite, which loses its rigid state at almost 4500 °C. A long crystalline peak of fiber and filler-based composite materials arises between the diffraction angles (2) of 10°–20° and 60°–70°. © 2025 Elsevier B.V.

Author keywords- Chickpea shell; Natural okra; Peanut shell; Rattan plam; Thermal conductivity; Thermogravimetric analysis

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	97th	13.2	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

ULTRA-ENHANCED ENERGY HARVESTING AND STORAGE IN PVDF COMPOSITES VIA FLAKE-TO-ROD TRANSFORMED AG-DOPED ZNO NANORODS FOR SMART WEARABLES AND EMBEDDED SECURITY DEVICES

Mukherjee, A.; Ghosh, B.D.; **Roy, S.**

Chemical Engineering Journal Article 2025

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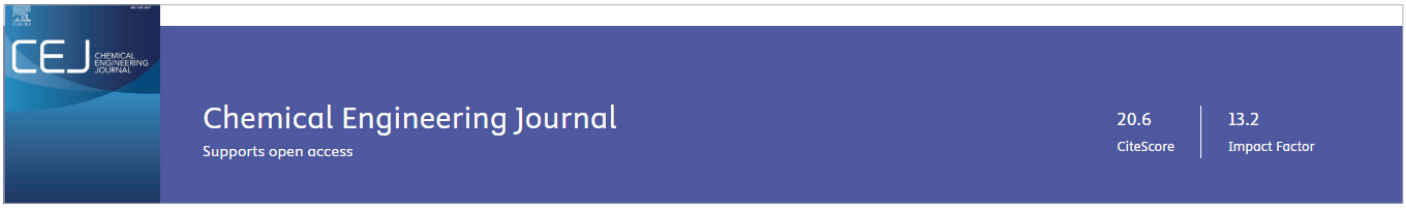

Abstract

Harvesting energy from human motion using piezoelectric and triboelectric materials has emerged as a promising approach to sustainably power smart wearables. However, progress remains limited due to the challenges in developing cost-effective, flexible, durable, and highly responsive materials. This study introduces a high-performance filler (f-Zn1-xAgxO, functionalized Ag-doped ZnO) and robust PVDF/f-Zn1-xAgxO composites with remarkable energy storage capacity. The filler was carefully engineered by doping ZnO with 2 wt% Ag, followed by APTES functionalization (f-Zn0.98Ag0.02O), transforming its structure from nanoflakes to uniaxial nanorods, significantly enhancing interfacial interactions and energy storage capacity. When an optimized 30 vol% of f-Zn0.98Ag0.02O is mixed with PVDF matrix, the resulting composite achieves an energy storage density (Wrec) of ~11.6 J/cm3, 39 times higher than PVDF (0.3 J/cm3), with 85% efficiency(n) and reduced dielectric loss. Additionally, the PVDF/f-Zn0.98Ag0.02O composite exhibited an outstanding piezoelectric power density of 42.5 μW/cm2, 56.7 times higher than neat PVDF (0.75 μW/cm2), surpassing many contemporary reports that utilized even more complex materials and processes. A small piezoelectric nanogenerator (PENG) based on this composite successfully powered 26 colorful LEDs and responded effectively to various biomechanical movements and toy motions, demonstrating its versatility and potential across various applications. Moreover, the PENG exhibits significant potential for security systems, as it can differentiate unique signal patterns under various conditions when integrated into ATMs and smart door systems. These findings highlight the versatility and promise of our composites for next-generation energy harvesting and storage, security applications, and smart wearables. © 2025 Elsevier B.V.

Author keywords- Composites; Dielectric loss; Doping; Energy harvesting; Piezoelectric; Power density

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**84th**	**3.9**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

SYNERGISTIC ENHANCEMENT IN THERMAL CONDUCTIVITY OF RTV SILICONE RUBBER VIA NON-COVALENTLY SURFACE-MODIFIED GRAPHENE AND MWCNT HYBRID FILLERS

Chandrashekar, A.; Hegde, M.; Siya Shetty; Reddy, B.K.; **Jineesh, G. A.**; Varrla, E.; Prabhu, T.N.

Journal of Materials Science Article 2025

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Journal of Materials Science
Publishing model
Hybrid

Abstract

Effective thermal management is critical for advanced electronic devices, yet conventional polymer-based thermal interface materials (TIMs) often exhibit low thermal conductivity, poor filler dispersion, and high interfacial resistance. This study addresses these limitations by enhancing filler–matrix interactions and exploiting synergistic effects between dual-dimensional carbon nanofillers. Graphene (GPs) and multiwalled carbon nanotubes (MWCNTs) were non-covalently surface modified using phenyl glycidyl ether (PGE) via ultrasonication in THF, improving dispersion and compatibility with room temperature vulcanizing silicone rubber (RTV SR). The surface-functionalized fillers (PGE@GP, PGE@MWCNT) were characterized using FTIR, Raman spectroscopy, FESEM, and TGA to confirm successful modification. Composite films were fabricated by incorporating PGE-modified fillers into RTV SR at three different hybrid ratios (PGE@GP:PGE@MWCNT = 9:1, 8:2, and 7:3) with a total filler content of 10 wt%. The composite with a 9:1 ratio achieved the highest thermal conductivity of 0.459 ± 0.001 Wm−1 K−1, representing a 129.5% enhancement over pure RTV SR. The observed 48.06% synergistic improvement highlights the effectiveness of combining dual-dimensional fillers. Additionally, the composite retained electrical insulation, a critical property for TIM applications. Application tests using a 1 W LED bulb demonstrated the composite's ability to dissipate heat efficiently, confirming its potential as a high performance, electrically insulating thermal interface material for modern electronic systems.

Indexed keywords: Engineering controlled terms: Composite films; Dispersions; Fourier transform infrared spectroscopy; Graphene; Interfaces (materials); Silicone rubber; Thermal conductivity of solids; Thermal insulating materials; Thermal insulation; Yarn

Engineering uncontrolled terms: Graphenes; Multi-walled-carbon-nanotubes; Phenyl glycidyl ethers; Room temperature vulcanizing; RTV silicone rubber; Silicone rubber; Surface-modified; Synergistic enhancement; Thermal; Thermal interface materials

Engineering main heading: Fillers

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	92nd	8.5	03 GOOD HEALTH AND WELL-BEING; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

ISOLATION AND CHARACTERIZATION OF CELLULOSE PARTICLES FROM GROUNDNUT (ARACHIS HYPOGAEA) SHELL WASTE FOR SUSTAINABLE REINFORCEMENT APPLICATIONS

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International Journal of Biological Macromolecules

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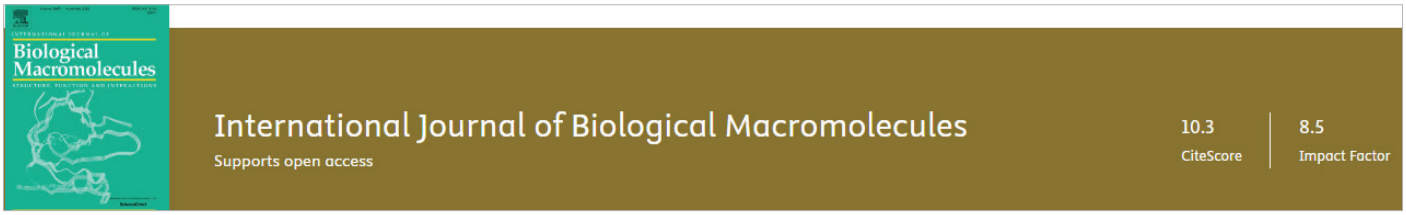

Abstract

The use of agro-based waste materials is a growing trend in research. The production of value-added products from such waste material is gaining popularity within the sustainable materials concept. Our study used a modified organic acid hydrolysis technique to produce groundnut shell waste microcrystalline cellulose (GSW MCC). The extracted MCC was characterized using Fourier transform infrared spectroscopy, X-ray diffraction, thermogravimetric analysis/ derivative thermogravimetry (TGA/DTG), scanning electron microscopy, surface roughness analysis, and density and yield measurements. The crystallinity index of the MCC was determined to be 48.91 %, with a crystallite size of 25.68 nm, ensuring consistency in reported values. The UV absorption peak was obtained at 283.82 nm. The highest thermal degradation and impurities were identified using TGA and DTG analysis. The particle size of the MCC was measured using ImageJ software. The scanning electron microscopy (SEM) analysis revealed a minimal roughness and a fibrous structure of MCC rather than showing distinct particles. The surface roughness analysis showed that the MCC possesses adequate surface roughness for filler applications. According to the atomic force microscopy study, GSW cellulose has a range of surface roughness, including sharp peaks and deep valleys, which suggests improved mechanical bonding and adhesion in composites. Comparative analysis with commercial MCC and literature data highlights the unique properties of the extracted MCC. The MCC obtained from GSW exhibits better physicochemical properties and can be used as a low-cost excipient in the manufacturing of pharmaceutical dosage forms and fillers in biocomposites. © 2025 Elsevier B.V.

Author keywords- Agro-waste use; Arachis hypogaea; Biofiller; Biomass; Groundnut shell; Microcrystalline cellulose

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q1	**76th**	**1.8**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

A HYBRID GROUP KEY MANAGEMENT SYSTEM FOR SECURE IOT NETWORKS USING IT2FONC-HKM APPROACH

Regan, R.; **Rangasamy, R.**; Krishna, B.V.; Manikandan, J.

International Journal of Communication Systems

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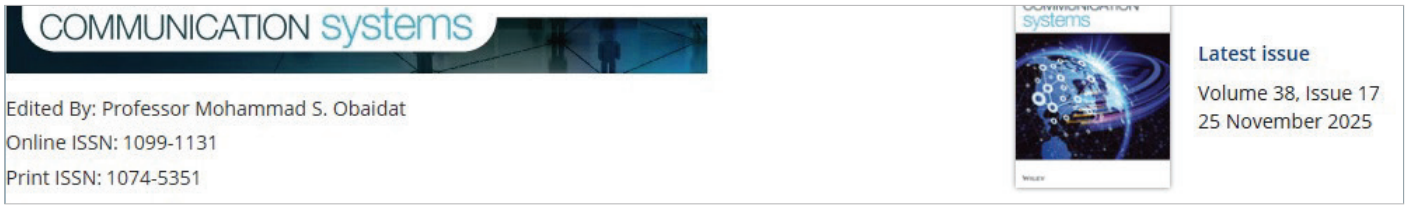

Abstract

Key Management System aids in safeguarding cryptographic keys within an organization, which becomes complex particularly in decentralized Internet of Things networks because of the wide range of devices and constant development of the structure of the network. Numerous existing research were made for efficient key management, but these methods face some, issues, such as the misbalancing of performance metrics and low security for important parameters in the data sharing. To overcome these problems, this work developed a Hybrid Group Key Management system that utilizes Interval Type 2 Fuzzy Logic and Optimal Non-Monopoly Search Strategy Boosted Coati (ONS-CO) algorithm named IT2FONC-HKM approach. The proposed work effectively manages qualitative and quantitative decision-making by combining Type 2 Fuzzy Logic. The ONS-CO affirms that unauthorized devices are rapidly eliminated from the network, which improves the performance of the key revocation process. The Hybrid Group Key Management system is more effective for resource-constrained environments. This work presents a comprehensive comparative analysis to appraise the effectiveness of the IT2FONC-HKM approach. The evaluation results demonstrate that the IT2FONC-HKM procures superior effectiveness with a high-security level of 99.2%, and low encryption and decryption times of 0.4 and 0.3 s. The Hybrid Group Key Management system offers a robust solution to safeguard communication in IoT networks and tackles the revocation issues faced by existing approaches.

Author keywords- coati optimization algorithm; fuzzy logic system; group key management system; internet of things

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**83rd**	**5.6**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

EFFECT OF $SrTiO_3$ ADDITION ON THE THERMAL STABILITY OF $BA_2TiSi_2O_8$ MATRIX IN THE RADIO FREQUENCY RANGE

Colares, D.M.; Abreu, R.F.; Nobrega, F.A.C.; Do Nascimento, J.P.C.; do Carmo, F.F.; da Silva, M.A.S.; da Silva, R.S.; **Singh, Charanjeet**; Lacerda, R.; Sombra, A.S.B.

Ceramics International

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Abstract

The dielectric properties of the $Ba_2TiSi_2O_8$(BTS) ceramic matrix added with strontium titanate ($SrTiO_3$) at varying concentrations were investigated in this work using Impedance Spectroscopy (IS). The Rietveld refinement method was employed to analyze the presence of a secondary phase, $(Ba_{0.3}Sr_{0.7})TiO_3$, in the composites, while scanning electron microscopy (SEM) was used to examine the morphologies of the synthesized composites. According to the IS results, it was observed that the relative dielectric permittivity (ε'_r) of the composites increases with the addition of $SrTiO_3$, a fact attributed to the formation of the new phase $(Ba_{0.3}Sr_{0.7})TiO_3$(ε'_r~623). The Nyquist plot was utilized to study the dielectric behavior, and the grain and grain boundary effects in the ceramic samples were numerically modeled using an equivalent circuit (CPE). The activation energy (Ea) of the ceramic composites was determined to range from 1.76 to 1.92 eV. Additionally, the temperature coefficient of capacitance (TCC) values for the composites doped with 10 % and 15 % strontium titanate ($SrTiO_3$, by mass) showed within the range of ±1500 ppm °C−1. The BTS-STO system, which has not been explored previously, overcomes the thermal instability of pure STO (typical TCC > ±2000 ppm/°C) and similar compounds such as (Ba,Sr)TiO3.

Author keywords- Author keywords: $Ba_2TiSi_2O_8$; Ceramic composites; Impedance spectroscopy; Nyquist plot; $SrTiO_3$

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q2	**61st**	**1.3**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

EMPOWERING HEALTHCARE: SECURE HAND GESTURE AUTHENTICATION IN MEDICAL IOT WITH sEMG

Venkateswari, P.; Nagendran, R.; Rohini, M.; **Manoj, S.O.**

International Journal of Artificial Organs

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Abstract

Enhancing information security via reliable user authentication in wireless body area network (WBAN)-based Internet of Things (IoT) applications has garnered increasing attention. Traditional biometric methods, like fingerprint recognition, carry significant privacy risks because they cannot be cancelled or changed. Once a biometric template is exposed, it cannot be replaced, leading to potential privacy violations. Addressing these challenges, this study proposes a novel Secure EMG Framework, a cancellable biometric modality using surface electromyogram (sEMG) signals encoded by hand gesture passwords for user authentication. sEMG signals are collected from the forearm muscles, specifically the flexor carpi ulnaris (FCU), during hand gestures, forming a unique and secure biometric token. This proposed method enhances security and reliability through a multi-stage process that involves data capture, pre-processing, feature extraction, and machine learning-based computation of matching scores. A cancellable biometric token is generated through the collection of sEMG data during 16 static wrist and hand movements, increasing authentication diversity and security. To ensure signal clarity within the critical frequency range of 5–500 Hz, a Pure Frequency Hamming Filter is used to reduce noise and artifacts in the raw sEMG data. Key time-domain parameters are then extracted to form a 16-length feature vector, enhancing gesture discrimination. To further improve classification accuracy, a Tuned Boost Perfect Classifier is implemented, addressing overfitting and minimizing errors. The matching score computation enables the evaluation of input and registered signal similarity, allowing users to reset compromised biometric tokens. Experimental results validate the method, achieving an accuracy of 99.72%, an F1-score of 96.0%, and an Equal Error Rate (EER) of 0.0037. © The Author(s) 2025

Author keywords- equal error rate; hand gesture movements; medical IoT; Surface electromyogram; user authentication; user privacy

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	79th	2.9	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

ENHANCED FIRE RETARDANCY OF EPOXY RESINS UPON ADDITION OF BORON NITRIDE NANOPARTICLES USING BORON POLYOL COMPLEX

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Materialia

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Materialia
Supports open access
5.8 CiteScore
2.9 Impact Factor

Abstract

Fire retardancy and thermal management improvements in epoxy resins can critically impact their use in electronics for IoT and 5G devices. This study proposes a facile method to improve the fire retardancy and thermal properties of epoxy resins (EPs) by incorporating boron nitride nanoparticles (BNNPs) with boron polyol complex (BPC) to form an ionanofluid and explores the synergistic effect of polyelectrolytes with BN. The modified multifunctional additive BPC–BNNPs were then used for the functional modification of epoxy resin. Our detailed tests and analyses on these materials confirm that by adding 0.2 wt% of BNNPs in the EP–BPC–BN complex achieved a V-0 rating in the UL-94 vertical burning test. The resultant composite demonstrated that the modification of BN with the polyol complex imparted a low smoke and char formation in the modified epoxy composites. The current study shows that EP–BPC–BN complex has great potential as a thermal interface material for the thermal management of electronics or similar applications. The presented EP–BPC–BN composite can also be utilized as a fire-retardant coating, adhesive, and binding agent in the aerospace, transportation, and building industries.

Author keywords- boron nitride; epoxy resin; fire retardant; ionic liquid; thermal management

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q1	**85th**	**2.91**	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

SUSTAINABLE AI FOR DIABETIC FOOT ULCER DETECTION: A DEEP LEARNING APPROACH FOR EARLY DIAGNOSIS

Debnath, S.; Khurana, A.; **Senbagavalli, M.**; Naik, S.; **Patni, J.**; Mishra, P.K.; Kishore, J.

Discover Applied Sciences

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Abstract

Diabetic foot ulcer (DFU) is one of the most expensive and debilitating complications of diabetes. According to procedures developed by the National Institute of Health and Clinical Excellence, early and effective treatment of DFU can minimize the severity of complications, such as unnecessary amputations, and improve overall quality of life. In this paper, a stacked parallel convolution layers based Convolution Neural Network (CNN) is proposed, known as DFU MobileNet, to classify skin infected with DFU against normal skin. The main objective of this work is to develop a DFU recognition system that accurately identifies infected skin. DFU MobileNet consists of three blocks of parallel convolution layers, each with a unique kernel size to extract local and global features distinctly. Using the DFUC 2020 dataset, the proposed DFU MobileNet outperformed existing state-of-the-art models, achieving an accuracy of 92.2% using CNN DenseNet, 95.4% using MobileNet, and 97.8% when combining DenseNet and MobileNet.

Author keywords- Convolution neural network; Deep learning; DFUNet; Diabetic foot Ulcers; Medical imaging; MobileNet

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	92nd	8.5	07 AFFORDABLE AND CLEAN ENERGY

WASTE-DERIVED CELLULOSE ENCAPSULATED BIMETALLIC (FE/AL) COMPOSITE (WD-CBMC) FOR THE REMOVAL OF FLUORIDE: WASTE TO FUNCTIONAL MATERIALS

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International Journal of Biological Macromolecules

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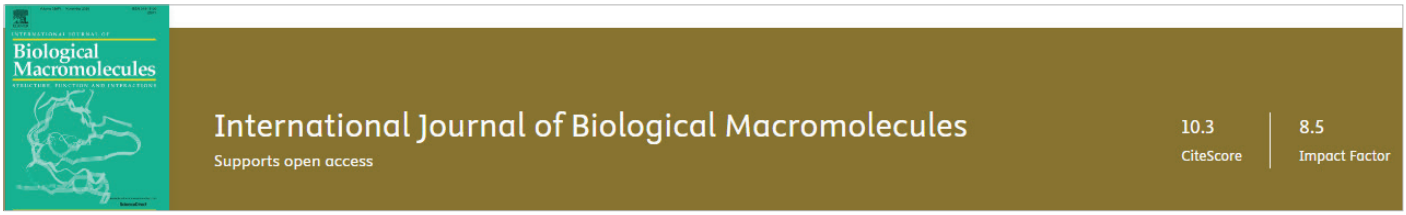

Abstract

Fluoride (F–) ions contamination significantly increased with increasing industrialization, a significant public health problem nowadays. At the same time, waste materials (WMs), such as agricultural waste, food waste, plastic waste, etc., have considerably increased with the increase in population. Therefore, there is an immediate requirement to manage the burden of WMs and remove F– ions from water. The present study focuses on developing waste-derived cellulose encapsulated bimetallic (Fe/Al) (WD-CBMC)-based composite to remove F– ions. Interestingly, banana peel (BP) is used as a reducing and encapsulating agent for the synthesis of WD-CBMC-based composite. Additionally, BP contains polyphenols that offer various active sites to enhance the removal efficiency of F– ions. The prepared WD-CBMC composite efficiently removes F– ions from the water under batch conditions. The results revealed that the prepared WD-CBMC composite had significant sorption ability (120 mg/g), which was higher or comparable to that of existing materials. The high removal efficiency is mainly due to both metal complexation and electrostatic interaction, as confirmed from the thermodynamic parameters (ΔG = −2.72 to −1.35 kJ/mol; ΔH = −16.53 kJ/mol), which demonstrated a spontaneous and exothermic process of adsorption. Moreover, F– ions are efficiently removed by surface hydroxyl groups and ligand exchange of WD-CBMC-based composite, which makes it easier for F– ions to interact with active sites. Therefore, the prepared WD-CBMC composite is low-cost, environmentally friendly, and can be used to remove F- ions simultaneously while managing the burden of WMs.

Author keywords- Adsorption; Bimetallic; Composite; Encapsulated; Fluoride

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	85th	3.3	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

MIXED VIRTUAL ELEMENT METHOD FOR A STRONGLY DAMPED WAVE EQUATION

Suthar, M.; Kumar, A.; Yadav, S.

Journal of Scientific Computing

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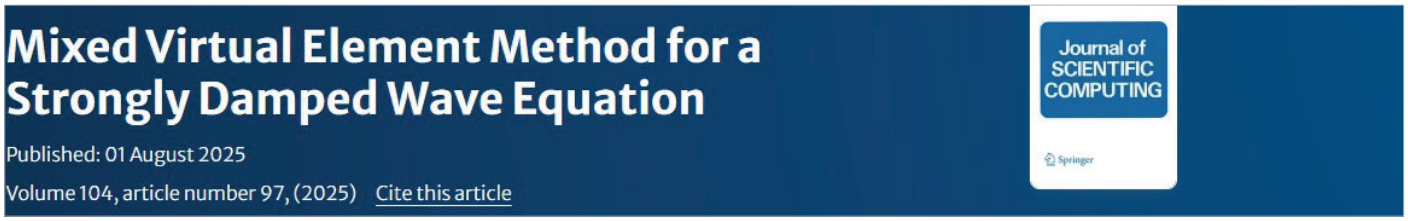

Abstract

This paper discusses and examines a Virtual Element Method (VEM) in mixed form for discretizing a strongly damped wave equation within a bounded region in R2. The analysis includes establishing optimal convergence rates for both semi-discrete and fully discrete methods using estimates from a novel mixed intermediate projection. Using the enhanced regularity of the displacement u, the discrete solution's super-convergence is demonstrated. Additionally, theoretical results are validated through numerous numerical experiments. The influence of the damping factor on the system's energy is also demonstrated.

Author keywords- Fully-discrete scheme; Mixed intermediate projection; Mixed virtual element method (MVEM); Semi-discrete scheme; Strongly damped wave equation; Super-convergence

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPU/WOS/Q1	**75th**	**2.9**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

HIGH ON/OFF RATIO AND NEAR-THERMAL SUBTHRESHOLD SWING IN A P-TYPE SILICON CHANNEL FIELD-EFFECT TRANSISTOR

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Physical Chemistry Chemical Physics

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Physical Chemistry Chemical Physics

Abstract

We performed a numerical simulation of a field-effect transistor (FET) employing a p-type silicon channel and a SiO_2 gate dielectric using Silvaco Atlas TCAD. The device structure shows remarkable switching performance with the subthreshold swing (SS) reaching near thermal limits at 86.5 mV dec^{-1} (drain voltage −0.1 V) and 152 mV dec^{-1} (drain voltage −3 V). The FET operates with ultra-high ON/OFF current ratios of ~10^{11} and peak field-effect mobilities of about 2 cm^2 V^{-1} s^{-1} under a low drain bias. The mobilities exhibits degradation due to enhanced scattering at higher biases. The simulation also emphasizes the interplay of the drain voltage affecting the transfer characteristics, highlighting the importance of electrostatic design for high-performance, low-power p-type silicon-based FETs.

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q1	**91st**	**0.45**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

ADAPTIVE MACHINE LEARNING SYSTEM FOR CYBERSECURITY THREATS

Narooka, P.; Arora, S.; Srivastava, S.; Tiwari, M.; **Yadav, S.**

Journal of Discrete Mathematical Sciences and Cryptography

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Abstract

With the proliferation of digital technologies, cybercrime has become a pervasive system where end users, government users and business industries worldwide. Addressing this complex challenge requires innovative approaches that leverage different technologies like machine learning and data science. This abstract presents a machine learning-based computational system designed to combat cybercrime offenses effectively. The proposed system integrates machine learning algorithms with computational systems that find a lot of information and its similar patterns which are the ways of cybercrimes. By leveraging supervised, unsupervised, and reinforcement learning methods, the system can detect anomalies, classify malicious behavior, and predict potential cyber threats in real-time. Cybercrime has become a significant concern in the modern system where most of the users are using digital devices which causes the identity theft to financial fraud. Traditional methods of combating cybercrime are often reactive and fall short in finding the rapidly evolving system of cyber threats. In response, there is a growing interest in developing proactive and intelligent systems to detect, prevent, and mitigate cybercrime offenses. This paper presents a machine learning-based computational system for controlling cybercrime offenses. By seeing the information in the data set it starts learning itself and adapting to emerging threats, the system can effectively detect and reaction on the cyber threats active in the real environment.

Author keywords- Cyber threats; Cybercrime detection methods; Cybercrime offenses; Cybersecurity; Machine learning; Pattern recognition

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q1	**91st**	**0.45**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

MINIMUM ABSOLUTE DEVIATION COVERING CHROMATIC ENERGY OF GRAPHS

Rao, M.V.; Srimannarayana, N.; **Venkatesh, K.A.**; Ramu, G.; Gajula, G.

Journal of Discrete Mathematical Sciences and Cryptography

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Journal of Discrete Mathematical Sciences and Cryptography
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Scopus CiteScore 2024: 3.0 (91st Percentile - Q1)
Clarivate Analytics JIF 2024 : 1.1(Q2)

Abstract

The study of Minimum Absolute Deviation Covering Chromatic Energy explores the relationship between graph structures and energy metrics, providing insights into optimal colouring strategies. We are introducing minimum absolute deviation of a graph covering chromatic energy G corresponding to minimum covering C of some standard graphs and their bounds also established.

Author keywords- Graph energy; Minimum absolute deviation covering chromatic energy; Minimum covering chromatic energy

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q4	**5th**	**0.93**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

A BLOCKCHAIN-ENABLED ADAPTIVE LEARNING MODEL FOR SECURE AND SCALABLE DATA SHARING

Anakal, S.; **Arif, M.**; Artheeswari, S.; Balaji, K.; Pankajam, A.; John Augustine, P.J.; Mohitha, M.R.; Patil, A.; Mickle Aancy, H.M.; Vidhya, R.G.

International Journal of Basic and Applied Sciences

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International Journal of Basic & Applied Sciences (ISSN: 2227-2720)

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ISSN: 2227-2720

Abstract

The blockchain skillset is one of the most emerging skill sets that brings the world into the hands of the self. The number of industrial applications depends on this new technology just because of its decentralized, transparent, and secure nature. This enables a new way for the next generation of computing environments like cloud computing and edge computing. By keeping this in mind, this work develops a new disruptive method using adaptive learning model to address the security issues in a data sharing environment with decentralized access control. The developed framework has been executed and tested utilizing Python, and the results have been presented. A performance study comparison between the existing RSA algorithm, AES algorithm, and the proposed algorithm (ALM) has been done, and the various parameters taken for the study and their values are presented in this paper. Results obtained show that the algorithm presented is proven to be efficient in terms of security, scalability and time.

Author keywords- Blockchain Skillset; Cloud Computing; Decentralized; Edge Computing; Transparent

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q1	**93rd**	**2.2**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

INSIGHTS INTO IF-GEODETIC CONVEXITY IN INTUITIONISTIC FUZZY GRAPHS: HARNESSING THE IF-GEODETIC WIENER INDEX FOR GLOBAL HUMAN TRADING ANALYSIS AND IF-GEODETIC COVER FOR GATEWAY NODE IDENTIFICATION

Anto, A.M.; Rajeshkumar, R.; **Preshiba, L.E.**; Mary Mettilda Rose, V.

Symmetry

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Insights into IF-Geodetic Convexity in Intuitionistic Fuzzy Graphs: Harnessing the IF-Geodetic Wiener Index for Global Human Trading Analysis and IF-Geodetic Cover for Gateway Node Identification

by **A. M. Anto, R. Rajeshkumar, Ligi E. Preshiba** and **V. Mary Mettilda Rose**
Symmetry **2025**, *17*(8), 1277; **https://doi.org/10.3390/sym17081277** - 8 Aug 2025

Abstract

To offer a viewpoint on convexity and connectedness inside intuitionistic fuzzy graphs (IFGs), the paper is devoted to the study of intuitionistic fuzzy geodetic convexity. The paper introduces an algorithm for precise identification and characterization of geodetic pathways in IFGs, supported by a Python program. Various properties of IF-geodetic convex sets such as IF-internal and IF-boundary vertices are obtained. Furthermore, this work introduces and characterizes the concepts of geodetic IF-cover, geodetic IF-basis, and geodetic IF-number. Additionally, the study develops the IF-geodetic Wiener index. The scope of the work explores the application of IF-geodetic cover in wireless mesh networks, focusing on the identification of gateway nodes, where symmetry in connectivity patterns enhances network efficiency. A practical implementation of the IF-geodetic Wiener index method in global human trading analysis underscores the real-world implications of the developed concepts, where the efficiency and interpretability of fuzzy geodetic measures are improved by symmetry in network topologies and trade patterns.

Author keywords- geodetic IF-basis; geodetic IF-number; IF-boundary vertices; IF-geodetic convex; IF-geodetic Wiener index; IF-internal vertices; intuitionistic fuzzy graph

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**75th**	**2.3**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

EFFECT OF SURFACE MODIFICATION TECHNIQUE ON MICROSTRUCTURE AND TRIBOLOGICAL ATTRIBUTES OF NI-CR-CO-MO ALLOY DEPOSITION ON MARTENSITIC STAINLESS STEEL

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Surface Engineering
I·M3 Institute of Materials Minerals & Mining
Impact Factor: **2.6** / 5-Year Impact Factor: **2.3**

Abstract

The demand for stainless steel in technical applications has increased to improve the wear resistance of pump components in chemical and industrial operations. But, the stainless steel is in desperate condition to withstand the wear under fatigue loading. Hence, surface modification to attain higher-order wear resistance is a growing trend in research. This study examines the surface modification of a Martensitic Stainless Steel (MSS) alloy by a nickel- and chromium-based Inconel 617 alloy coating applied through three different techniques: Atmospheric Plasma Spray (APS), Tungsten Inert Gas (TIG), and Metal Inert Gas (MIG) cladding techniques. The cladded subsurface microstructure is studied for possible grain structure improvements and defects. The porosity measurement results reveal the rich oxide formation, followed by more micro-pores and microcracks for MIG cladded ones. The effect of coating technique on wear performance of the coating is investigated through statistical modelling to rank the prominent wear resistance coatings associated with the ideal wear parameters. The statistical results declare the excellence in wear resistance of APS coating by registering 84.92% and 51.05% reductions in wear rate than MIG and TIG depositions, respectively. The confirmation experiments are conducted to validate the statistical findings. The post-worn-out surface analysis corroborates the phenomenon of wear being driven by adhesive-initiated two and three-body abrasive wear mechanisms.

Author keywords- APS; frictional force; microstructure; MIG; TIG; wear rate

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	98th	8.4	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

TINY MACHINE LEARNING APPROACH FOR GRID-BASED MONITORING OF UAV TRACKING AND CYBER-PHYSICAL SYSTEMS IN HYDRAULIC SURVEYING

Kiran, A.; Ramesh, J.; Quraishi, A.; **Patni, J.**; Keshta, I.; Byeon, H.; Raparthi, M.; Sandhu, M.; Soni, M.

IEEE Transactions on Intelligent Transportation Systems

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IEEE Transactions on Intelligent Transportation Systems

8.4	0.0794	1.994	17.8
Impact Factor	Eigenfactor	Article Influence Score	CiteScore

Powered by Scopus

Abstract

With the advancement in Tiny Machine Learning (ML) technologies, their application in enhancing unmanned aerial vehicles (UAVs) for hydraulic engineering surveying and mapping has become increasingly significant. TinyML's integration offers a leap in processing efficiency and capabilities, particularly in addressing challenges such as UAV search and monitoring due to loss of contact or forced landings. The usage of medical cyber-physical systems in healthcare can revolutionize existing service delivery methods. The study focuses into the spatial grid mapping technique for three-dimensional information, the PTZ camera spatial grid target locking algorithm, and the UAV detection and image correction algorithm. The UAV target is processed using the surveying UAV target tracking method. TinyML techniques are essential for processing and analyzing these photos quickly. Precise UAV identification and tracking are made possible by the combination of image recognition and radar data, which are then processed using TinyML algorithms. This study explores the complexities of algorithms designed specifically for TinyML, such as tracking, UAV detection, grid mapping, and 3D grid space division. Experimental results validate the enhanced capability of this. The results show how well the proposed technique maps and surveys water conservation regions while promptly catching, locking onto, and tracking drones. The algorithm in this study betters than the YOLO, SSD, and RetinaNet algorithms in the recognition and detection of image-oriented surveying and mapping drones.

Author keywords- grid-based tracking; hydraulic engineering surveying; image recognition algorithms; Unmanned aerial vehicles (UAVs)

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q2	**63rd**	**2.59**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

LITECSHUFFLE: A LIGHTWEIGHT AND EFFICIENT DEEP LEARNING APPROACH FOR PLANT DISEASE CLASSIFICATION

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Soil & Crop Sciences

LiteCShuffle: a lightweight and efficient deep learning approach for plant disease classification

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Article: 2568197 | Received 04 Mar 2025, Accepted 24 Sep 2025, Published online: 10 Oct 2025

Abstract

Recent advancement in artificial intelligence and deep learning technologies has made automatic diagnosis of plant disease a reality, which offers a better alternative to traditional manual methods. However, the large size of many existing deep learning models limits their deployment on resource-constrained platforms such as IoT or mobile devices. This study proposed LiteCShuffle (LCS), a lightweight model based on the standard ShuffleNetv2 model, to solve this issue. The LCS model utilized channel attention mechanisms and channel shuffle in its inverted residual block for improving the model's ability to extract relevant features at various stages. The proposed model performance is assessed on the PlantVillage dataset, which includes 39 classes across 13 crop types. The LCS model shows a notable enhancement in plant disease classification, attaining an accuracy of 99.86% while having only 0.15 million trainable parameters and a total size of 0.58 MB. In comparison to ShuffleNetV2, which attains an accuracy of 99.68% with 1.29 million parameters and a model size of 15.4 MB. The proposed model uses fewer parameters and is less complex. Additionally, it surpasses other frequently employed models, such as VGG16, EfficientNetV2s, DenseNet201, SqueezeNet, and MobileNetV2. The model's effectiveness for real-time applications is demonstrated by its 28 millisecond latency on the Nvidia Jetson Nano, which is far lower than ShuffleNetV2 models. Code at: https://github.com/Dsangeeta97/Litechsuffle/.

Author keywords- Classification; computer vision; crop disease; deep learning; precision agriculture

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	80th	4.38	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

CHARACTERIZATION OF FICUS BENJAMINA L. AERIAL ROOT FIBER REINFORCED POLYESTER COMPOSITE

Mohan, M.S.; Prince Sahaya Sudherson, D.P.S.; **Suyambulingam, I.; Senthamaraikannan, P.**; Kumar, R.

Journal of Natural Fibers

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Journal of Natural Fibers

An open access journal

Publishes research in processing natural raw materials, particularly fibers; related bioreclamation.

Abstract

The aerial root of Ficus benjamina L. was reinforced with polyester-based bio-composites that were fabricated using the manual lay-up cum compression method. The composite's mechanical, thermal, and fractographical properties were investigated using tensile, hardness, impact, water absorption, thermo gravimetric analysis, and scanning electron microscopy analysis. Mechanical behaviors of the composites are enhanced by up to 30% when the weight percentage of Ficus benjamina L. root fiber (FBRF) is utilized. A significant decrease occurs at these values as the fiber content rises. The composite's hardness is proportional to the fiber loading. Thermo gravimetric anaylsis shows that FBRF addition raises the transition temperature, while pure composites lower it. The composites had an excellent water absorption property, compatible, and strong. Tensile fractograph exhibited homogeneous dispersion and increased fiber adherence at 30 wt. %. The findings show the potential of FBRF and their green composite applicability.

Author keywords- biofiber; Biomass; Ficus benjamina L. root fiber; natural fiber; polymer composite

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q4	**14th**	**0.178**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

EDU VAULT: AN INTERACTIVE, MULTILINGUAL, AND INTELLIGENT TOPIC-CONSCIOUS VIDEO DISCOVERY SYSTEM FOR ENHANCED CONCEPTUAL LEARNING USING ADVANCED NLP TECHNIQUES

Mandal, L.; Vardhan, T.B.H.; Reddy, K.G.N.; Reddy, D.S.Y.; Bal, S.

Computacion y Sistemas

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Abstract

The present work developed an intelligent topic-conscious video discovery system to retrieve videos from YouTube to enhance e-learning. Speech recognition and machine translation techniques have been used to transform educational videos into easy-to-understand, organized content. The platform supports multilingual content and can transcribe, translate, summarize, and illustrate concepts in an effective manner. It also calculates the readability score of the extracted documents to ensure learners' understanding. The platform uses live data from YouTube, is 93% accurate, and responds quickly to search queries, in less than a second. The effective management of large data is handled by the four tier Command Query Responsibility Segregation (CQRS) architecture. Using their API simplifies the link up to YouTube and Google translate. This innovative approach provides solutions towards earing language barrier, saves learners time by helping them discover their needs quickly, and simplifies understanding of difficult subjects.

Author keywords- automatic speech recognition; Educational videos; large language models; machine learning; machine translation; NLP; semantic seasoning; transformers

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	93rd	6.3	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

IMPACT OF IRON NANOPARTICLES ON BORON COMBUSTION IN A HYBRID PROPELLANT DUCTED ROCKET CONFIGURATION

Hashim, S.A.; Mandal, S.; Karmakar, S.; Roy, A.; Kd, P.; Nahak, J.; Routary, A.; Mali, A.

Propulsion and Power Research

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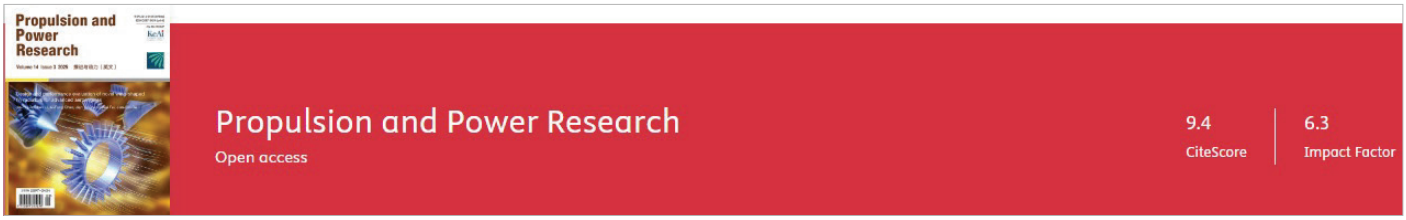

Abstract

Boron-based solid fuel is considered advantageous for ducted rocket applications due to its high energy density and dual-stage combustion process. Nonetheless, its performance is constrained by the formation of a protective boron oxide layer. In the current study, iron nanoparticles are incorporated into boron-based solid fuel to enhance boron's burning. Paraffin wax serves as the primary fuel and binder, while gaseous oxygen is used as an oxidizer. Four different solid fuel combinations were investigated in the experiment: pure paraffin wax, paraffin wax mixed with boron particles, and paraffin wax mixed with boron alongside 10% and 20% iron particles. The main effort of the research is to assess their combustion characteristics, focusing on regression rate and combustion efficiency. While the inclusion of 10% iron particles resulted in a decrease in the regression rate, it led to an improvement in combustion efficiency by reducing the residual active boron content in the condensed combustion product by 60%. Furthermore, it was observed that increasing the proportion of iron particles to 20% further enhanced combustion efficiency to approximately 4%. The entire assessment has been carried out using a lab-scale hybrid propellant ducted rocket motor configuration having an inlet duct on regenerative concept with the secondary combustor. In the present investigation oxygen is injected both in the primary and the secondary combustor, whereas in the existing actual/lab-scale ducted rockets, an energized air is introduced in the secondary combustor. It serves as an economical system for the preliminary investigation of solid fuel impregnated with boron particles. It is expected that the present study could prove valuable strategies for future applications of boron-based hybrid propellants in ducted rocket systems.

Author keywords- Additive loading; Boron-based solid fuel; Ducted rocket; Residual products; Thermal analysis

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	56th	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

PHOTO-RESPONSIVE SHAPE MEMORY POLYMERS: A CRITICAL REVIEW OF SYNTHESIS, ACTUATION PRINCIPLES, AND FUNCTIONAL APPLICATIONS

Kumar, S.V.; S, R.P.; A Gopakumar, D.; Sarath, S.; P M, R.; B, K.; **Parameswaranpillai, J.**; George, J.J.

Journal of Macromolecular Science, Part A: Pure and Applied Chemistry

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Photo-responsive shape memory polymers: a critical review of synthesis, actuation principles, and functional applications

S. Vimal Kumar, Ram Prasanth S., Deepu A. Gopakumar, Sarath P. S., Ratheesh P. M., Kothandaraman B. ...show all

Pages 843-878 | Received 28 May 2025, Accepted 05 Sep 2025, Published online: 26 Sep 2025

Abstract

Shape memory polymers and their composites could be able to hold a temporary shape and return to its original shape when exposed to a specific external stimulus. The stimulus light could be defined as optical radiation with a wavelength ranging from 200 to 2500 nm. Light enables novel and advanced shape memory effects capable of meeting the most demanding requirements in micro and small-scale engineering, biomedical, space and large-scale engineering applications. The ability to change the wavelength, intensity, irradiated position, periodicity and polarization of the stimulus light allows for the progression of wavelength selective, sequential, reversible and multiple shape memory effects. Shape memory polymers and shape memory alloys could be mutually actuated or triggered to change its shape by heat, electric field and magnetic fields, but only shape memory polymers can be actuated or triggered by light and power of hydrogen (pH). Especially light activation gives unique advantages like long-range actuations, less or no interaction with subsystems, and importantly they are wavelength specific; hence there is less chance for unintended actuation. In this review, we have comprehensively covered the light actuation methods, functional moieties, activation mechanism, chemistry, characterization methods, applications, and modeling methods of Light Actuated Shape Memory Polymer in depth. As per our research there few to no reviews available on Light-activated Shape memory Polymers especially focusing on chemically modified system making this review important within the field.

Author keywords- azo benzene; intrinsic; Light-activated shape memory polymers; shape memory effect

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	56th	1.2	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

INTRUSION DETECTION IN CYBERSECURITY: A STUDY ON EXPLAINABLE GRAPHIC REINFORCEMENT LEARNING

Arun Kumar, B.S.; **Achary, R.**

International Journal of Applied Mathematics

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International Journal of Applied Mathematics
Years currently covered by Scopus: from 2017 to 2025
Publisher: Diogenes Co. Ltd.
ISSN: 1311-1728 E-ISSN: 1314-8060

Abstract

Intrusion Detections Systems (IDS), which are consequently vital for safeguarding digital infrastructure, counter evolving cyber threats. Often, conventional IDS systems including signature-based and anomaly-based battle dynamic attack patterns and high false warning rates. Artificial intelligence (AI) driven solutions, especially reinforcement learning (RL) and graph-based models—have grown more popular in reaction to their capacity to adapt and identify sophisticated threats. As a result, the lack of transparency that is associated with AI-driven intrusion detection systems provides a significant challenge for decision-makers in the field of cybersecurity. Growing confidence and interpretability in AI-based intrusion detection have been greatly influenced by explainable artificial intelligence (XAI). Emphasizing their efficacy in modeling network traffic, enhancing detection accuracy, and guaranteeing decision transparency, this paper seeks to investigate the incorporation of explainability in graph-based reinforcement learning models for IDS. Using secondary data gathering from online databases covering the years 2018 to 2025, a qualitative research approach is employed. The study methodically surveys research on explainability methods in AI-driven IDS, graph-based intrusion detection, and reinforcement learning applications in cybersecurity. Though explainability systems increase interpretability with minimal accuracy loss, the results show that graph-based RL improves intrusion detection and network traffic analysis by utilizing structural links. Nevertheless, problems including adversarial assaults, computation costs, and the trade-off between openness and performance remain. The research shows that using explainable artificial intelligence in graph-based RL IDS can significantly increase detection capabilities and user confidence, hence promoting more efficient and responsible cybersecurity solutions, future studies should concentrate on increasing the scalability, durability, and real-time applicability of explainable graph-based RL models in the field of cyber security.

Author keywords- Artificial Intelligence (AI); Cybersecurity; Explainable Artificial Intelligence; Explainable Graph; Intrusion Detection Systems (IDS); Reinforcement Learning (RL)

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	67th	1.6	16 PEACE, JUSTICE AND STRONG INSTITUTIONS

SHIFTING POWER BETWEEN CHINA'S ASSERTIVENESS AND INDIA'S RECALIBRATION

Maity, I.; **Kumar, S.**

Cogent Social Sciences

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Shifting power between china's assertiveness and India's recalibration

Ishita Maity & Sumant Kumar

Abstract

Regional threats and cooperation are closely associated with the international system. It is because, if one country increases its military power, another country imports arms or forges alliances with other countries to balance it. The balance of the shift can be disrupted when one country persistently invests in military development, thereby fueling regional tensions and assertiveness. Military enhancement and regional threats can be observed in China to illegally claim the territories of other nations. This study examines how China's military advancements in Asia have created opportunities for India to expand its military cooperation in response to perceived threats. This study applies the 'security dilemma theory' to understand the consequences of China's AI-based defense modernization towards India and other Asian countries. This highlights geopolitical trends and emerging military technologies. The findings of this study suggest that Chinese military development in the region provides an opportunity for India to build a regional alliance with Asian countries to maintain a balance of power.

Author keywords- China; India; military; regional security; security dilemma theory

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	80th	4.38	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

EFFECT OF PUMICE LOADING ON DEPLETING THE MACHINING DAMAGES OF A BANANA FIBER-PUMICE SANDWICH POLYMER COMPOSITE AT ABRASIVE WATER JET MACHINING (AWJM)

Chenrayan, Venkatesh; Saravanakumar, A.; **Shahapurkar, K.**; Vaishnavi, S.; S, S.; Manivannan, C.; Bhaviripudi, V.R.; Tirth, V.; Algahtani, A.; Petrů, J.; Bashir, M.N.; Soudagar, M.E.M.

Journal of Natural Fibers

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Journal of Natural Fibers

An open access journal

Publishes research in processing natural raw materials, particularly fibers; related bioreclamation.

Abstract

A significant portion of the material market is completely governed by the novel polymer composites, either reinforced with synthetic or natural fibers. However, machining the fiber-reinforced composite (FRP) poses a significant challenge, particularly in terms of kerf and delamination damage during the abrasive water jet machining (AWJM). This study advocates the novel development of a banana fiber woven-pumice particle reinforced sandwich composite and further machining quality improvement during AWJM by implementing a hybrid statistical model, Grey Relational Analysis (GRA)-Principal Component Analysis (PCA), and soft computing Machine Learning (ML) algorithms. Nine machining trials are executed by considering machining parameters like pumice composition, hydraulic pressure, abrasive flow rate, and standoff distance, where kerf ratio, delamination, and surface roughness are the machining damages. Invariably, the models considered declare the ideal set of parameters, which comprises 100 (MPa) hydraulic pressure, 300 (gm/min) abrasive flow rate, 2 mm standoff distance, and 10% pumice particles to ensure minimal damage. Both modeling approaches indicate that the pumice composition in the sandwich core is the highest contributor in deciding the machining quality. The implementation of the hybrid model facilitates the 7.88%, 24.43%, and 45.28% improvement in damage reduction in kerf ratio, surface roughness, and delamination.

Author keywords- delamination; kerf ratio; Pumice particles; sandwich composite; surface roughness

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q2	**56th**	**1.2**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

FINGER VEIN-BASED BIOMETRIC KEY GENERATION WITH POST-QUANTUM ENCRYPTION AND OPTIMIZED MAGNETIZED HOPFIELD GLOBAL NEURAL NETWORK

Arun Raj, S.R.; **Ramana Murthy, G.R.**; Shilpa, P.; Jose, N.N.; Shameem Ansar, A.; Venkateswarlu Reddy, P.

International Journal of Applied Mathematics

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International Journal of Applied Mathematics
Years currently covered by Scopus: from 2017 to 2025
Publisher: Diogenes Co. Ltd.
ISSN: 1311-1728 E-ISSN: 1314-8060

Abstract

Biometric authentication, especially using finger vein patterns, offers a reliable and non-invasive method for secure identity verification. However, current systems face limitations in robustness, scalability, and post-quantum resilience. Existing methods often struggle with noisy biometric inputs, key instability, and vulnerability to quantum attacks. This motivates the development of a lightweight, secure, and stable key generation system. This paper introduces a new biometric key generation framework based on the combination of several state-of-the-art techniques. It starts with Adaptive and Propagated Mesh Filtering (APMF) for improved preprocessing, followed by Spike-Driven Transformer (SDT) for spatiotemporal feature extraction. Min–Max Normalization (M2N) normalizes feature vectors, which are then mapped to binary strings for robust key representation. A fuzzy extractor produces helper data, and Dynamic Lightweight Symmetric Encryption (DLSE) provides post-quantum secure binding. Authentication and key recovery are carried out through a Magnetized Hopfield Global Neural Network (MHGNN), the weight parameters of which are optimized by the White Shark Optimizer (WSO). The model attains 99.7% accuracy with an Equal Error Rate of 0.08, which is higher compared to traditional methods with regard to accuracy and security. This paradigm provides secure authentication with minimal computational expense, and future extensions will be explored to extend it to multimodal biometrics and real-time deployment on edge devices.

Author keywords- Adaptive and Propagated Mesh Filtering; Dynamic Lightweight Symmetric Encryption; Min–Max Normalization; Spike-Driven Transformer; White Shark Optimizer

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q2	**56th**	**1.2**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

SECURE INTEGER DOMINATION IN GRAPHS

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International Journal of Applied Mathematics

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International Journal of Applied Mathematics
Years currently covered by Scopus: from 2017 to 2025
Publisher: Diogenes Co. Ltd.
ISSN: 1311-1728 E-ISSN: 1314-8060

Abstract

An Integer dominating function on a graph G is a function Σ f: V (G) W such that for every vertex v V (G), v V (G)(N[v]) ≥ k. For any function f: V (G) W and any pair of adjacent vertices with f(v) = 0 and u > 0, the function g<inf>uv</inf> is defined by g<inf>uv</inf> (l) = 1, g<inf>uv</inf> (l) = f(u) – 1 and g<inf>uv</inf> (l) = f(l) if l V – {u, v}. A secure integer dominating function on a graph G is defined as an integer dominating function g which satisfies the condition that for every vertex v with f(v) = 0, a neighbor u with f(u) > 0 is such that g<inf>uv</inf> is an integer dominating function. The weight of f is w(f) =Σv V (G) f(v). The minimum weight among all the dominant secure integer functions in G is the number of secure integer domination in G. This paper is devoted to initiating the study of SIDF of a graph. In particular, we have studied about the general bounds for standard graphs like Complete graph, Star graph, wheel graph, path, cycle.

Author keywords- dDomination; Integer domination; Secure domination

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	71st	2.6	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

TAILORED Yb@$SrMoO_4$/MoS_2 HYBRID NANOSTRUCTURES: APPLICATION IN HIGH-PERFORMANCE ASYMMETRIC SUPERCAPACITORS

Kumar, A.; **Yogesh Kumar, K**; Avadhani, D.N.; B P, B.P.; Raghu, M.S.; Jeon, B.-H.; Prasana, B.P.

Topics in Catalysis

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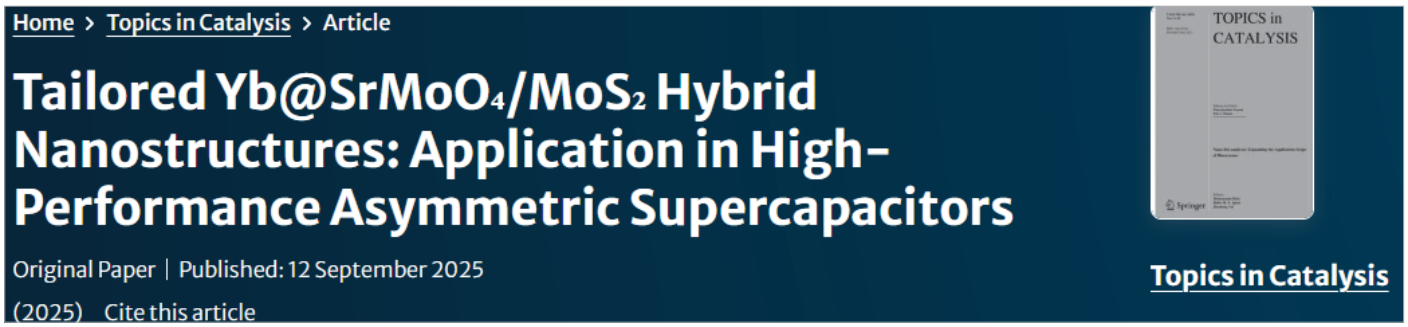

Abstract

A simple method for the fabrication of Yb doped SrMoO<inf>4</inf>, MoS<inf>2</inf> and Yb@SrMoO<inf>4</inf>/MoS<inf>2</inf> was developed using precipitation aided hydrothermal method. The structural, morphological and x-ray photoelectron spectroscopy (XPS) confirms the formation of nanocomposite and occurrence of mixed oxidation states. All the three materials were subjected to electrochemical studies towards supercapacitor applications in three electrode system and showed pseudocapacitor behaviour in the Yb@SrMoO<inf>4</inf>/MoS<inf>2</inf> nanocomposite. Due to the combined effect of Yb@MoO<inf>4</inf> and MoS<inf>2</inf>, Yb@SrMoO<inf>4</inf>/MoS<inf>2</inf> nanocomposites exhibited superior electrochemical activity when compared to counter parts. The specific capacitance values recorded at a scan rate of 10 mV s^{-1} were 724, 121, and 29 F g^{-1} for Yb@$SrMoO_4$/MoS_2, Yb@$SrMoO_4$, and MoS_2, respectively. Among these, the Yb@$SrMoO_4$/MoS_2 electrode demonstrated superior electrochemical performance, achieving a notable power density of 750 W kg^{-1} and an energy density of 75.4 Wh kg^{-1} at a current density of 0.5 A g^{-1}. Furthermore, this electrode showed commendable cycling durability, retaining 87% of its initial capacitance even after 5000 charge–discharge cycles. An asymmetric supercapacitor device (ASD) was fabricated using Yb@$SrMoO_4$/MoS_2 as the positive electrode and activated carbon as the negative counterpart. This configuration delivered a specific capacitance of 78 F g^{-1} at a scan rate of 5 mV s^{-1} and maintained 92.5% of its original capacitance during stability testing.

Author keywords- Device fabrication; MoS2; Pseudocapacitors; Yb@SrMoO4

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q1	85th	1.2	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

REVOLUTIONIZING DIABETIC MACULOPATHY DETECTION WITH MOBILENET, GAN-ENHANCED IMAGING, AND GRAPH NEURAL NETWORKS: A MULTIMODAL AI APPROACH FOR PRECISION OPHTHALMOLOGY

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Informatics in Medicine Unlocked

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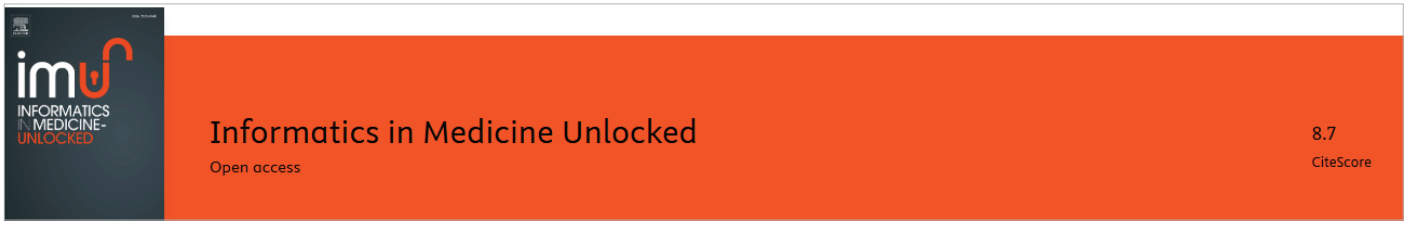

Abstract

Diabetic Maculopathy (DM) is a serious complication of diabetes that damages the small blood vessels in the macula, threatening central vision. Timely detection is essential for effective intervention and vision preservation. Traditionally, ophthalmologists have relied on labor-intensive manual examinations of retinal fundus images, which may delay diagnosis and treatment. This study proposes a modified MobileNet deep learning model for the automated detection and classification of DM at different stages, enhanced by the integration of clinical data and Optical Coherence Tomography (OCT) images. Synthetic fundus images were generated using Generative Adversarial Networks (GANs) to address data scarcity and class imbalance, focusing on underrepresented classes such as Severe maculopathy. External datasets, including Messidor and EyePACS, were also incorporated to validate the model's robustness and generalizability across diverse populations. The proposed model was trained on a unified dataset encompassing fundus images specifically annotated for diabetic maculopathy with varying degrees of severity. The model analyzes these images to extract relevant features and accurately classify them according to the corresponding stages of maculopathy. Achieving a training accuracy of 96% and a validation accuracy of 89.95% (five-fold cross-validation repeated twice), this study underscores the potential of this method for enhancing clinical applications. Furthermore, it represents a significant advancement in the automated assessment of diabetic eye diseases using deep learning. Future work will involve evaluating the model's effectiveness in real-world clinical settings and exploring methods to improve its transparency and reliability.

Author keywords- Bayesian Neural Networks; Calibration; Clinical decision support; Diabetic maculopathy; Explainable AI; Fundus imaging; Generative Adversarial Networks; Graph Neural Networks; MobileNet; Monte Carlo dropout; Multimodal fusion; Optical coherence tomography

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q3	**30th**	**1.1**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

REGRESSION RATE EVALUATION OF BORON-HTPB–BASED SOLID FUEL WITH SILVER NANOPARTICLES IN THE PRIMARY COMBUSTOR OF A DUCTED ROCKET MOTOR

Batabyal, P.; Kailash, S.; Jha, A.; Sharma, D.; **Hashim, S.A.**

Journal of Aeronautics, Astronautics and Aviation

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Journal of Aeronautics, Astronautics and Aviation
OpenAccess
Aeronautical and Astronautical Society of the Republic of China,正常發行

Abstract

Ducted rockets are extensively used in rocket propulsion to achieve high specific thrust in missile applications. Boron, a high-energy material, is commonly recommended for ducted rockets. However, boron (B) is always coated with an oxide layer (B<inf>2O3),</inf> which hinders its ignition and combustion performance. To overcome this issue, the present study deals with silver (Ag) nanoparticles, which possess high thermal conductivity and are added to Hydroxyl Terminated Polybutadiene (HTPB) and B mixture. Ag is anticipated to enhance the ignition and combustion of B particles by facilitating its rapid heat transfer properties. Three distinct HTPB-based solid fuel grains are formulated and tested in a static lab-scale hybrid propellant ducted rocket motor with a pure oxygen supply. Material characterization techniques, including X-ray diffraction (XRD) and scanning electron microscopy (SEM), have been utilized to analyze the as-received feed particles and condensed combustion products from the combustor, to examine their morphology and crystallinity. The study mainly focuses on the evaluation of combustion parameters such as regression rate and combustion chamber pressure. In the present investigation, the boron-HTPB combination demonstrates the highest regression rate, approximately 10.13% greater than that of the pure HTPB fuel grain.

Author keywords- Boron-silver combustion; Ducted rocket; HTPB; Regression rate

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	97th	5.4	04 QUALITY EDUCATION

PERCEIVED KEY FACTORS AFFECTING ONLINE UNIVERSITY CLASSROOMS

Sarker, P.; **Banshal, S.K.**; Newton, M.; Anika, S.; Sumsee Sristy, M.; Chakrobortty, A.

Education and Information Technologies

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Abstract

Online education is common in the current digital world. There has been some progress in adopting synchronous online education in the higher education sector, using general purpose online meeting software. The current global trend is to adopt human-technology integration to achieve better classroom engagement with the help of blending learning and to achieve equal or better performance than physical learning. In this paper, we investigate the research question "What are the key factors that affect the perceived quality ratings of online university classrooms?" To find the answers, using expert and convenience sampling methods, we perform web-based online quantitative cross-sectional surveys on university teachers and students. We use correlation analysis and decision trees as educational data mining methods to analyse and explain the collected data. Our findings from this investigation are that having appropriate online tools, having interactions in online classes, getting math lessons and labs well, and lively and engaging teaching methods are important for students. For teachers, getting participation, interaction, and feedback from students are key to improve online classes. Our study also seeks a hierarchical explanation behind the relations between the perceived quality ratings and the identified factors. Our findings would help higher education researchers in redesigning future online classrooms.

Author keywords- Higher education; Online classroom; Synchronous learning

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q3	**30th**	**1.1**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

INVESTIGATION OF BORON COMBUSTION EFFICIENCY THROUGH THERMAL ANALYSIS OF CONDENSED PRODUCTS IN A HYBRID DUCTED ROCKET MOTOR

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Journal of Aeronautics, Astronautics and Aviation

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Journal of Aeronautics, Astronautics and Aviation
OpenAccess
Aeronautical and Astronautical Society of the Republic of China,正常發行

Abstract

Boron has attracted interest as a fuel due to its high gravimetric and volumetric heating values. However, B2O3 formation around active boron particles lowers its burning efficiency. Adding metal additives is a key strategy to enhance boron combustion. In the present study, iron nanoparticles are considered as a combustion enhancer when incorporated into a boron and paraffin wax mixture. The current study utilizes a lab-scale hybrid fuel-ducted rocket (HFDR) that facilitates two-stage combustion of boron particles using gaseous oxygen. Four distinct solid fuel grains (tubular) are processed, which include pure paraffin wax, paraffin wax with boron, and boron-paraffin blends with 1% and 2% iron (Fe) particles of the total grain weight. Material characterization techniques, including scanning electron microscopy (SEM), x-ray diffraction (XRD), and thermogravimetric analysis (TGA), are applied to both feed particles and condensed combustion products (CCP) of the nozzle surface to examine chemical and morphological changes. These changes correlated with burning performance and the residual active boron content in the CCP, providing insight into the effect of iron particle additions on combustion performance.

Author keywords- Boron combustion; Combustion efficiency; Ducted rocket; Iron particles; Thermal analysis

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	59th	1.1	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

DEEP LEARNING AIDED ENERGY-EFFICIENT LOSSLESS VIDEO DATA TRANSMISSION FROM IOVT VISUAL SENSORS

Majumder, P.; Sinha, B.P.; Sinha, K.

Innovations in Systems and Software Engineering

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Abstract

We present a novel energy-efficient scheme for the wireless transmission of streaming video data from Internet of Video Things (IoVT) visual sensors to the backhaul network. Our solution employs a dynamic reference frame selection mechanism powered by a Long Short-Term Memory (LSTM) deep learning model to implement a low-complexity, lossless video data encoding scheme. By exploiting temporal correlations in video frames of the JPEG and JPEG 2000 standards, our dynamic reference frame selection mechanism creates a lossless encoding of the video data by eliminating redundant information. The encoded data is further compressed using the Redundant Binary Number System (RBNS), resulting in a non-uniform distribution of symbols, with 0's being the most frequent occurring symbol. A silent-symbol transmission strategy is employed to transmit the resulting RBNS-encoded data, transmitting only the non-zero RBNS symbols (1 and 1^-), resulting in significant energy savings. Simulation results on real-world traffic surveillance datasets demonstrate transmitter-side energy savings of over 84% (for outdoor scenarios) and 86% (for indoor scenarios) compared to transmitting raw video files. The proposed method ensures lossless data communication with zero Mean Squared Error (MSE). It outperforms the popular encoding techniques based on neighborhood correlation sequence (NCS) method, discrete wavelet transform (DWT), Haar discrete wavelet transform, high efficiency video coding (HEVC) and AV1 in terms of overall energy efficiency, making it highly suitable for energy-constrained IoVT applications.

Author keywords- Internet of Video Things; Long short-term memory; Lossless video encoding; Redundant binary number system; Silent-symbol based communication; Temporal correlation

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q3	39th	0.6	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

SUPERDERIVATIONS FOR ABELIAN EXTENSIONS OF LIE SUPERALGEBRAS

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Communications in Algebra

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Superderivations for Abelian extensions of Lie superalgebras

Nupur Nandi

Received 10 May 2024, Accepted 14 Aug 2025, Published online: 07 Sep 2025

Abstract

Consider an abelian extension of Lie superalgebras (Formula presented.). The aim of this paper is to construct exact sequences that relate superderivations to the second cohomology group and to apply them in studying the extension of superderivations of (Formula presented.) and the lifting of superderivations of (Formula presented.) to certain superderivations of (Formula presented.).

Author keywords- Abelian extensions; Lie superalgebras; superderivations

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	89th	6.0	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

A NANOBRIDGE STRATEGY TO FABRICATE MULTIFUNCTIONAL SILICONE RUBBER NANOCOMPOSITES WITH SYNERGY INTERPLAY IN ENHANCING THERMAL CONDUCTIVITY VIA BNNS-GO-PDA@MWCNT TERNARY FILLERS

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Journal of Industrial and Engineering Chemistry

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Abstract

The development of thermally conductive, electrically insulating polymer nanocomposites at lower filler concentrations presents a critical challenge in thermal management materials. In this study, we propose a potential strategy to synergistically improve the thermal conductivity of Silicone Rubber (SR) by incorporating 2-D Boron Nitride Nanosheets (BNNS), 2-D Graphene Oxide (GO), and 1-D Polydopamine-coated Multi-Walled Carbon Nanotubes (PDA@MWCNT) at 10 wt% of filler loading. The hybrid fillers, BNNS and GO, are systematically investigated in SR at varying weight ratios (8:2, 6:4, 4:6, and 2:8), identifying the optimal BNNS: GO (2:8) composition for thermal conductivity improvement. To further enhance the performance, 1-D PDA@MWCNT is incorporated as a third filler, creating continuous thermal pathways between the 2-D fillers. The SR nanocomposites were further characterised for structural, thermal, and electrical properties. The results indicated that the SR/BNNS-GO-PDA@MWCNT ternary nanocomposite demonstrated an excellent synergistic effect, resulting in significantly improved thermal conductivity compared to hybrid composites. The incorporation of 2 wt% PDA@MWCNT to SR/BNNS-GO composite (2:8) resulted in a thermal conductivity of 0.743 W/m. K, which is a 223 % improvement compared to neat SR. Additionally, the improved electrical insulation properties of the developed ternary nanocomposite highlight their potential application as advanced thermal management materials.

Author keywords- Nanobridge; Silicone rubber; Synergy; Ternary nanocomposites; Thermal conductivity

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**95th**	**1.9**	

TOWARDS A DALIT AESTHETICS IN MARKETING

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Consumption Markets and Culture

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Towards a Dalit aesthetics in marketing

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Received 23 Sep 2024, Accepted 14 Aug 2025, Published online: 02 Sep 2025

Abstract

This paper investigates the marketing communication strategies of Chamar, a Dalit-owned luxury circular fashion-accessory brand (India), and its role in challenging the entrenched caste-based prejudices and socio-cultural stigmas associated with Dalit identity. By examining Chamar's advertisements, we explore how Dalit aesthetics, rooted in a history of systemic oppression and marginalization, subvert dominant upper-caste narratives in the Indian market. Drawing on Dalit literature, aesthetics, and marketing theory, the paper argues that Chamar not only disrupts the hegemonic upper-caste Brahminical aesthetics but also redefines Dalit identity through creative engagement with market processes. This resistance-based marketing communication fosters an alternative aesthetic, one that is founded on equality, dignity, and inclusivity, and offers a counter-narrative to casteist stereotypes of mainstream aesthetics. Through a close reading of Chamar's advertisements and comparison with casteist portrayals in other media, we demonstrate how Dalit aesthetics in marketing can serve as a powerful tool for social and cultural emancipation.

Author keywords- aesthetics; Brahminical; Dalit; identity; marketing communication; vulnerable

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	69th	1.8	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

BANANA PEEL WASTE AS A SOURCE OF CELLULOSIC FILLER: ISOLATION, CHARACTERIZATION, AND ITS POTENTIAL AS A GREEN REINFORCEMENT IN POLYMER COMPOSITES

Indran, S.; Gokulkumar, G.; Divya, D.; Ayrilmis, N.; Suganya Priyadharshini, G.S.; **Senthamaraikannan, P.**; Munusamy, Y.

Journal of Material Cycles and Waste Management

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Abstract

This study focused on the extraction and full characterization of cellulose from banana peel waste using optimized chemical methods to obtain high yield and purity. The extraction steps included dewaxing, alkaline treatment, delignification, acid digestion, and bleaching, resulting in a cellulose yield of 72.5%. Fourier transform infrared spectroscopy showed the absence of non-cellulosic materials and peaks characteristic of cellulose. The absorption peak observed by ultraviolet (UV) spectroscopy at a wavelength of 293.889 nm indicates the presence of UV radiation filters. Thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC) tests demonstrated that the obtained cellulose had a primary decomposition temperature of approximately 303.9 °C. X-ray diffraction (XRD) analysis proved that it was crystalline in nature, with a degree of crystallinity of 73.35%. The surface morphology of the cellulose was irregular and fibrillar in shape, as revealed by scanning electron microscopy (SEM) and atomic force microscopy images. Energy-dispersive X-ray (EDX) analysis of cellulose showed good purity, with carbon and oxygen as the main elements. Particle size analysis showed a normal distribution with a mean particle size of 102.287 µm. The detailed characterization of banana peel cellulose (BPC) would further advance the development of environmentally friendly high-performance biocomposites to achieve global sustainability goals.

Author keywords- Banana peel; Biofiller; Cellulose; Characterization; Industrial waste; Sustainability

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**85th**	**1.8**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

A MACHINE-LEARNING APPROACH TO WEIGHT APPROXIMATION FOR A NEW FAMILY OF ORTHOGONAL POLYNOMIALS

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AIMS Mathematics

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AIMS Mathematics
https://www.aimspress.com/journal/Math

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DOI:10.3934/math.2025843
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Published: 20 August 2025

Abstract

This research introduces a novel two-parameter family of orthogonal polynomials that emerge as solutions to a doubly confluent Heun-type differential equation. We investigate these polynomials, examining their geometric properties and analyzing the behavior and distribution of their zeros under varying parameter conditions. Leveraging machine learning techniques, we successfully derive symbolic expressions for the corresponding weight functions associated with these orthogonal polynomials. Our numerical results demonstrate the efficacy of this approach, achieving a maximum absolute error of order 10−4 in weight function approximation. Furthermore, we present a comparison between our proposed model and conventional approximation methods, including cubic spline interpolation and Lagrange polynomial interpolation, highlighting the advantages of our methodology.

Author keywords- Heun equation; machine learning; orthogonal polynomials; recurrence relation; symbolic regression; weight approximation; zeros

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q3	27th	0.5	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

AN INTEGRATED DATA-DRIVEN ANALYSIS-BASED DEEP LEARNING FRAMEWORK FOR EARLY AUTISM DETECTION IN CHILDREN TO IMPROVE DIAGNOSTIC PERFORMANCE

Shaik, J.; **Shekhar, R.; Shelke, C.J.**

International Journal of Biomedical Engineering and Technology

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International Journal of Biomedical Engineering and Technology

Abstract

Autism spectrum disorder (ASD) children must be recognised early to obtain prompt care, promote development, and reduce long-term issues. This research provides a VGG16 and ResNet50-based data-driven deep learning system for early ASD screening using facial picture data. The study meticulously normalises, augments, and selects features using chi-square methods to ensure high-quality inputs and low dataset variability. Hyperparameter adjustment optimises model performance and five-fold cross-validation provides robust evaluation. VGG16 can recognise complex face characteristics with 87% accuracy for autistic classifications due to its precision and recall measures. Bio-inspired optimisation improves classification, helping ResNet50 outperform training epochs. Despite these advances, multimodal inputs are still needed for complete analysis due to the limits of facial data and the diversity of datasets. Deep learning models with feature selection can improve diagnostic precision, reduce false positives, and enable clinical real-time ASD screening. The proposed framework speeds diagnosis and is adaptable to varied healthcare circumstances. Future studies will focus on behavioural and genetic data, expandable artificial intelligence (XAI) for interpretability, and larger datasets for robustness. A scalable and effective ASD diagnosis using AI shows the transformative potential of AI in healthcare.

Author keywords- ASD; autism spectrum disorder; deep learning; early autism detection; early diagnosis; expandable artificial intelligence; ResNet50; VGG16; XAI

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q2	**56th**	**0.46**	

TIME FOR A RETHINK: ALIGNING INDIA'S RESERVATION POLICY WITH THE REALITIES OF THE 21ST CENTURY

Thomas, S.; **Satapathy, S.**

Round Table

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The Round Table
The Commonwealth Journal of International Affairs and Policy Studies
Open Select: choose to publish open access
Analysis and commentary on international affairs affecting the contemporary Commonwealth, i
interest and topical issues.

Abstract

The framers of the Indian Constitution envisioned the system of reservations as a mechanism to achieve social equality by empowering historically oppressed communities and fostering a more egalitarian society in which every citizen, irrespective of caste and community, would have equal opportunities in employment, education and public representation. The premise was when such a society comes into existence, these measures would no longer be required. But despite the passage of more than seven decades of independent rule, this ideal remains elusive. The lingering reservation framework indicates that social and economic disparities persist in society. Despite efforts in the past through certain reforms, primarily the recommendations of the Kaka Kalelkar (1953) and Mandal Commissions (1979), significant differences are still present. Many agree that numerous people have undoubtedly benefited from preferential policies in securing employment, gaining admission to higher education, and receiving political representa-tion. But we must ask these questions: has the reservation system truly fulfilled the Constitution's guarantee of equality? Is it not time to reassess the parameters upon which such benefits are bestowed? The recent addition of the Economically Weaker Sections (EWS) policy offered a different lens through which we might look at issues, one that transcends caste and addresses economic marginality. It may be the time to consider a different model of inclusion that more realistically addresses today's conditions and builds national cohesion, and a deeper sense of belonging.

Author keywords- Reservations, Equality, Disparities,Inclusion

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	95th	6.9	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

UTILIZING PHASE CHANGE MATERIALS IN THERMAL ENERGY SYSTEMS: APPLICATIONS IN WASTE HEAT RECOVERY

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Applied Thermal Engineering

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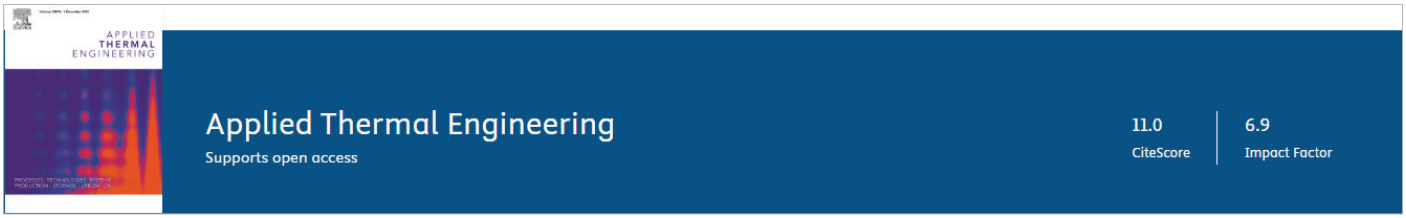

Abstract

While Thermal Energy Storage (TES) systems are being explored for various applications, their role in industrial waste heat recovery holds immense potential to enhance energy efficiency and reduce greenhouse gas emissions. Industrial waste heat represents a largely untapped resource that can be transformed into a valuable energy asset, addressing both environmental and economic challenges. The review presents a detailed analysis of TES technologies divided into sensible, latent, and thermochemical storage, while highlighting their critical role in matching heat generation with demand. Phase Change Materials (PCMs) are fundamental components in TES systems as they offer high energy storage density, enhance temperature stabilization, and versatility across various thermal management applications. The paper examines advanced Mobilized Thermal Energy Storage (M–TES) systems that significantly transport thermal energy to demand sites, thereby improving system flexibility. PCM-based systems show great potential, but their scalability remains limited by several critical challenges, including low thermal conductivity, material degradation, supercooling, and phase segregation. To address these limitations, several techniques such as composite formulation and encapsulation strategies are being explored by many researchers. This review highlights the potential of TES in promoting energy conservation, reducing emissions, and advancing global sustainability efforts.

Author keywords- Industrial waste heat recovery; Latent heat; Mobilized thermal energy storage; Phase change materials; Thermal energy systems

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	**72nd**	**2.7**	

DESIGN, SYNTHESIS AND ANTICANCER EVALUATION OF VARIOUS ARYL THIAZOLE AMINO QUINAZOLINE DERIVATIVES AS ANTICANCER AGENTS

P, B.K.R.; **Bhansali, P.R.**; Chollety, V.; Nalla, S.

Chemical Data Collections

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Chemical Data Collections
6.3 CiteScore
2.7 Impact Factor

Abstract

A new series of various aryl thiazole amine incorporated quinazoline (10a-j) derivatives and their structures are characterized by 1HNMR, 13CNMR and mass spectral data. Further, all the newly developed (10a-j) derivatives are assessed for their preliminary anticancer activity against four human cancer cell lines, such as MCF-7(human breast cancer), A549 (human lung cancer), Colo-205 (human colon cancer) & A2780 (human ovarian cancer) by employing the MTT method and etoposide (Etoposide) used as a positive control. Most of the screened compounds were displayed good to moderate activity as compared with etoposide (Etoposide). The IC50 values range from 0.02±0.0072 μM to 7.90±2.14 μM, and the positive control showed values ranging from 0.17 ± 0.034 μM to 3.34 ± 0.152 μM respectively. Among the tested derivatives, five compounds 10a, 10g, 10h, 10i and 10j exhibited more potent activity. Mainly, one compound 10j displayed superior anticancer activity than the positive control.

Author keywords- Dasatinib; Erlotinib; Quinazoline; Thiazole and anticancer activity

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	92nd	8.5	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

CHARACTERIZATION OF CELLULOSIC FICUS TSJAHELA FIBER AS A REINFORCING MATERIAL IN POLYMER COMPOSITES

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International Journal of Biological Macromolecules

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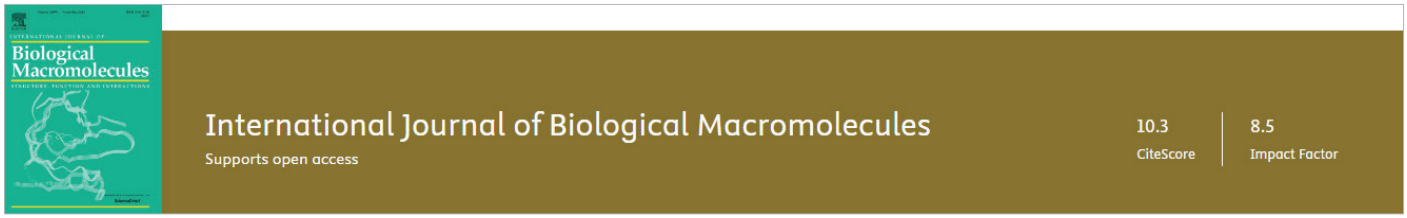

Abstract

The use of natural fibers is increasingly being recognized as a sustainable reinforcement in polymer composites due to their biodegradability and better mechanical properties during implementation. The aim of this research article was to focus on the extraction of fiber from the Ficus tsjahela plant and evaluate its suitability for reinforcing polymer composites. After extraction, the fiber's suitability for use as reinforcement in polymers was tested. The chemical analysis of the F. tsjahela fiber (FTF) estimated a cellulose content of 62.56 ± 8.77 wt%, which was corroborated by the results of the X-ray diffraction (XRD) analysis. The crystallinity index of 77.08 % and the crystallite size value of 4.22 nm for FTF were revealed by the XRD analysis. Thermal analysis outcomes showed the feasibility of using fiber in polymer composites with working and fabrication temperatures of 200 °C. The single fiber tensile strength (308.1 ± 22.93 MPa) and Young's modulus (2.575 ± 0.2081 GPa) of FTF were calculated and statistically verified using Weibull analysis. Impurities and a smoother surface in the FTF were identified through energy-dispersive X-ray analysis. Surface modification of the FTF is essential to improve surface roughness, as enhanced surface roughness enables better bonding with the matrix material.

Author keywords- Ficus tsjahela fiber; Polymer composites; Surface roughness; TGA; X-ray diffraction analysis

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	88th	6.2	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

THE POTENTIAL OF BIOMASS SUGAR PALM (ARENGA PINNATA) IN PAPERMAKING AND THEIR POTENTIAL INDUSTRIAL APPLICATIONS: A REVIEW

Husain, H.S.N.; Shamimimraphay, S.H.R.; Ilyas, R.A.; **Rajeshkumar, L.**; Abotbina, W.; Haron, S.; Samsudin, S.A.; Shamjuddin, A.; Rangappa, S.M.; Siengchin, S.; Mahardika, M.

ChemBioEng Reviews

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ChemBioEng Reviews

Abstract

As global paper demand surges, conventional wood pulp methods raise deforestation concerns. This study explores the potential of sugar palm (SP) (Arenga pinnata) fibers, particularly in Malaysia, as a sustainable alternative for papermaking. SP, known for its versatility in food products and biofiber production, offers an eco-friendly option. It is also used for bioethanol, providing renewable energy sources. The research highlights SP biofibers as viable raw materials for the pulp and paper industry, emphasizing their seawater resistance, durability, and natural availability in woven forms. Its fibers exhibit seawater resistance, durability, and natural woven availability, with cellulose content of 45–60%, hemicellulose of 10–17%, and lignin of 16–30%, indicating strong suitability for papermaking. Comprehensive evaluation of SP properties, treatment approaches, and pulping processes demonstrates its role as a viable non-wood source, especially for forest-deficient regions. Beyond technical aspects, the study emphasizes environmental benefits, highlighting how SP utilization could reduce reliance on wood, mitigate deforestation, and foster sustainable industrial practices. This review bridges academic research on SP biomass with industrial applications, outlining current challenges, opportunities, and future directions for integrating non-wood fibers into industrial papermaking.

Author keywords- Cellulose; Industrial papermaking; Renewable pulping; Sugar palm; Sustainable papermaking

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	80th	4.38	08 DECENT WORK AND ECONOMIC GROWTH; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

FROM DEGRADATION TO DURABILITY: STRATEGIES FOR PROLONGING THE SHELF LIFE OF NATURAL FIBER COMPOSITES—A COMPREHENSIVE REVIEW

Prasath, A.; **Senthamaraikannan, P.; Suyambulingam, I.**; Akash, S.; Kathic, S.; Chanth, M.V.; Sunesh, N.P.; Kumar, R.

Journal of Natural Fibers

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Abstract

Natural fiber composites (NFCs) have emerged as eco-friendly alternatives to synthetic composites, yet their shelf life remains a critical limitation. This review comprehensively examines factors affecting NFC degradation including moisture absorption, UV exposure, microbial attack, and oxidation and highlights recent mitigation strategies such as surface treatments, hybridization, and advanced packaging. The integration of shape-memory behavior and sustainability metrics is also explored, offering a roadmap to extend NFC lifespan for real-world applications in construction, packaging, and automotive sectors.

Author keywords- Natural fiber composites; optimizing the shelf life and packaging; shelf-life analysis; shelf-life challenges and solutions; sustainable environment

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	80th	4.38	08 DECENT WORK AND ECONOMIC GROWTH; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

PROTECTION OF INNOVATION IN PLANT FIBER-REINFORCED COMPOSITES: A CRITICAL ANALYSIS OF THE INTELLECTUAL PROPERTY RIGHTS OPPORTUNITIES AND CHALLENGES

Mandal, A.; Chutia, U.; Dutta, G.; **Senthamaraikannan, P.**; Kumar, R.

Journal of Natural Fibers

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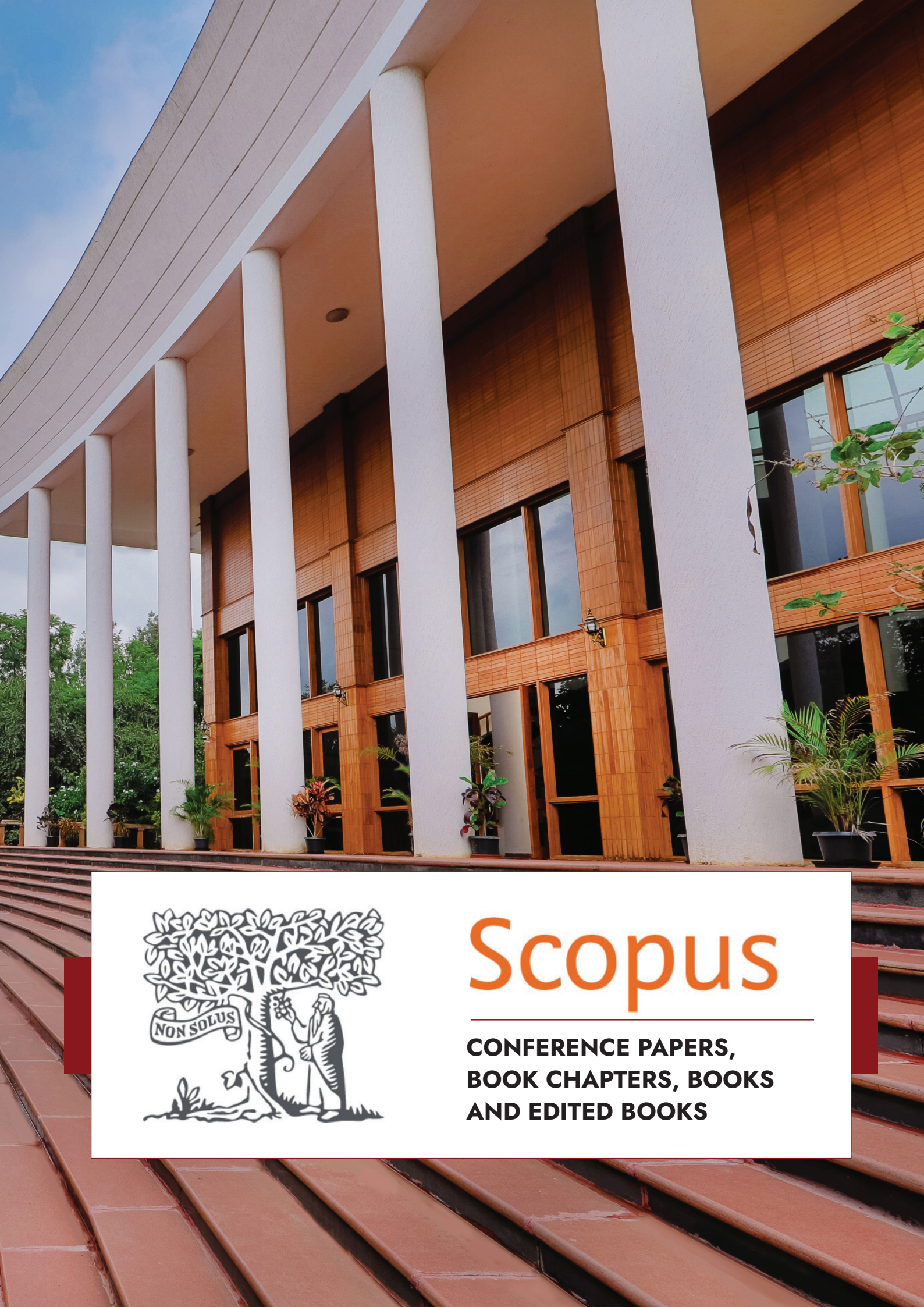
Abstract

The major global concern is to have a sustainable future to achieve sustainability by adopting green, eco-friendly, biodegradable, and zero carbon footprint material like the Plant Fiber-Reinforced Composites (PFRCS), replacing the synthetic materials like nylon, polyester, etc. However, the PFRC innovations are not recognized or protected under the current Intellectual Property Rights (IPR) mechanisms due to novelty issues, as they are the outcome of Traditional Knowledge (TK), which is orally transmitted from generation to generation. With the help of traditional knowledge and natural ingredients like jute and latex, etc, innovations in PFRC are made, making it difficult to prove its uniqueness, novelty, or originality, which is a basic requirement for obtaining patent protection along with other IPR protection. Therefore, the study aims to critically analyze and compare with the help of doctrinal research and quantitative data, the IPR framework of India with that of other countries like the United States, China, and the European Union to understand the present legal framework, its opportunities, and the challenges to protect PFRCs' innovation. This paper is unique in a way that it is mainly focused on a particular natural fiber composite that is PFRC which helps in replacing the synthetic fiber,.

Author keywords- Natural fiber composites; optimizing the shelf life and packaging; shelf-life analysis; shelf-life challenges and solutions; sustainable environment



Scopus

CONFERENCE PAPERS, BOOK CHAPTERS, BOOKS AND EDITED BOOKS

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

REDEFINING DMAIC WITH AI AND REAL-TIME DATA

Boopathy, G.; Bose, G.C.; Gayathri, M.; **Kumar, M.H.**

Transformative Lean Six Sigma Techniques for the Quality 5.0 Paradigm

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Redefining DMAIC With AI and Real-Time Data
August 2025
DOI:10.4018/979-8-3373-0943-9.ch005
In book: Transformative Lean Six Sigma Techniques for the Quality 5.0 Paradigm (pp.123-150)

Abstract

The combination of Artificial Intelligence (AI) and real time data analytics with the typical Lean Six Sigma (LSS) DMAIC framework is investigated in this chapter as it includes the use of Industry 5.0 principles. As an alternative to more static data analysis, it offers more dynamic, predictive, and prescriptive decision-making procedures that allow these organizations to better optimize their operations. Machine learning and Internet of Things (IoT) are also exciting AI skills by which some problems can be proactively identified to augment operational efficiency and quality in alignment with human-centric, sustainable and resilient manufacturing paradigms. It also presents a new conceptual framework that adds to every phase of the DMAIC cycle and consequently turns this reactive system into a predictive system, supporting the continuous improvement and tackling sustainability, efficiency, and the collaboration challenges. This integration helps firms attain operational excellence in Industry 5.0 by bridge the gaps between new, technology-based methods and conventional processes.

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	04 QUALITY EDUCATION

BRAIDING THE INFORMAL AND FORMAL ARCHIVES FOR LEARNING: INTEGRATING INFORMAL ARCHIVES IN EDUCATIONAL RESEARCH AND PEDAGOGY

Alam, A.

Understanding and Utilizing Informal Archives

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Abstract

This chapter conceptualizes the "braided archive" as a hybridized epistemic framework that entwines informal archival modalities including personal, community- driven, digital, and ephemeral, with institutionalised formal repositories to reconfigure pedagogical praxis. Anchored in experiential learning theory, constructivist paradigms, postcolonial epistemologies, and critical archival studies, it interrogates the ontological and epistemological underpinnings of archival legitimacy within educational ecologies. The chapter delineates typological taxonomies, methodological scaffolds, and didactic applications that operationalise informal archives as legitimate cognitive artefacts. By foregrounding counter-hegemonic narratives and subaltern epistemes, the braided archive functions as an agent of epistemic justice and curricular decolonisation. Empirical illustrations and transnational exemplars elucidate its efficacy in augmenting learner agency, enhancing cognitive engagement, and nurturing dialogic, multimodal knowledge construction.

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING

AI FOR PREDICTIVE SUSTAINABILITY IN HEALTHCARE

Rajesh, R.; Veena, S.; Shanthini, A.; John Deva Prasanna D, D.S.; Yasmeen, D.; Selvakumar, P.; Manjunath, T.C.

Responsible Innovation in Smart Healthcare: AI, IoT, and Ethical Sustainability Practices

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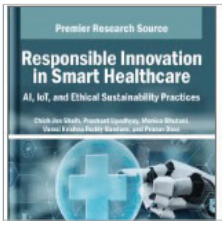

AI for Predictive Sustainability in Healthcare

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Source Title: Responsible Innovation in Smart Healthcare: AI, IoT, and Ethical Sustainability Practices
Copyright: © 2026 | Pages: 30
DOI: 10.4018/979-8-3373-5791-1.ch002

Abstract

When applied to healthcare, predictive sustainability refers to leveraging AI technologies to forecast, analyse, and optimize healthcare systems to balance long-term environmental, economic, and social considerations. AI particularly offers substantial benefits by helping healthcare organizations anticipate challenges and optimize resources while reducing their environmental footprint and ensuring better care for populations. In this comprehensive analysis, we explore the significance of AI in predictive sustainability within healthcare, focusing on its role in improving efficiency, managing resources, and advancing global health goals. In the healthcare sector, AI's role in improving operational efficiency is critical for predictive sustainability. Healthcare systems worldwide face significant challenges, including rising patient demands, resource constraints, and increasing costs. Predictive analytics, powered by AI, allows healthcare administrators to anticipate future trends.

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q3	25th	2.5	07 AFFORDABLE AND CLEAN ENERGY

A COMPREHENSIVE ANALYSIS OF WASTEWATER MANAGEMENT CHALLENGES IN INDIA: INFRASTRUCTURE AND POLICY PERSPECTIVES

Wani, S.A.; Tari, V.; Mansoor, S.I.U.

Springer Water

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Abstract

The increasing urbanization and industrial pollution are a serious concern for future generations. Having a proper sewage system in India casts human lives and unfortunately remains the least concern for the policymakers. As per reports, almost 80% of global wastewater is released into the environment without adequate treatment, which can have disastrous health effects. In 2021, The Central Pollution Control Board (CPCB) in its report said that India's current capacity for treating sewage is 18.6% and its current capacity for treating water is 27.3%. According to government official statistics, 62.5% of urban India's wastewater is either partially or not at all treated. There are existing research studies that claim "most of the sewage treatment plants that were established under the Ganga Action Plan (GAP) and Yamuna Action Plan (YAP) are not working, and interestingly, out of the 33,000 MLD of waste generated, only 7000 MLD is collected and treated. To underscore the environmental urgency and its pitfalls, it becomes imperative that the centralized wastewater treatment demands a well-developed network of interconnected sewers and drainage for the wastewater to be collected in a central location." This chapter mainly deals with a critical review of "policies, rules, regulations, on wastewater management in India." The study will also examine the implementation challenges in enforcing wastewater laws and bye-laws in India. The chapter will also delve into the existing challenges and constraints that impede the development of current waste management practices and propose solutions. Moreover, the study investigate the possibilities for waste management, so complementing centralized treatment plants with less expensive alternatives to reduce potential effects on the aquatic environment and suggest a more effective waste management approach. This chapter seeks to undertake a legal and policy assessment of the reuse of Wastewater in India and establish the challenges and prospects in mitigating water scarcity. Regarding the role of Wastewater reuse policies and regulations, it provides a comprehensive overview of the applied economic, social, and environmental value.

Author keywords- : Environmental law; Policies; Pollution; Rules; Water management

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q3	**25th**	**NA**	07 AFFORDABLE AND CLEAN ENERGY

GREENING THE FUTURE: LEVERAGING FINTECH FOR SUSTAINABLE BLUE ECONOMY INVESTMENTS

Singh, R.; Rabby, F.; Sharma, A.R.; Banerjee, J.; **Mishra, V.**

World Sustainability Series

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Abstract

This study examines the ways in which fintech solutions such as blockchain, AI-powered risk assessment, and digital payment platforms can spur long-term investments in blue economy industries like coastal tourism, marine energy, and fisheries. The integration of fintech tools in promoting financial inclusion and risk reduction in green investments is investigated using a mixed-methods approach that combines quantitative data analysis and literature reviews. This chapter offers policymakers, investors, and entrepreneurs' practical insights by highlighting successful implementations and tackling issues including technology and regulatory constraints. Fintech's revolutionary role in bringing financial systems into line with the Sustainable Development Goals (SDGs) of the UN, especially SDG 14 (Life Below Water), is highlighted in the conclusion.

Author keywords- : Blue economy; Fintech; Green investment; Marine ecosystem conservation; Sustainable finance

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

ENSEMBLE LEARNING-ENHANCED IOT AND FOG-BASED FRAMEWORK FOR PRECISION CROP DISEASE DIAGNOSIS

Aby K Thomas, A.K.; Kandepu, S.; Reddy, N.; Tanna, P.; Ramraj, B.; Saimanasa, M.

2025 2nd International Conference on Multidisciplinary Research and Innovations in Engineering, MRIE 2025

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Ensemble Learning-Enhanced IoT and Fog-Based Framework for Precision Crop Disease Diagnosis

Publisher: IEEE Cite This PDF

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Abstract

The overarching goal of this research is to develop a proactive and preventative method for crop disease prediction. In order to greatly aid in the prevention of agricultural illnesses, the suggested approach can foretell when they would arise at an early stage. Various smart agricultural disease diagnostic frameworks for illness prediction have been suggested in the research proposal. In the first scenario, we provide a cloud-based smart illness diagnostic framework that is helped by the Internet of Things (IoT). This framework has three primary parts: the User the system, the Data Analytic System, and the Cloud Storage System. After gathering information IoT sensors, the suggested design uses predictive machine learning algorithms to forecast when illness will strike. Ultimately, reports are delivered to the end user so they may take the appropriate measures. As for the second scenario, it suggests using an IoT-Fog architecture that is built on machine learning to keep an eye on the crop and prevent disease outbreaks. The USS, the internet of things sub-system, and the consumer's platform are the three main parts of the structure. Data collecting is the purview of the consumer's system function. The IoT system as well, gateway, and fog unit - all of which host the data analytics - are likewise housed in the USS. Gradient Boosting (GB), the suggested technique, has an astounding 98% accuracy. Gradient Boosting guarantees great consistency and precision in projections, making it the most efficient strategy for crop disease detection compared to other approaches like Decision Tree (DT), Support Vector Machine (SVM), Random Forest (RF), Bagging, and AdaBoost.

Author keywords- : AdaBoost; Bagging; DT; GB; IoT; IoT Gateway; RF; SFN; SVM

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 16 PEACE, JUSTICE AND STRONG INSTITUTIONS

ADVANCED AI-POWERED SIGNATURE AUTHENTICATION SYSTEM USING SIAMESE NEURAL NETWORK

Patni, J.; Bhaskarrao Bahadure, N.; Parashar, D.; Patil, P.D.; Shah, B.; Jethani, H.

2025 IEEE International Conference on Computer, Electronics, Electrical Engineering and their Applications, IC2E3 2025

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Advanced AI-Powered Signature Authentication System using Siamese Neural Network

Publisher: IEEE Cite This PDF

Jagdish Chandra Patni ; Nilesh Bhaskarrao Bahadure ; Deepak Parashar ; Prasenjeet D. Patil ; Bhoomi Shah ; Hetal Jethani **All Authors**

Abstract

Signature forgery is a major concern in high-stakes fields such as law, finance, and business, where secure authentication is censorious. This research addresses the challenges of traditional authentication of signatures using a deep learning-based system. Signature authentication remains a tenacious concern, and traditional systems where manual inspection is tender, are prone to human error and inefficiency. This research investigated deep learning techniques based on the Siamese Neural Network (SNN) model. SNN is a specialized deep learning architecture, that leverages automation and strengthens signature verification seamlessly. The SNN-based approach authorizes both skilled and random identification of signatures by comparing the samples and ensures high accuracy of signature classification. The system provides a high volume of signature verification quickly, the system is highly scalable, and also ensures authentic results through a well-praised user-friendly interface. The entire system is integrated with an SQLite database for handling a large amount of data with the SNN model for real-Time assessment of the signatures.

Author keywords- Convolutional neural network (CNN); Deep learning; Machine learning; Natural language processing (NLP); Siamese neural network (SNN)

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

RIVER BED MAPPING WITH DEVIATION SENSITIVE UNSUPERVISED SEGMENTATION OF OPTICAL SAR REMOTE SENSING

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2025 IEEE Space, Aerospace and Defence Conference, SPACE 2025

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River Bed Mapping with Deviation Sensitive Unsupervised Segmentation of Optical SAR Remote Sensing

Publisher: IEEE Cite This PDF

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Abstract

Tripura, India, faces escalating flood frequency and severity, threatening ecosystems, economies, and public health. This study develops an operational framework for rapid flood inundation mapping using Sentinel-1 SAR imagery through unsupervised segmentation of backscatter variations, eliminating dependency on manually labeled data. By applying VV/VH polarization with the Lee sigma filtering, we achieved optimal flood detection, validating fused VV+VH approach. Critical thresholds were identified at -14.2 dB (VV), -21.5 dB(VH), and 0 dB (VV/VH) ratio, with a mean backscatter drop of -6.4 dB (VV) confirming flood-induced surface smoothing. Elevation analysis revealed 25% of Tripura lies below 30m highly vulnerable to inundation supported by a pixel count surge signifying expanded flood extent. Visual and statistical validation confirms this method enables efficient disaster response through accurate, near real time flood mapping.

Author keywords- Back Scatter; Floods; Polarization; SAR; Tripura; Unsupervised Segmentation

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

RNN-BASED PREDICTION AND RISK CLASSIFCATION FOR IMPROVING ENDOMETRIAL CANCER DIAGNOSIS USING CLINICAL AND IMAGING DATA

Ghantasala, G.S.P.; Thrilok, K.; Vidyullatha, P.; **Vijayalakshmi, N.; Rajesh Sharma, R.; Sungheetha, A.**

Proceedings of 5th International Conference on Soft Computing for Security Applications, ICSCSA 2025

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Advanced AI-Powered Signature Authentication System using Siamese Neural Network

Publisher: IEEE Cite This PDF

Jagdish Chandra Patni ; Nilesh Bhaskarrao Bahadure ; Deepak Parashar ; Prasenjeet D. Patil ; Bhoomi Shah ; Hetal Jethani **All Authors**

Abstract

Endometrial cancer is one of the most prevalent malignancies in women; hence, its early detection is critical for effective treatment and improved survival rates. Traditional techniques for diagnosis are usually invasive and quite variable in their accuracy. This study is primarily focused on applying machine learning, and more specifically recurrent neural networks (RNN), for the analysis of clinical and imaging data for early cancer detection and assessing recurrence risk. Patient datasets were preprocessed through normalization, imputation, and feature extraction. PCA and t-SNE-related dimensionality reduction methods were applied to enhance feature relevance and visualization. The RNNs have a great potential for the analysis of temporal data, but the initial results indicate a poor performance in classification, with an ROC AUC sitting at 0.46. Visualizations suggest overlapping feature spaces, calling for new modeling strategies. Optimizing model architecture, enhancing data varieties, and establishing integration of multimodal sources will be the strategy for establishing clinical utility. The study, while affirming the promise of artificial intelligence in personalized cancer diagnostics, also acknowledges the challenges posed by data quality, model generalization, and interpretability.

Author keywords- : AI in health care; Cancer diagnosis; Data preprocessing; Deep learning; Endometrial malignancy; Feature extraction; Machine learning; Medical imaging; Prognostic modeling; Recurrent neural networks

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

SURGICAL STRATEGIES IN PRIMARY FALLOPIAN TUBE CANCER: A GYNECOLOGIC ONCOLOGY PERSPECTIVE

Kolla, T.; **Ghantasala, G.S.P.;** Vidyullatha, P.; **Rajesh Sharma, R.; Vijayalakshmi, N.; Sungheetha, A.**

Proceedings of 5th International Conference on Soft Computing for Security Applications, ICSCSA 2025

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Surgical Strategies in Primary Fallopian Tube Cancer: A Gynecologic Oncology Perspective

Publisher: IEEE Cite This PDF

Thrilok.Kolla ; G S Pradeep Ghantasala ; Pellakuri Vidyullatha ; Rajesh Sharma R ; N Vijayalakshmi ; Akey Sungheetha **All Authors**

Abstract

Fallopian tube cancer became clinically meaningful as its biology and pathology resembled ovarian and peritoneal cancers, especially high-grade serous carcinoma. Emerging evidence shows that the distal fallopian tube is often the primary site of origin for these aggressive malignancies, changing protocols for early detection, prevention, and classification. This paper presents a multifaceted analysis involving clinical data and molecular insights combined with computational modeling to assess and improve treatment strategies against fallopian tube cancer. By assessing survival outcomes, recurrence rates, and patient volumes across five major surgical procedures - Total Hysterectomy, Salpingectomy, Bilateral Salpingo-oophorectomy, Lymphadenectomy, and Omentectomy. This study, therefore, seeks to point out ways in which they differ in long-term efficacy and consistency of each intervention. Further, molecular studies involving mutations in TP53 and RAD51D in patient-derived organoids provide a model for the understanding of early-stage tumorigenesis. Deep learning algorithms based on ultrasound imaging are integrated so that patients might understand their platinum resistance. This would further enhance personalized and adaptive treatment regimens. This entire study signifies the merit of synergizing the clinical performance measures with modern computational tools that would make a difference in prognostication and treatment decisions. This work makes an unprecedented blend of surgical outcome modeling and molecular profiling with AI-driven prognostic tools, and it is identified with a comprehensive, computationally improved approach to managing fallopian tube cancers.

Author keywords- artificial intelligence; Fallopian tube cancer; high-grade serous carcinoma; management strategies; organoids; personalized oncology; platinum resistance; recurrence rates; survival analyses; TP53 mutations

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

REVOLUTIONIZING WARFARE: AI-DRIVEN SWARM QUADCOPTERS WITH MODULAR AND SELF REPAIR TECHNOLOGY

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2025 IEEE Space, Aerospace and Defence Conference, SPACE 2025

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Revolutionizing Warfare: AI-Driven Swarm Quadcopters with Modular and Self Repair Technology

Publisher: IEEE Cite This PDF

Raja Munusamy ; Keerthana K ; Shreya R S Gowda ; K. Thyagaraja **All Authors**

Abstract

The revolutionary impact of the latest technologies on modular quadcopters in contemporary warfare, particularly in their application in using swarm drones, is examined in this essay. The convergence of such technologies has enabled mass manufacturing, deployment of swarm drones at reduced expenses, and reduced dependency on conventional supply chains through neighborhood production near battlegrounds. Modularity and scalability of such quadcopters allow for easy replacement of parts to be done, thus allowing swarm drones to easily change from surveillance, assault, and logistics mode dynamically, transforming the tactic field of military force. Further, the combination of AI-powered damage sensing and self-healing materials is making it possible for swarm drones to repair themselves, greatly boosting their performance and survivability in harsh environments. Quadcopter's sturdy four-rotor configuration offers superior stability, maneuverability, and ease of use, making them a perfect platform to deploy swarm drones. Made of ultra-light yet incredibly strong carbon fiber-reinforced filaments or nylon, these swarm drones are designed for high-stress use in aerial photography, intelligence gathering, and tactical combat missions where performance and reliability are critical.

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

A COMPREHENSIVE SYSTEM FOR MULTILINGUAL TEXT RECOGNITION AND CROSS-LANGUAGE DATA ACCESSIBILITY USING MACHINE LEARNING

Patni, J.; Bhaskarrao Bahadure, N.; Parashar, D.; Shah, B.; Jethani, H.; Patil, P.D.

2025 IEEE International Conference on Computer, Electronics, Electrical Engineering and their Applications, IC2E3 2025

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A Comprehensive System for Multilingual Text Recognition and Cross-Language Data Accessibility Using Machine Learning

Publisher: IEEE Cite This PDF

Jagdish Chandra Patni ; Nilesh Bhaskarrao Bahadure ; Deepak Parashar ; Bhoomi Shah ; Hetal Jethani ; Prasenjeet D. Patil **All Authors**

Abstract

The purpose of this research is to upgrade accessibility and cross-language information retrieval by fashioning a Multilingual Text Recognition and Interpretation System. This system seeks to control communication gaps and create an alternative inclusive digital environment in response to the growing need for digital tools that can exercise and understand text in different languages. The system recognizes text from diversified sources, including digital files, handwritten notes, and printed documents, using sophisticated machine learning models including Transformer-based models and Convolutional Neural Networks (CNNs). Users may obtain and penetrate information in languages they may not be familiar with thanks to the system's integration of Optical Character Recognition (OCR) and Neural Machine Translation (NMT), which transforms identified text into the appropriate language. This research develops a reliable system that can work with various scripts and languages and provide high accuracy in real-Time performance. Common issues include managing low-resource languages, enhancing the ability to concede intricate scripts, and maximizing performance for real-Time applications, which will all be addressed by the solution.

Author keywords- Convolutional neural network; Information retrieval; Multilingual text; Neural machine translation; Optical character recognition

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

MODELING TUMOR HETEROGENEITY IN OVARIAN CANCER USING GRAPH NEURAL NETWORKS FOR PROGNOSTIC ANALYSIS

Pradeep Ghantasala, G.S.; Thrilok, K.; Vidyullatha, P.; **Rajesh Sharma, R.; Ananthanagu, U.**

Proceedings of 5th International Conference on Soft Computing for Security Applications, ICSCSA 2025

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Abstract

Despite early diagnosis and prediction of survival, cancer continues to be a major cause of death in the world. There has been an emergence of artificial intelligence in the last few years, especially in the field of Graph Neural Networks (GNNs), which provide avenues for dissecting complexity in biomedical data. GNNs model structurally non-Euclidean data such as molecular interactions, patient similarity networks, and heterogeneous clinical features, thereby being different from conventional machine-learning methods. This additional strength of GNNs promises to highlight another breakthrough in important areas of cancer biology and progression. This study deals with GNNs in cancer-specific survival outcome modeling with a focus on ovarian vs breast cancers. By employing graph-based representations of clinical and biological determinants, GNNs capture dependencies for even more accurate and personalized predictions. Moreover, imparting time-sensitive clinical data to temporal GNNs would have further enhanced predictability measured by the extent of such temporal factors. According to various literature, GNNs are said to outperform traditional models in areas that have to do with recognition, interpretability, and scalability. Among significant advancements are enhanced strategies for graph construction enriched with medically relevant features applied to imaging data.

Author keywords- Biomedical Graphs; Cancer Prediction; Graph Neural Networks; Machine Learning in Healthcare; Oncology AI; Ovarian Cancer; Personalized Medicine; Survival Analysis; Temporal Data

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 16 PEACE, JUSTICE AND STRONG INSTITUTIONS

MACHINE LEARNING IN CYBER SECURITY: A COMPREHENSIVE REVIEW

Swetha, C.B.; Kumar, P.G.; Babu, A.M.K.; Aswathy, A.A.; Gracia, C.D.

Proceedings of the ACCTHPA 2025 - Conference on 2025 Advanced Computing and Communication Technologies for High Performance Applications

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Machine Learning in Cyber Security: A Comprehensive Review
Publisher: IEEE Cite This PDF
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Abstract

The escalating sophistication and frequency of cyber threats have necessitated the development of intelligent and adaptive cybersecurity solutions. Traditional security measures are increasingly inadequate against modern cyber attacks that leverage advanced techniques and exploit zero-day vulnerabilities. Machine learning (ML) has emerged as a transformative technology in cybersecurity, offering automated threat detection, pattern recognition, and predictive capabilities that significantly enhance defensive mechanisms. This comprehensive survey systematically reviews current machine learning techniques applied to cybersecurity, analyzing their effectiveness across various attack categories including network-based attacks, malware, social engineering, web application vulnerabilities, password attacks, and IoT-based threats. Our critical analysis reveals that ensemble methods and deep learning approaches achieve detection accuracies exceeding 99% in controlled environments, with Decision Tree classifiers, Random Forest, and LSTM networks showing particular promise. However, significant gaps exist in real-world deployment, adversarial robustness, and cross-domain generalization. Key findings indicate that while ML-driven solutions demonstrate superior performance over traditional signaturebased methods, challenges remain in handling concept drift, reducing false positive rates, and ensuring model interpretability. This survey contributes a structured taxonomy of ML applications in cybersecurity, identifies critical research gaps, and proposes future research directions focusing on explainable AI, federated learning, and quantum-resistant security mechanisms.

Author keywords- Cyber attacks; Cyber threats; Cybersecurity; Defense mechanisms; Machine Learning

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q4	**22nd**	**0.429**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

BIFURCATION BEHAVIOR OF A BRUSHLESS DC MOTOR DRIVE FOR OPERATION WITH FIELD-ORIENTED CONTROL

Adhikary, S.; Adhikary, P.; Banerjee, S.; Mondal, S.

Lecture Notes in Networks and Systems

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Abstract

This article explores bifurcation behavior of a Brushless DC (BLDC) motor drive operating with PI controller-based field-oriented control mechanism. In this study, gain of the PI controller is considered as the bifurcation parameter. Investigation for occurrence of different nonlinear behaviors like limit cycle oscillation, quasi periodic or chaotic response is conducted by plotting bifurcation behavior of the system against variation in controller gain. The key objective is to obtain the basin of attraction for the controller gain to ensure occurrence of application specific response, i.e., either limit cycle behavior (electric vehicle) or chaotic dynamics (mixing, compaction).

Author keywords- Bifurcation; BLDC motor; Chaos

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

EXPLAINABLE GRAPH-BASED REINFORCEMENT LEARNING FOR INTRUSION DETECTION IN CYBERSECURITY

Kumar B S, A.; **Achary, R.**

Proceedings of 8th International Conference on Computing Methodologies and Communication, ICCMC 2025

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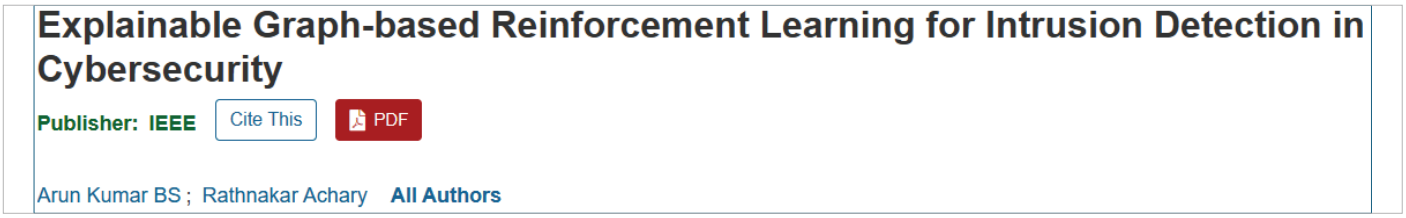

Abstract

The rapid growth in digitalization has increased the number of cyber threats. This has challenged the traditional Intrusion Detection Systems (IDS), which depend on static rules and predefined signatures. Among the various methods available for detection, the Reinforcement Learning (RL) method is an adaptive approach that guarantees intrusion detection. Still, some of its limitations and the black-box nature weaken the trust and clearness in security-critical ecosystems. In this paper, we analyzed the need for artificial intelligence (AI) integration with intrusion detection by enabling Explainable Artificial Intelligence (XAI) techniques and Graph Neural Networks (GNNs) with an integration of RL to create an efficient and interoperable intrusion detection framework. The result is to leverage GNNs to depict complex relationships in network traffic and apply explainable AI to improve the transparency of RL models. We also analyze the issues related to key performance parameters such as scalability and model interoperability and provide the scope for future research.

Author keywords- Cybersecurity; Explainable AI; Graph Neural Networks; Intrusion Detection; Reinforcement Learning

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

LEVERAGING PREDICTING MULTIPLE DISEASES WITH MACHINE LEARNING

Bathla, P.; **Pradeep Ghantasala, G.S.P.**; Sachdeva, R.K.; Bansal, N.; **Rajesh Sharma, R.; Sungheetha, A.**

Proceedings of 8th International Conference on Computing Methodologies and Communication, ICCMC 2025

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Leveraging Predicting Multiple Diseases with Machine Learning

Publisher: IEEE Cite This PDF

Priyanka Bathla ; G S Pradeep Ghantasala ; Ravi Kumar Sachdeva ; Nitika Bansal ; Rajesh Sharma R ; Akey Sungheetha All Authors

Abstract

This research explores the increasing burden of disease all over the world, and highlights early detection for reduced mortality and cost of care. The study presents a machine learning framework to forecast disease risk based on 4920 patient records. The dataset has 132 binary symptom attributes and 41 different disease outcomes. The experiments utilized four classifiers, Logistic Regression (LR), Random Forest (RF), K-Nearest Neighbors (KNN), and Naive Bayes (NB), to determine disease presence. For hold-out validation, the best accuracy of 97.62% was obtained by KNN, followed by LR at 95.24%, RF at 80.95%, and NB at 59.52%. These findings indicate the promise of early disease detection and the possibility of early interventions. Such models can be incorporated into clinical practice to ensure the optimal outcome for patients and the mitigation of the global disease burden. This work addresses the inefficiency and inaccessibility of traditional diagnostic systems in low-resource settings. The proposed machine learning model significantly improves disease detection accuracy, with KNN achieving 97.62% accuracy on 41 disease types. Future work entails extending the dataset and incorporating a user-friendly interface for real-time analysis of risk for disease.

Author keywords- Disease Prediction; Early Detection; Healthcare; Logistic Regression; Machine Learning; Naive Bayes; Random Forest

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

HYBRID TRANSFORMER-CONV AUTOENCODER FOR ENHANCED DENOISING OF NOISY CHEST X-RAY IMAGES

Muthulakshmi, V.; **Ramalakshmi, K.**

2025 6th International Conference on Data Intelligence and Cognitive Informatics, ICDICI 2025

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Hybrid Transformer-Conv Autoencoder for Enhanced Denoising of Noisy Chest X-Ray Images

Publisher: IEEE Cite This PDF

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Abstract

Pneumonia remains a critical health challenge, particularly in children under the age of five, causing more deaths annually than other infectious diseases. Early diagnosis through chest X-rays is essential for timely treatment, but noisy medical images can hinder accurate diagnosis. In this article a Hybrid Transformer-Conv Autoencoder (HTCA) for effective denoising of X-ray images, aiming to enhance diagnostic precision. The model combines convolutional layers for local feature extraction with Swin Transformer blocks for capturing both local and global dependencies through self-attention mechanisms. The proposed model achieved superior performance compared to existing methods, with PSNR scores of 57.6,54.9, and 53.7 and SSIM scores of 0.95,0.94, and 0.93 at noise levels of 15,20, and 25, respectively. These results demonstrate the robustness of the HTCA in reducing noise while preserving essential anatomical details, outperforming state-of-the-art models. The improved image quality achieved by the HTCA model can support more reliable and accurate pneumonia diagnosis, particularly in low-quality medical imaging scenarios.

Author keywords- Convolutional autoencoder; Peak Signal-toNoise Ratio (PSNR); Pneumonia diagnosis; Swin Transformer; X-ray image denoising

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

DETECTING PHISHING URLS WITH MACHINE LEARNING INTELLIGENCE

Bathla, P.; Kartik; Sachdeva, R.K.; **Pradeep Ghantasala, G.S.P.; Rajesh Sharma, R.; Sungheetha, A.**

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Detecting Phishing URLs with Machine Learning Intelligence

Publisher: IEEE Cite This PDF

Priyanka Bathla ; Kartik ; Ravi Kumar Sachdeva ; G S Pradeep Ghantasala ; Rajesh Sharma R ; Akey Sungheetha All Authors

Abstract

The increasing popularity of the internet and technological development has led to substantial growth in the use of e-commerce over the past few years. With the increase in online activity, online payments and trades have also grown to a greater extent. Due to this, the risks related to theft and cyber fraud have also increased. One of the familiar and famous cyber frauds is phishing. Phishing is a cyberattack in which a customer or consumer is tricked into surfing a deceptive website that is the same as the original one to gain their sensitive information. Various kinds of apps and extensions are used to block these phishing websites. However, with the advancements in innovation and technology, attackers have succeeded in bypassing these security systems. The number of victims is increasing because the dynamic and unpredictable nature of the internet creates opportunities for attackers to perform phishing attacks. The authors introduced a URL detection method utilizing machine learning concepts in this research paper. The researchers used a dataset of 235795 URLs with 134850 legitimate and 100945 malicious URLs. The total features extracted from the URL is 54. The proposed method outperformed the recent approaches for Phishing URL Detection.

Author keywords- DCyberattack; Legitimate; Machine Learning; Phishing; Uniform Resource Locator

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

FEATURE-DRIVEN DRY EYE DIAGNOSIS: LEVERAGING IMAGE PROCESSING AND OPTIMIZED TECHNIQUES FOR CLINICAL GRADING

Kumar, N.A.; Reddy, R.B.K.; Satapathi, G.S.; **Pradeep Ghantasala, G.S.P.**; Shet, R.V.; Nisanth, V.

2025 International Conference on Computing Technologies, ICOCT 2025 Conference Paper 2025

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Abstract

Dry eye disease (DED) is a common ocular ailment and therefore requires successful treatment that depends upon an accurate and impartial diagnosis. The root of this work is to propose an automated method for DED description through image-based fern pattern analysis. Tear samples were collected and treated to improve pattern visibility in a microscope. Edge detection techniques were used in order to extract significant structural features, namely branch density and empty space ratio, which are important structural features of the tear film. The Support Vector Machine (SVM) classifiers showed high diagnostic accuracy when appropriate hyperparameters are used for classification. Bayesian and Random Search techniques were further used to enhance the model's performance and proved more reliable than usual techniques. The results demonstrate how well a feature driven approach can distinguish between DED severity, possible clinical use for the application of this tool is shown. Relying on subjective assessment can be avoided through usage of machine learning and image processing in the ocular diagnostics technique as this study suggests.

Author keywords- Dry eye disease (DED); Feature extraction; Image processing; Load efficiency; Machine learning; Ocular diagnostics; SVM; Tear film

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	

PEDIATRIC COUGH CLASSIFICATION FOR RESPIRATORY CONDITIONS USING A MODIFIED SQUEEZENET MODEL

Anilkumar, N.; Dikshitha, K.; **Pradeep Ghantasala, G.S.P.**; Soans, S.; Satapathi, G.S.; Pandey, S.

2025 International Conference on Computing Technologies, ICOCT 2025 Conference Paper 2025

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Abstract

Respiratory diseases like asthma, lower respiratory tract infections (LRTI), upper respiratory tract infections (URTI), and pneumonia are common among children, typically characterised by cough as a major symptom. This paper presents a deep learning method for classifying pediatric cough sounds into the four conditions based on a modified SqueezeNet model. Cough sound recordings were obtained from Dakshina Kannada hospitals in India, converted into spectrograms, and utilized for training the model. The system was trained to 97.96% accuracy, showing promise as a non-invasive tool for diagnosis. Validation performance suggests overfitting, and it is an indicator of areas to be improved upon. This work showcases the promise of CNNs in pediatric healthcare and suggests directions for future improvement for clinical usage.

Author keywords- asthma; deep learning; Pediatric cough; pneumonia; respiratory conditions; spectrogram; SqueezeNet

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 16 PEACE, JUSTICE AND STRONG INSTITUTIONS

PRIVACY-PRESERVING AUTISM DETECTION USING FEDERATED CNN-LSTM NETWORKS: A SPATIOTEMPORAL DEEP LEARNING FRAMEWORK FOR DECENTRALIZED BEHAVIOURAL DIAGNOSIS

Kranthi, M.; Venkatesan, R.; **Ramalakshmi, K.**; Wanika, A.C.R.

2025 International Conference on Sensors and Related Networks, SENNET 2025 - Special Focus on Digital Healthcare (64220)VConference Paper2025

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24 - 27 Jul 2025
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Conference

Abstract

: Early detection of autism spectrum disorder (ASD) is essential for effective intervention but remains limited by privacy concerns, fragmented data sources, and constrained access to large-scale, labelled datasets. This paper presents a privacy-preserving diagnostic framework based on federated learning, enabling decentralized institutions to collaboratively train models without sharing sensitive patient data. The proposed architecture integrates Convolutional Neural Networks (CNNs) for spatial feature extraction with Long Short-Term Memory (LSTM) networks to capture temporal behavioural patterns. Training is performed across five heterogeneous ASD datasets in a federated environment, ensuring both model generalizability and data confidentiality. Local preprocessing pipelines standardize input formats, while secure aggregation and differential privacy mechanisms protect model updates. Experimental results demonstrate that the federated CNN-LSTM model achieves 98.9% classification accuracy, outperforming centralized and shallow learning baselines. This work illustrates the feasibility of combining spatiotemporal deep learning with federated protocols for real-world ASD screening and contributes to the growing field of privacy-aware medical AI.

Author keywords- autism spectrum disorder (ASD); Behavioral Analysis; CNN-LSTM; Deep Learning; Distributed Healthcare; Federated Learning; Medical Diagnosis; Privacy-Preserving AI; Secure Aggregation; Spatiotemporal Modeling

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

AI-DRIVEN NEUROMORPHIC SYSTEM FOR SUSTAINABLE MARINE ENERGY INTEGRATION AND POWER SYSTEM STABILITY ENHANCEMENT

Sungheetha, A.; Rajesh Sharma, R.; Mahapatra, S.; Agrawal, N.; **Pradeep Ghantasala, G.S.P.**; Singh, T.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025Conference Paper 2025

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Abstract

This work presents an innovative approach to integrating artificial intelligence (AI) and neuromorphic computing to address the critical challenges of power system stability and sustainable marine renewable energy deployment. We propose a novel AI-driven neuromorphic system that seamlessly combines adaptive control of marine energy installations, real-time power system stability analysis, and comprehensive environmental impact assessment capabilities. At the core of our system is a neuromorphic computing-assisted thermoelectric capacitive-coupled sensor array that provides high-fidelity environmental and power system data. This sensor network feeds into a deep reinforcement learning framework that optimizes marine renewable energy device performance while minimizing environmental impacts and enhancing grid stability. Our experimental results demonstrate significant improvements in power system stability metrics, with voltage profiles improving by 28% and frequency deviations reduced by up to 35% compared to conventional control methods. The environmental impact assessment component shows a 40% increase in accuracy for predicting potential ecological effects when compared to traditional assessment techniques. Furthermore, the adaptive control mechanism increases energy harvesting efficiency by 25% across variable marine conditions. This multidisciplinary approach effectively addresses the complex challenges of integrating sustainable marine energy into existing power systems by leveraging cutting-edge AI, neuromorphic computing architectures, and renewable energy engineering principles. The system's ability to simultaneously optimize energy production, ensure grid stability, and minimize environmental impacts represents a significant advancement in sustainable energy integration technologies with practical applications for marine renewable energy development globally.

Author keywords- Artificial Intelligence; Environmental Impact Assessment; Marine Renewable Energy; Neuromorphic Computing; Power System Stability; Triboelectric Sensors

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

QUANTUM NEURAL NETWORK INTEGRATING WITH GRADIENT DESCENT TECHNIQUES FOR ENHANCED LEARNING

Vidyullatha, P.; **Pradeep Ghantasala, G.S.P.; Rajesh Sharma, R.; Sungheetha, A.; Ananthanagu, U.**
Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025Conference Paper2025

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Abstract

Quantum Machine Learning refers to the interdisciplinary area of research, blending principles from quantum physics and machine learning that can process information on quantum computers. Quantum machine learning (QML) intentions to exploit the superposition (qubit can exist in multiple states) property and other effects of quantum mechanics for enhanced efficiency and speed in specific machine learning computations, promising exponential-power superiority in particular computations. This paper focusses on Quantum Machine Learning Models to develop the framework to learn complicated associations within the data through the adjustment of the variational parameters during training. This framework serves as a foundational structure for implementing quantum neural networks, allowing for further experimentation and growth in quantum machine learning applications. It highlights the quantum circuits to process and learn from data in a mode distinct from classical neural networks. As the retrieve of quantum computing grows, such frameworks can be adapted and expanded to explore more sophisticated quantum algorithms and architectures. In the circumstances of Quantum Neural Networks, gradient descents is used in minimizing cost or loss function by iteratively adjusting the variational parameters based onto the gradient of the loss with admire to those parameters. The output that indicates the process of installing the Quantum information science Kit (Qiskit) library in Python specifically version 3.7 along with its dependencies.

Author keywords- Gradient Descent; Loss Function; Qiskit; Quantum bits; Quantum Circuit; Quantum Machine Learning; Quantum Neural Networks

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	

INTELLIGENT TRAFFIC VIOLATION DETECTION

Banshal, S.K.; Moni, R.; Jhansi, A.; Deep, A.S.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025Conference Paper 2025

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Abstract

Precise feature extraction is vital in traffic scene analysis, especially in vehicle detection and segmentation. In this research, the performance of Histogram of Oriented Gradients (HOG) in extracting meaningful visual features from traffic images is assessed. Two instances are under examination: one with an empty road and the other with vehicles on the road. By comparing and analyzing HOG features of both scenarios, we see how traffic affects feature intricacy. The features are then processed further with Decision Tree, Support Vector Classifier (SVC), Multi-Layer Perceptron (MLP), Random Forest and Logistic Regression in order to analyze their contribution towards object detection. The findings reveal that under notraffic conditions, HOG is seen to target static background structures most of the time, while under vehicle conditions, the detected features are more complex with the presence of added edges and contours. This work emphasizes the effect of traffic on feature extraction and validates the application of HOG-based methods for automated traffic surveillance and vehicle detection.

Author keywords- Feature Extraction; Traffic Flow Analysis; Traffic Violation Detection; Vehicle Recognition; Violation Detection Algorithms

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES

UNET AND SEMANTIC SEGMENTATION BASED LANDSLIDE DETECTION SYSTEM

Nair, R.R.; Babu, T.; Singh, T.; Afnaan, K.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025Conference Paper2025

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Abstract

In the contemporary world Landslides pose huge risks to communities and infrastructure globally. One of the reasons it occurs is due to slope movement caused by urbanization and climate change in recent years. Landslide Detection Systems are an evolving technology that is very crucial for handling the impacts of these natural disasters. LDS plays a vital role in identifying and monitoring landslide occurrences across diverse terrains. This paper aims to propose one such LDS system that can detect landslides using a benchmark dataset called LandSlide4Sense through specialized deep- learning models. The motive is to determine the most effective methods by training them on large amounts of data that can help enhance accuracy and ensure quick detection and response. Through this research, the paper highlights advancements in DL-based semantic segmentation for satellite imagery analysis.

Author keywords- Deep Learning; Landslide Detection Systems (LDS); LandSlide4Sense; Satellite imagery; Semantic segmentation

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	04 QUALITY EDUCATION; 03 GOOD HEALTH AND WELL-BEING

A MACHINE LEARNING BASED APPROACH TO PREDICT THE EFFECTS OF VIDEO GAMES ON YOUTH BEHAVIOR

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Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025 Conference Paper 2025

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Abstract

Video game addiction is a rapidly growing concern among young people, emerging as a major issue due to its harmful impact on their mental health. This study investigates how predictive models might reveal subtle patterns in gaming habits by examining the relationship between video games, youth development, and machine learning. The research will investigate social dynamics as well as cognitive, academic, and mental health implications in order to educate individuals about responsible gaming habits and teaching tactics. The study covers ethical considerations and long-term societal ramifications, emphasizing the significance of a compatible way to navigating the IT based world because of young people's prosperity. Its purpose is to evaluate whether a gamer is career-minded. That's why we gathered 804 data points from them, of which 780 were utilized. The key point that we utilized were name, gender, age, amount of time spent studying, amount of sleep or wakefulness, amount of time spent playing games, reason for playing games, amount of time spent playing games more than with family, time spent honing skills, and time spent worried about a career. and after that, they underwent reprocessing and were checked before being used with certain machine learning algorithms. Various prediction and find ways use machine learning, artificial intelligence, and deep learning method. Our approaches include Gaussian Naive Bayes (GNB), Random Forest (RF), Adaptive Boosting (ADA Boosting), Decision Tree (DT), Extra Trees (ET), Gradient Boosting (GB) classifier, KNN (K-Nearest Neighbors), Support Vector Machine (SVM). The Random Forest classifier performed better in our analysis than the other eight methods. While all eight classifiers have great prediction accuracy, Random Forest Classifier (RF) has the highest accuracy of 97.00%. This study analyses the various behaviours or habits of the current youth society. Based on the results obtained from that analysis, a machine learning-based model has been proposed. This proposed model will help in understanding the behavior of young people and their current situation.

Author keywords- Impact on Video Games; Machine Learning; Online Gaming; Random Forest; Video Games Addiction

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	16 PEACE, JUSTICE AND STRONG INSTITUTIONS

INTELLIGENT SMART SENSOR NETWORKS FOR SUSTAINABLE AND PREDICTIVE POWER SYSTEM STABILITY: A MACHINE LEARNING-DRIVEN APPROACH

Sungheetha, A.; Rajesh Sharma, R.; Mahapatra, S.; Agrawal, N.; **Pradeep Ghantasala, G.S.P.**; Sharma, N.
Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025Conference Paper 2025

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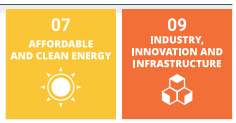
Abstract

This work presents an innovative approach to integrating artificial intelligence (AI) and neuromorphic computing to address the critical challenges of power system stability and sustainable marine renewable energy deployment. We propose a novel AI-driven neuromorphic system that seamlessly combines adaptive control of marine energy installations, real-time power system stability analysis, and comprehensive environmental impact assessment capabilities. At the core of our system is a neuromorphic computing-assisted thermoelectric capacitive-coupled sensor array that provides high-fidelity environmental and power system data. This sensor network feeds into a deep reinforcement learning framework that optimizes marine renewable energy device performance while minimizing environmental impacts and enhancing grid stability. Our experimental results demonstrate significant improvements in power system stability metrics, with voltage profiles improving by 28% and frequency deviations reduced by up to 35% compared to conventional control methods. The environmental impact assessment component shows a 40% increase in accuracy for predicting potential ecological effects when compared to traditional assessment techniques. Furthermore, the adaptive control mechanism increases energy harvesting efficiency by 25% across variable marine conditions. This multidisciplinary approach effectively addresses the complex challenges of integrating sustainable marine energy into existing power systems by leveraging cutting-edge AI, neuromorphic computing architectures, and renewable energy engineering principles. The system's ability to simultaneously optimize energy production, ensure grid stability, and minimize environmental impacts represents a significant advancement in sustainable energy integration technologies with practical applications for marine renewable energy development globally.

Author keywords- Artificial Intelligence; Environmental Impact Assessment; Marine Renewable Energy; Neuromorphic Computing; Power System Stability; Triboelectric Sensors

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	



REDUCING DIGITAL CO2 FOOTPRINT IN IT SYSTEMS USING TEMPORAL DIFFERENCE LEARNING FOR ENERGY-AWARE SCHEDULING

Radhakrishnan, J.; Shekhar, R.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025Conference Paper 2025

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Abstract

Optimizing resource allocation is critical for reducing power consumption and minimizing carbon emissions in high-performance computing environments. This research presents a Deep-Q-Network based Reinforcement Learning DQNAgent to enhance decision-making in CPU/GPU allocation, and workload allocation. For better decision making, the proposed DQNAgent follows an epsilon-greedy policy to balance exploration and exploitation. The agent is trained for 1000 episodes, keeping exploration rate ( ) decreases from 1.0 (random action selection) to 0.01 (optimal policy execution), which enables the DQNAgent to make more informed decisions. The DQNAgent is trained on a CPU/GPU workstation. The experimental results clearly indicate that training the agent on a CPU-based system to learn an optimal policy to minimize emissions takes approximately 7 hours and 17 minutes, while utilizing a GPU workstation significantly reduces execution time to less than 2 minutes, thereby accelerating real-time decision-making. Results indicate that the proposed method effectively optimizes energy efficiency, reducing overall power consumption while maintaining computational performance. This research work paves way for leveraging Artificial Intelligence driven reinforcement learning for sustainable and intelligent computing systems.

Author keywords- Artificial Intelligence; Digital Carbon Footprint; DQNAgent; High Performance Computing; Reinforcement Learning; Sustainable Computing

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

FORWARD CHAINING IN EXPERT SYSTEMS: APPLICATION TO MEDICAL DIAGNOSIS

Nair, R.R.; Babu, T.; Poornima, B.M.; Komala, K.N.; Dharunkrishna, P.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025Conference Paper2025

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Abstract

Expert systems play a crucial role in modern health- care by providing accurate and automated medical diagnoses. This study explores the application of forward chaining in expert systems, specifically for diagnosing vitamin deficiencies and COVID-19 symptoms. Forward chaining, a rulebased inference method, systematically evaluates symptoms against a predefined knowledge base to generate diagnostic insights. The proposed system aims to enhance accessibility to healthcare, especially in resource-constrained settings, by reducing dependency on human experts while maintaining accuracy and consistency in diagnoses. The research outlines the design and implementation of an expert system that utilizes a dynamic rule base for medical evaluation. By integrating certainty factors, the system quantifies the confidence levels of diagnoses, improving reliability. A decision support framework is developed to analyze patient symptoms, infer possible conditions, and provide medical recommendations. Performance evaluation is conducted to assess diagnostic ac- curacy, consistency, and efficiency. The findings highlight the effectiveness of forward chaining in real-time symptom analysis, ensuring early detection of diseases and enabling proactive healthcare management. Future advancements include machine learning integration, dynamic rule updates, and natural language processing (NLP) enhancements to improve user interaction and system adaptability. Additionally, incorporating wearable health monitoring devices and cloud-based deployment can enhance scalability and real-time tracking. This study underscores the potential of AI-driven expert systems in revolutionizing medical diagnostics, offering a cost-effective and scalable solution for early disease detection and personalized treatment recommendations.

Author keywords- : Back Sequence; Data-Driven Approach; Expert System; Forward chaining; Inference Rules; Known Facts

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	

DETECTION AND PREVENTION OF MALICIOUS NODE IN WIRELESS SENSOR NETWORK

Nair, R.R.; Kishore, S.; **Babu, T.**; Rakesh, S.; Vishnu, K.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025Conference Paper2025

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Abstract

Wireless Sensor Networks (WSNs) face significant security challenges, particularly from malicious nodes exploiting packet capture and tunneling attacks, compromising network integrity. Existing solutions often require additional hardware, increase transmission delays, or fail to ensure optimal throughput and energy efficiency. To address these limitations, the Hybrid Malicious Node Detection (HMND) algorithm was developed. HMND identifies in-band malicious nodes using hop count and Packet Delivery Ratio (PDR) criteria and detects out-of-band malicious nodes based on transmission distances. Unlike traditional approaches, HMND eliminates the need for extra hardware or comprehensive node identification, reducing latency and energy consumption. Implemented in the NS-2 simulator, HMND demonstrated superior performance across metrics such as throughput, energy consumption, PDR, and end-to-end delay. By enhancing the detection process within Ad-hoc On-Demand Distance Vector (AODV) routing protocols, HMND effectively improves global network performance, offering a robust solution to mitigate malicious node threats in WSNs.

Author keywords- Hybrid Malicious Node Detection Algorithm (HMND); Network Security; NS-2 Network Simulator; Packet Delivery Ratio (PDR); Round Trip Time (RTT)

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

SMOKING RISK PREDICTION IN BANGLADESH USING MACHINE LEARNING

Anik, M.S.M.; Moni, R.; Zerin, S.I.; **Banshal, S.K.; Rajesh Sharma, R.; Sungheetha, A.**

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025Conference Paper 2025

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Abstract

Smoking is a severe threat to public health that impacts Bangladesh's general population as well as university students. Many people engage up smoking as a habit as a result of personal stressors or social trends, frequently disregarding the adverse consequences of smoking. Thirty-five percent of Bangladeshi adults smoke or use electronic cigarettes, according to the WHO. This study investigates the root causes of smoking and its broader implications through a sustainable AI-driven approach. This is because our study to find out the reason behind it and the consequence of smoking risk in personal life. In this study, various aspects of life were considered to establish the effects of smoking. Most people who used to do daily smoke of what with a huge amount did not lead a better life in personal life. The use of these findings assists people, corporations, and authorities in identifying the primary hazards of smoking that may be lethal. To predict the Risk of smoking KNN, Logistic Regression, Random Forest, XGBoost, LightGBM, Decision Tree, Naive Bayes and SVM were practiced to get the model. By collecting data via the survey form and keeping nine questions from the service, 501 data collections were made from various persons. Among the models, SVM and XGBoost perform better than all other working classifiers attaining 98.40% and 97% accuracy. In this study, the integration of sustainable AI practice enhances resource scalability and long-term planning. It enables the allocation of resources better to achieve the desired outcomes besides other institution's health services to introduce and implement successful interventions. Specifically, this work underscores the significance of sustainable AI for development for improving various public health causes and forming a healthier and more equitable society.

Author keywords- feature selection; high risk; machine learning; prediction; smoking

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q4	**20th**	**0.48**	04 QUALITY EDUCATION; 08 DECENT WORK AND ECONOMIC GROWTH

APPLICATION OF BEHAVIORAL DESIGN STRATEGY FOR IMPROVEMENT OF STUDENT ENROLLMENTS UNDER VARIOUS PROGRAMS IN UNIVERSITIES

Sachdeva, P.; Chowdhury, A.

Lecture Notes in Mechanical Engineering

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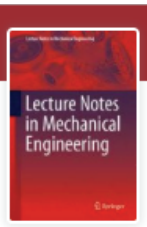

Book series
Lecture Notes in Mechanical Engineering

Abstract

Various data analytics services such as Google Analytics and Amazon Alexa, are helping strategists and web designers to understand the interactive and navigation behaviors of target users visiting various websites. Sometimes universities have no clue because the conversion rate for student enrollment is very low even though a huge number of the crowd is visiting the university website. User experience designers might help in such scenarios through various UI Design interventions for university websites. The goal of this paper is to find out the visiting rates of different university websites offering similar types of programs and deriving User Interface and User Experience strategies to improve the student enrollment status (conversion rate). For this purpose, five university websites (top private universities in India) have been chosen, and the current status of web traffic and navigation behavior was analyzed using the Amazon Alexa web ranking framework. The top-visited university website and the least-visited university website were identified based on Alexa Web Analytics data. Then, the strategy for UI and UX design was derived based on brainstorming with five UX and UI Design experts to improve the number of visits to the university website which has a higher ranking and a smaller number of visits. Persuasive interactions like rewards (various scholarships: domicile, girls' scholarships, other merit scholarships), proactive chatbots, search engine optimization, and social media marketing came up as better strategies based on the strategy ratings given by experts. It is envisaged that these strategies will help to improve the student enrollment rate for the university which has websites with fewer visitors.

Author keywords- BBehavioral design; Conversion rate; UI strategy

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

REAL-TIME SIGN LANGUAGE TO TEXT AND SPEECH CONVERSION: BRIDGING THE COMMUNICATION GAP WITH EFFICIENTNETB4

Babu, T.; Nair, R.R.; Singh, T.; Afnaan, K.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025 Conference Paper 2025

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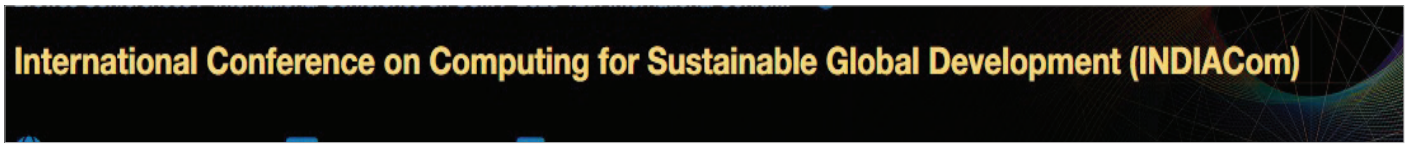

Abstract

Unlike spoken language, sign language is a representation of the culture and values of the deaf community that is easily misinterpreted or improperly translated, creating barriers in information access when there are real-time environments dominated by spoken language. This work covers the construction of a machine basedon deep learning that would be used to translate the sign language into text. The motivation for this invention is to make sign language analogous to ordinary language and close the communication gap that it creates. The data set collection covers the range of sign language videos from different people, and the preprocessing technique is included. The features are captured and based on these features a neural network model is designed that maps a sign language gesture into corresponding texts. The effectiveness of the model is seen through its data and evidence which includes accuracy. The last part of the process covers the idea for the deployment of the model in real-world situations and the commitment to a process of iterative refinement through user feedback and ongoing improvement. The results of the work are revolved around the formation of the new technologies for this community, consequently helping these people to be more integrated into communication environment.

Author keywords- Deep Learning; EfficientNetB4; Neural Networks; Sign Language

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES

AUTOMATED TRAFFIC SIGNAL VIOLATION DETECTION AND REAL-TIME NOTIFICATION SYSTEM FOR ENHANCED ROAD SAFETY

Nair, R.R.; Babu, T.; Kishore, S.; Jacob, N.; Kalidasan, A.S.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025 Conference Paper 2025

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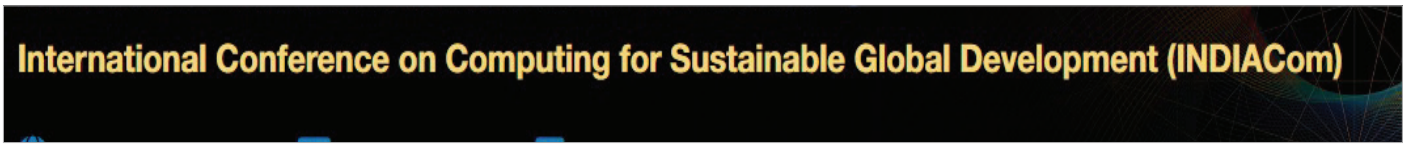

Abstract

Traffic violations and accidents are major concerns in urban areas, leading to safety issues and traffic congestion. This research work develops an automated traffic signal detection and notification system to address these problems. The system uses computer vision and machine learning techniques to monitor traffic in real-time through CCTV cameras. It detects vehicles violating traffic signals or involved in accidents by analyzing video frames and applying object detection algorithms. When a violation or accident is detected, the system automatically sends notifications to relevant authorities like nearby police stations and hospitals. Key features include real-time monitoring of traffic through video feeds, detection of signal violations and accidents using computer vision, automated notifications via messaging apps and phone calls, location tracking to alert nearest authorities, and database logging of incidents for future analysis. The system aims to improve road safety and traffic management by enabling quicker response times to incidents. It reduces manual monitoring needs and provides a technological solution to enforce traffic rules. The research demonstrates the potential of AI and IoT technologies in creating smarter and safer transportation systems. Future enhancements could include expanded violation detection and predictive analytics for proactive traffic management.

Author keywords- Automated surveillance; Emergency response optimization; Intelligent Transportation Systems (ITS); Rule violation monitoring; Traffic signal detection

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	

DEEPFAKE DETECTION USING CONVOLUTIONAL NEURAL NETWORKS: A COMPARATIVE ANALYSIS

Nair, R.R.; Babu, T.; Singh, T.; Afnaan, K.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025 Conference Paper 2025

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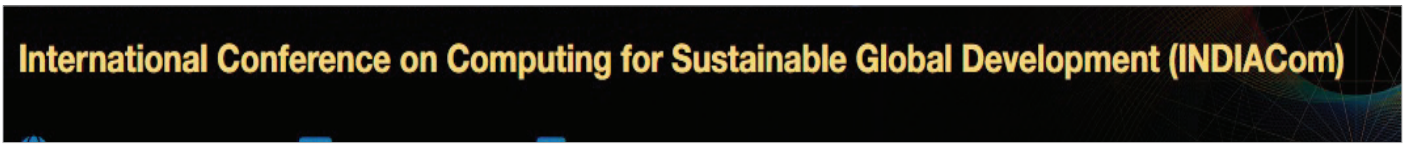

Abstract

The rapid advancement of Artificial Intelligence (AI) has enabled the creation of hyper-realistic deepfake videos, raising serious concerns about misinformation, privacy breaches, and media manipulation. The research work introduces an innovative deepfake detection system utilizing a comparative analysis of nine state-of-the-art Convolutional Neural Network (CNN) models: MobileNet, NASNet, InceptionNet, InceptionResNet, XceptionNet, VGG16, AlexNet, LeNet, and EfficientNet. Through extensive experimentation on the DFDC dataset, VGG16 achieved the highest accuracy of 98.22%, with precision and recall scores of 98%, demonstrating its reliability in detecting even subtle manipulation artifacts. InceptionResNet and XceptionNet followed closely, with accuracies of 97.58% and 96.42%, respectively, highlighting the strength of hybrid and depthwise separable convolution architectures. The research also reveals that lighter models like MobileNet (86.87%) offer a tradeoff between efficiency and accuracy, making them suitable for mobile and resource-constrained environments. By integrating advanced data augmentation, frame-based analysis, and a systematic evalu- ation across multiple epochs, this work not only refines detection capabilities but also contributes to safeguarding digital content. The findings support global digital security efforts, aligning with the United Nations' SDG 16 goal of promoting trustworthy information ecosystems.

Author keywords- : Augmentation; Computer Vision; Deep Learning; Deepfake; Efficient Net; Inception; MobileNet

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	

MITIGATING PHYSICAL LAYER SECURITY VULNERABILITIES IN 4G AND 5G CELLULAR NETWORKS

Ramisetty, S.; **Pradeep Ghantasala, G.S.P.; Rajesh Sharma, R.;** Vidyullatha, P.; **Sungheetha, A.**

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025 Conference Paper 2025

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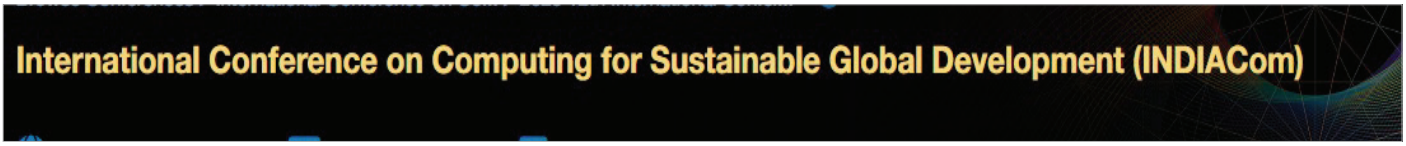

Abstract

Security vulnerabilities on the physical layer in 4G and 5G networks divulge those networks to diverse threats. Eavesdropping, in which unauthorized interception of consumer information occurs, is mitigated through encryption and stable key change protocols in 4G, at the same time as 5G carries stronger encryption radio interface assaults, probably inflicting sign disruptions, are mitigated via way of means of sign jamming detection, frequency hopping, and unfold spectrum strategies in 4G, and beamforming, MIMO, and Rogue base stations are addressed through authentication mechanisms, consisting of IMSI catcher detection in 4G, and stronger authentication approaches in 5G. Physical layer assaults, such as hardware compromise, are countered via way of means of tracking radio parameters and using hardware protection modules (HSMs). Man-in-the-middle assaults are mitigated the use of public key infrastructure (PKI) for certificate-primarily based totally authentication. Denial of carrier assaults are tackled thru site visitors sample tracking and fee proscribing in 4G, and stronger detection mechanisms and community reducing for isolation in 5G. This work specifically focuses on the practical implications of these vulnerabilities in real-world deployments. The novelty in this study, encompasses the comprehensive adaption of security that uses advanced signal processing, encryption techniques and analytics that are machine learning based with the aim of enhancing resilience with evolving threats. Additionally, modern telecommunication security falls within this scope of real-time intrusion detection and compliance to global security standards. These mitigations enhance community protection on the physical layer, making sure sturdy and dependable Wi-Fi communication.

Author keywords- Eavesdropping; Man-in-the-middle; physical layer; Physical Layer Attacks; radio interface assaults; Rogue base stations; Security vulnerabilities

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

COMPARATIVE ANALYSIS OF DEEP LEARNING MODELS FOR AUTOMATED CATARACT DETECTION IN MEDICAL IMAGING

Babu, T.; Nair, R.R.; Singh, T.; Afnaan, K.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025 Conference Paper 2025

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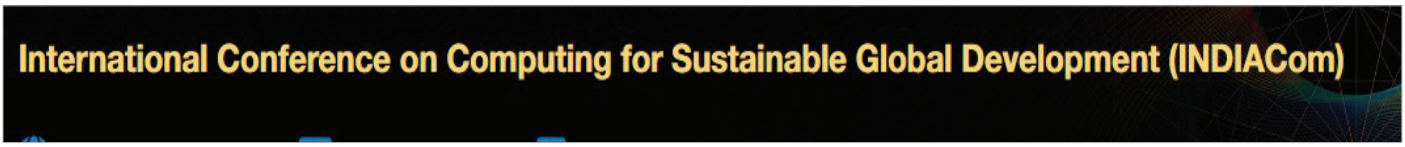
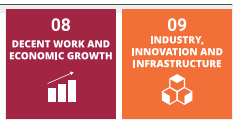


Abstract

Lung disease remains a major global health concern, requiring early and accurate diagnosis for effective treatment. This study presents a novel approach for lung disease classification using Principal Component Analysis (PCA) for feature reduction and XGBoost for classification. SMOTE addresses class imbalance, while Min-Max normalization standardizes data for improved model performance. PCA reduces dimensionality, pre- serving essential features and enhancing computational efficiency. The proposed model achieves 96.5% accuracy, outperforming traditional classifiers in precision and recall. The novelty lies in combining feature extraction, synthetic data generation, and ensemble learning to create a more reliable diagnostic tool. This system can serve as a valuable clinical support tool, aiding clinicians with fast and accurate lung disease identification. Future work includes integrating deep learning models and developing real-time, cloudbased systems for remote diagnostics, making this approach highly scalable and impactful in resource- constrained healthcare environments.

Author keywords- : Cataract; Early detection; InceptionResNetV2; InceptionV3; VGG19

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	



ENSURING SAFE TRANSACTIONS: CREDIT CARD FRAUD DETECTION WITH MACHINE LEARNING AND USER-FRIENDLY INTERFACE

Nair, R.R.; Babu, T.; Singh, T.; Afnaan, K.

Proceedings of the 2025 12th International Conference on Computing for Sustainable Global Development, INDIACom 2025Conference Paper2025

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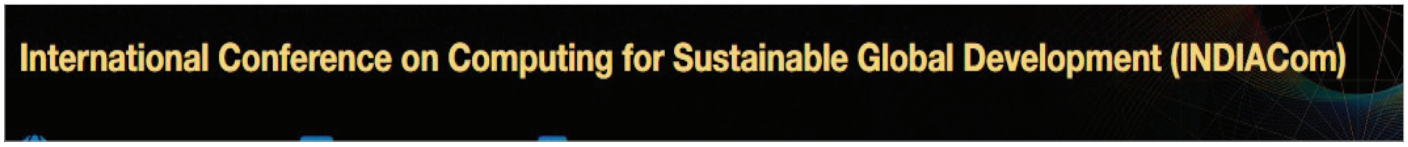

Abstract

Digital transaction growth has increased credit card fraud risks, necessitating effective detection systems for financial security. This research introduces a novel approach combining multiple machine learning models with an intuitive web interface for real-time fraud detection. The hybrid methodology research work uniquely balances accuracy and reduces false positives through feature selection and SMOTE for class imbalance correction. Systematic evaluation of Random Forest, XGBoost, and AdaBoost on a highly imbalanced dataset shows Random Forest achieving 96.83% accuracy with high recall, making it reliable for detecting rare fraudulent transactions. Unlike previous research, this work prioritizes user accessibility via a web-based inter- face, connecting robust backend fraud detection with seamless frontend experience. Results confirm that integrating ensemble learning, class balancing, and real-time feedback improves both detection accuracy and usability, establishing groundwork for future secure digital transaction advancements.

Author keywords- Credit card fraud detection; Feature selection methods; Frontend-backend architecture; Random Forest; Supervised learning algorithms

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

CONSTRAINT PROPAGATION TECHNIQUES FOR EFFICIENT SUDOKU SOLVERS

Nair, R.R.; Kishore, S.; Joseph, S.; Divyashree, N.R.; Sharma, N.

Proceedings of 2025 International Conference on Emerging Technologies in Computing and Communication, ETCC 2025

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Abstract

This paper treats the use of constraint satisfaction techniques to solve Sudoku puzzles, a classic problem in computer research. Complex Sudoku combinations pose a challenge for efficient solutions with simple rules, especially for more complex puzzles. We use constraint propagation techniques such as Arc Consistency (AC-3), Forward Checking, and Domain Reduction to improve both the speed and accuracy of the solvers. These methods remove invalid candidates from the solution space, significantly reducing the computational effort. In addition, heuristics such as minimum residual value (MRV) and degree heuristics have been added to further guide the search and increase solver performance. Experimental results show that combining constraint propagation with these heuristics significantly reduces solution time and improves accuracy on a variety of puzzle problems The study investigates the scalability of these techniques and their application to new constraint satisfaction problems (CSPs), such as scheduling, resource allocation, optimization s shine and lay the foundation for future developments in CSP algorithms and real-world applications.

Author keywords- Arc Consistency (AC-3); Constraint Satisfaction Problem (CSP); Degree Heuristic; Forward Checking; Minimum Residual Value (MRV)

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

AN END-TO-END SIGN LANGUAGE TRANSLATION PIPELINE FROM STATIC GESTURES TO ENGLISH USING T5

Adarsh Pritam, N.A.; **Kurian, A.**

Proceedings of 2025 International Conference on Emerging Technologies in Computing and Communication, ETCC 2025

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Abstract

Sign language remains a crucial mode of communication for individuals with hearing and speech impairments, yet it remains largely inaccessible to the general population. This paper addresses the problem of translating finger spelled American Sign Language (ASL) from static images into fluent English sentences. We propose an end-to-end pipeline that integrates gesture recognition with natural language processing (NLP). Hand gestures are classified using Google Teachable Machine and refined with MediaPipe for better hand tracking and landmark detection. The classified signs are then passed to a fine-tuned FLAN-T5-small model to generate grammatically correct English sentences. This paper demonstrates a functional prototype that successfully bridges gesture inputs with natural language generation. Evaluation using BLEU and ROUGE-L scores indicates that the system produces coherent and contextually relevant translations, showcasing its potential as an assistive communication tool.

Author keywords- American Sign Language (ASL); Assistive Technology; Deep Learning; Fingerspelling Recognition; FLAN-T5 Transformer; Natural Language Processing (NLP); Sign Language Translation

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

MONTE CARLO TREE SEARCH OPTIMIZATION FOR GO GAME AI

Babu, T.; Tejaswi, S.; Anup, S.B.; Srinivas; Reddy, N.R.K.; Manasvi, S.; Singh, D.

Proceedings of 2025 International Conference on Emerging Technologies in Computing and Communication, ETCC 2025

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Abstract

The Monte Carlo Tree Search is the name of the best search algorithm in artificial intelligence history, especially for strategic games, where its ability was proven by integration with deep learning techniques, such as Go. The abstract underlies MCTS as a decision-making algorithm that tends to balance between exploration and exploitation through random sampling and statistical analysis of game states. MCTS works in a tree-search fashion by incrementally building up this tree, in which nodes represent game states and edges represent possible actions. The algorithm runs through four phases: selection, expansion, simulation, and backpropagation. In selection, it explores the tree until it arrives at a leaf node; expansion creates new nodes; simulation executes some random moves starting from the new node; and backpropagation sends back the simulation results into the tree. This iterative process enables MCTS to update knowledge of the best promising moves based on what happens in previous iterations. This was a significant step in the application of MCTS in Go with Google DeepMind's AlphaGo, which enabled superhuman performance by combining MCTS with neural networks. This in fact allowed AlphaGo to evaluate board positions much better and to make strategic choices to surpass human abilities in the game. The successes of MCTS inspired its usage in various domains beyond games and applications, such as optimization problems and real-time decision-making scenarios.

Author keywords- Exploration vs Exploitation; Monte Carlo Tree Search (MCTS); Neural network integration; Simulation strategy; UCT (Upper Confidence Bound for Trees)

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	08 DECENT WORK AND ECONOMIC GROWTH; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

SAPK + K-MEANS: IMPROVING E-COMMERCE CUSTOMER SEGMENTATION THROUGH ALGORITHMIC HYBRIDIZATION

Babu, T.; Mano Shankari, J.; Singh, M.K.; Nisarga, D.; Vaishnavi, R.; Punia, A.

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Abstract

Customer segmentation represents a critical strategic capability in e-commerce, enabling personalized customer experiences and optimized marketing approaches. This paper explores the application of K-Means clustering, enhanced with innovative preprocessing techniques and algorithmic improvements, for effective customer segmentation in e-commerce environments. The research utilizes a comprehensive dataset comprising over 10,000 customer records with purchase histories, browsing patterns, and demographic information. We implement and compare standard K-Means, Affinity Propagation + K-Means (AP + K-Means), and our proposed Semi-supervised Affinity Propagation K-Means (SAPK + K-Means) algorithms. The preprocessing pipeline incorporates normalization and edge detection techniques to enhance clustering quality. Experimental results demonstrate that SAPK + K-Means consistently outperforms traditional approaches, achieving a superior silhouette score of 0.74 and reduced error rates of 3.1% when combined with preprocessing techniques. The algorithm identifies four distinct customer segments: high-value frequent buyers, casual browsers, seasonal shoppers, and new potential customers—each characterized by unique purchasing behaviors and product preferences. An interactive dashboard implementation transforms complex clustering results into actionable business intelligence, enabling targeted marketing strategies and inventory optimization. The proposed methodology demonstrates significant practical value for e-commerce businesses seeking to better understand their customer base and develop segment-specific strategies. This research contributes to the growing field of data-driven customer relationship management by presenting an enhanced clustering approach that addresses common limitations of traditional methods while maintaining computational efficiency.

Author keywords- Affinity Propagation; Customer Segmentation; Data Preprocessing; E-commerce Analytics; K-Means Clustering; Semi-Supervised Learning

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

STRATEGIC AI: ITERATIVE DEEPENING A FOR REAL-TIME CHALLENGES

Nair, R.R.; Kishore, S.; Joseph, S.; Rashmi Hegde, K.; Thakur, R.

Proceedings of 2025 International Conference on Emerging Technologies in Computing and Communication, ETCC 2025

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Abstract

The Iterative Deepening A* (IDA*) is a robust solution for tackling complex problems in vast state spaces because it combines the memory efficiency of depth-first search with the optimality of A*. The application of IDA in real-time strategy games is explored in this paper. Computational inefficiency and memory limitations are problems for traditional A* algorithms. This study introduces a novel framework for IDA that can respond to real-time changes, such as evolving terrains and resource availability. Parallel processing is used to partition the search space, which reduces computation time while maintaining accuracy. Improved path-finding efficiency and enhanced resource management capabilities are shown to be compatible with IDA*. This research extends the applicability of IDA to real-time and provides a foundation for further innovations in the field of artificial intelligence.

Author keywords- AI; Decision Making; Game AI; Iterative Deepening A*; Pathfinding; Real-Time Strategy Games; Resource Management

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

ENHANCING GREEDY BEST-FIRST SEARCH WITH DYNAMIC HEURISTIC FOR PUZZLE SOLVING

Babu, T.; T.; Nayak, D.; Shivakumar; Shweta; Nishitha, O.; Mishra, S

Proceedings of 2025 International Conference on Emerging Technologies in Computing and Communication, ETCC 2025

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Abstract

Because the GBFS algorithm uses a heuristic-driven methodology giving priority to the most promising nodes, this algorithm is frequently used in the solving of puzzles and pathfinding problems. However, when the heuristic function cannot provide apt guidance, the GBFS algorithm often encounters problems such as choosing less-than-ideal routes or becomes stuck in local minima. For especially complex problems requiring complex state evaluation, this may imply longer search times and generally lower-quality answers.A dynamic GBFS system with adaptive heuristic modification is presented to overcome these drawbacks. Contrasted with traditional GBFS that relies on a fixed heuristic at each step of the search process, this proposed algorithm modifies the heuristic dynamically on-line based on real-time feedback from its current search operations. By judging the effectiveness of previously known routes, this adaptive heuristic improves Classic puzzles such as the 8-puzzle, 15-puzzle, and sliding tile puzzles are considered to test the new GBFS. Experimental results state that the proposed method significantly outperformed the basic GBFS in search time and quality of solutions. Such robustness explains how this algorithm could potentially work well in scenarios where heuristic correctness is essential by remaining insensitive to varying complexity. This research is therefore groundbreaking, for it proves the benefits of dynamic heuristic adjustment in making puzzle-solving techniques even more effective and dependable.

Author keywords- 15-Puzzle; 8-Puzzle; Dynamic Heuristic; Greedy Best-First Search; Heuristic-Based Search; Puzzle Solving; Search Algorithms

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	08 DECENT WORK AND ECONOMIC GROWTH; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

DECISION TREE LEARNING FOR CREDIT RISK ASSESSMENT IN BANKING

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Proceedings of 2025 International Conference on Emerging Technologies in Computing and Communication, ETCC 2025

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Abstract

Credit risk assessment is one of the most important banking functions. It provides a basis for estimating the default risk of borrowers, which thereby influences lending decisions in the most appropriate manner. The present work reviews a Credit Assessment based on Decision Tree, beginning with data preprocessing, model training, hyperparameter tuning, and model performance benchmarking. The paper studies the possibilities, efficiencies, and limitations of the use of Decision Trees with respect to credit risk while making comparisons with more complex ensemble methodologies. Considerations regarding practical deployment are made, focusing on possibly realistic scenarios regarding online credit scoring systems. Performance evaluation shows the Decision Tree approach achieved 85% classification accuracy.

Author keywords- Credit Risk Assessment; Data Preprocessing; Decision Tree as an ensemble method; Ensemble Techniques; Performance Benchmarking

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	08 DECENT WORK AND ECONOMIC GROWTH; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

FLIPKART SMART RECOMMENDER: AI-DRIVEN PERSONALIZED SHOPPING

Pal, B.; **Thangavel, G.; Ramalakshmi, K.; SasiKala Rani, K.**

Proceedings of 2025 International Conference on Emerging Technologies in Computing and Communication, ETCC 2025

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Abstract

Growing rapidly with e-commerce platforms, personalized product recommendation systems are a must to improve user experience and drive up the sales. Among many other, one online marketplace that uses intelligent recommendation algorithms is Flipkart, and the suggestion item is based on interests of customers, what they have browsed, and what they have purchased in the past. The aim of this research is to develop a Flipkart Product Recommendation System based on machine learning techniques and the combination of such techniques, namely collaborative filter; content-based filter, that would recommend personalized products to the customer. Finally, the study investigates several key challenges of recommendation systems: cold start problem, data sparsity, scalability, etc. It evaluates how effective various recommendation methods like Collaborative Filtering (using patterns derived from users' interactions) and Content Based Filtering (based on product attributes) are as well. Therefore, with the idea of combination of these approaches into a hybrid model, the proposed system aims to increase recommendation accuracy and diversity. proposed according to user behavioral patterns and history of purchases. Efficient recommendation system is important, as millions of users and card inventory result In this paper, we also tackle the effects of recommendation engines on customer engagement and conversion rate, to the overall business growth. In the research, insights into the architecture and implementation of a highly efficient, scalable, and AI driven recommendation system are provided through analysis of data collection, preprocessing, feature extraction and ranking algorithms. The findings will help further the development of e-commerce recommendation technologies for enhancing satisfaction of customers on such platforms as Flipkart.

Author keywords- Collaborative Filtering; Content-Based Filtering; E-Commerce; Flipkart; Machine Learning; Personalization; Recommendation System

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	08 DECENT WORK AND ECONOMIC GROWTH; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

NATURAL LANGUAGE GENERATION USING MARKOV CHAINS FOR CHATBOT

Babu, T.; Nayak, D.; Deepthi, D.J.; Dhanyashree, A.; Anusha, G.K.; Pandey, S.

Proceedings of 2025 International Conference on Emerging Technologies in Computing and Communication, ETCC 2025

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Abstract

This paper presents a mini project on Natural Language Generation (NLG) using Markov Chains for chatbot development. The problem addressed is the challenge of generating coherent and contextually relevant dialogue in chatbots, a fundamental component of conversational AI. While many advanced models such as transformers and recurrent neural networks (RNNs) excel in generating context-aware responses, simpler methods like Markov Chains remain a popular approach for basic conversational systems. The motivation behind this project is to explore the feasibility of using Markov Chains in text generation, which offers a simple, probabilistic approach to model word sequences. The background of this work lies in the concept of Markov Chains, where the generation of each word depends on the previous word, creating a chain of predictions based on learned word pairs. This method is widely used in natural language processing for tasks like text prediction and sentence generation. However, it faces limitations in handling long-term dependencies and maintaining context over extended conversations.we designed a chatbot using Markov Chains to generate responses based on a dataset of dialogues. The process involved preprocessing the text, building a Markov Chain model from the dataset, and implementing a simple chatbot interface. The results showed that while the chatbot could generate random, contextually linked responses, it often lacked logical coherence, demonstrating the simplicity and limitations of the Markov Chain approach.

Author keywords- Chatbot; Coherence; Conversational AI; Dialogue System s; Markov Chains; Natural Language Generation; Text Generation

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	

BAYESIAN NETWORK FOR WEATHER PREDICTION

Babu, T.;.; Mano Shankari, J.; Rakshitha, G.; Kumar, N.; Kumar, H.; Dhawan, A.

Proceedings of 2025 International Conference on Emerging Technologies in Computing and Communication, ETCC 2025

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Abstract

Weather forecasting has never been an easy task-owing to the complex and dynamic nature of atmospheric systems. Conventional techniques of weather forecast mainly involve deterministic models where it can be challenging to incorporate the intrinsic uncertainty and non-linearity in weather phenomena. This paper describes an integration of Bayesian Network (BN) with Support Vector Machine (SVM) and Linear Regression (LR) for better weather forecast. The Bayesian Network is applied for modeling the probabilistic dependence between different weather parameters (for example, temperature, humidity, wind speed), to represent the uncertainty and connections between the items in the data. SVM is used for classification purposes including the prediction of occurrence of certain weather phenomena like rain and storms whereas Linear Regression is utilized in continuous weather parameter predictions such as temperature. By bringing these techniques together, the model attempts to improve predictive accuracy and better deal with the variety and vagueness of weather data. The results show that hybrid models give a promising result in predicting the condition of the weather with the superior performance on traditional approaches, which are good for meteorological analysis and decision-making.

Author keywords- Bayesian Network; Linear Regression; Machine Learning; Probabilistic Modeling; Support Vector Machines; Weather Prediction

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

UNIFICATION ALGORITHM IMPLEMENTATION FOR FIRST-ORDER LOGIC INFERENCE ENGINES

Babu, T.; Tejaswi, S.; Darshan, S.K.; Pavan Kumar, M.; Raviprakash, B.P.; Ravindra, G.; Parashar, K.

Proceedings of 2025 International Conference on Emerging Technologies in Computing and Communication, ETCC 2025

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Abstract

A unification algorithm is one of the most important parts of a First-Order Logic (FOL) inference engine because it allows for the discovery of substitutions that make two logical expressions identical. This process, in fact, is the very foundation for the work of successful automated reasoning and knowledge representation systems: such systems work by manipulating logical formulas in the tasks of theorem proving, query answering, and updating a knowledge base. Traditionally, unification uses heuristic and manual approaches that are very time-consuming and prone to errors. But recent advances in AI and machine learning techniques applied along with some image processing techniques open new scopes within which the process of unification may be made more efficient and accurate. This paper describes how the unification algorithm can be put into practice for inference engines built on FOL, focusing on how it facilitates the automation of logical deduction. We discuss a range of approaches from using CNN for the detection of very subtle logical relationships and differences in expressions. Put emphasis on recursive unification to cope with compound terms and nested structures. Methods proposed generally indicate rather serious efficiency improvements for scalability and reliability in automated reasoning systems. The unification procedure is more consistent and reproducible and can deal with large-scale logical problems if AI is applied.

Author keywords- Automated Reasoning; Inference Engine; Inference engine; Knowledge Representation; Logical deduction; Recursive Unification; Symbolic Logic; Theorem proving

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q2	50th	6.6	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES

VISCOELASTIC MATERIALS AND COMPOSITES: A COMPREHENSIVE REVIEW ON MECHANICS, MODELING, AND DESIGN CONFIGURATIONS FOR VIBRATION CONTROL IN STRUCTURAL APPLICATIONS

Mishra, V.N.; **Gupta, A.**; Sarangi, S.K.

Multiscale and Multidisciplinary Modeling, Experiments and Design

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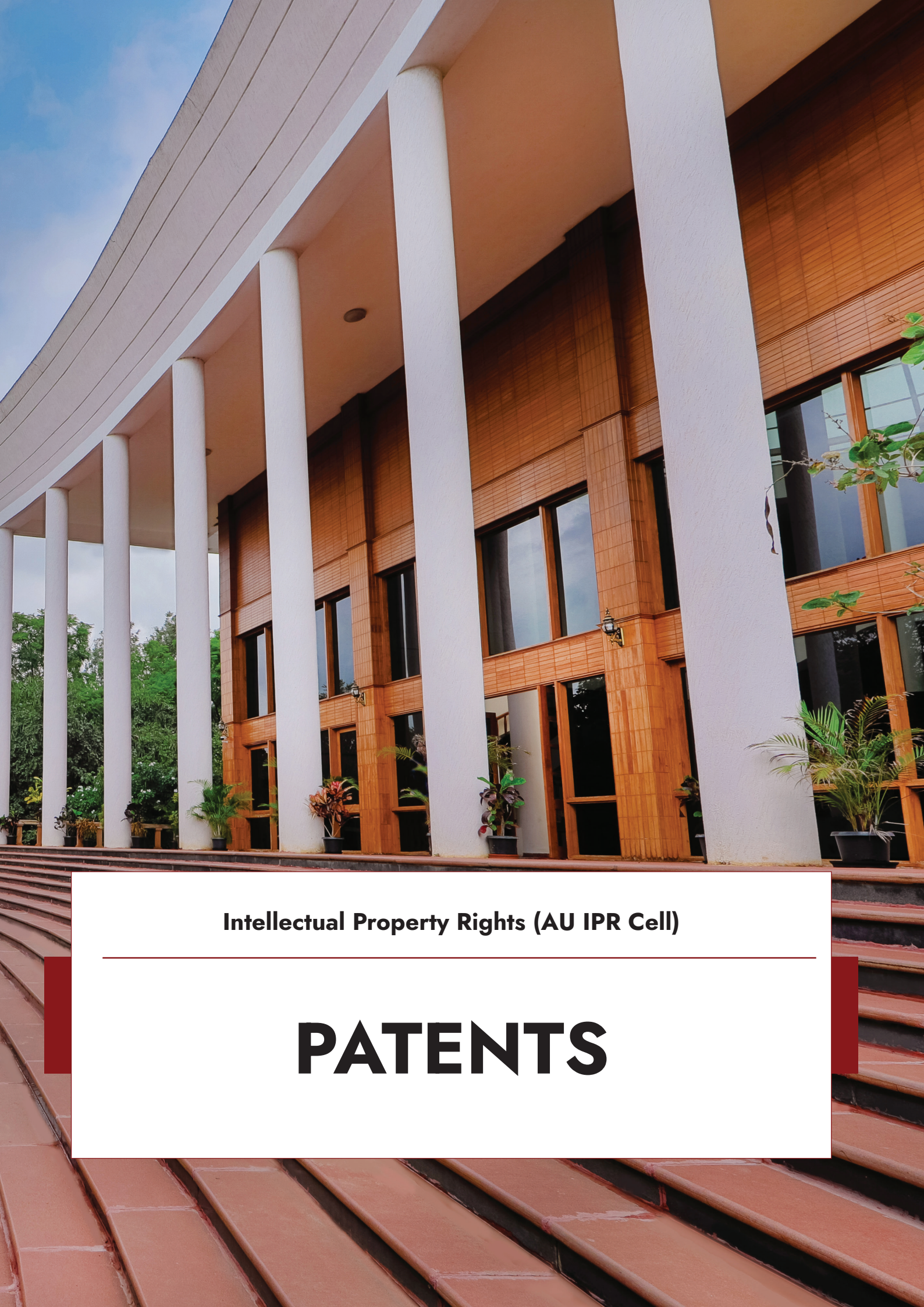
Abstract

This paper discusses the design & development, and application of the viscoelastic composite material to mitigate the structural vibration. High Impact strength with desired damping properties, with less weight & cost, is required for defense and marine applications. It can be achieved by hybridization of composite materials and spraying the high-damping compound onto surfaces to dissipate the undesired vibrational and noise. A chronological review of damping treatments with viscoelastic material is described for structures. The damping treatment and techniques arrangement using viscoelastic composites to measure damping are presented. The comparative study of various viscoelastic models to study viscoelastic behavior is shown in this work. The various approaches to evaluate the effective properties of viscoelastic composites, including the micromechanical & micromechanical method, empirical models, and differential scheme, are analyzed. The configuration, types of viscoelastic composites, and their structural applications are given. The investigation of the fiber-reinforced, hybrid, filled viscoelastic composites novel material configuration is emphasized here. The attempt to develop a mathematical and numerical model with the integration of damping qualities using finite elements is presented here. This work further explores experimental techniques related to viscoelastic composites and selection of reinforcement & fillers, effect on the damping is presented here.

Author keywords- Damping treatments; FEM; High-damping compound; Vibration; Viscoelastic composites



Intellectual Property Rights (AU IPR Cell)

PATENTS

Application No **202511084406**

Title of the invention **FUNCTIONAL EXTENSION FOR LEGAL ASSISTANCE KIOSK**

Name of Inventor

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Dr. Kartik Agre, and **Dr. Rachana Choudhari**

Abstract

The present disclosure is about a system and method for processing, securing, and delivering preliminary legal assistance through use of an interactive legal kiosk. The system includes a document scanning and pre-processing module; which converts legal documents to digital format and then semantically classifies them using Artificial Intelligence based Optical Character Recognition (AI OCR); a multimedia evidence authentication module, that confirms images, audio files, and videos (evidence); and a blockchain secure evidence ledger that creates tamper-proof records and timestamps documents. An adaptive assistance engine, using Natural Language Processing and a legal knowledge graph, also understands user inputs and presents applicable clause explanations, templates or statutory references. A multilingual accessibility interface allows for accessibility and voice-guided information in the form of text-to-speech, speech-to-text, and translation to regional languages when available; Regulatory compliance also includes cross-checking deadlines for statutes as a compliance check and allowing for real-time alerts. The method includes securely digitizing, authenticating, storing, and intelligently processing unstructured legal input, changing traditional awareness kiosks into advanced, accessible, inclusive, and secure self-help legal assistance ecosystems.

Application No **202521087841**

Title of the invention **AN AI-BASED CAMERA SYSTEM FOR EARLY DETECTION OF PSYCHOLOGICAL DISTRESS AND SUICIDE PREVENTION IN EDUCATIONAL INSTITUTIONS**

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Abstract

The present invention relates to an AI-based camera system for early detection of psychological distress and suicide prevention in educational institutions. Further, the invention pertains to the technical field of AI-integrated surveillance for mental health. It advances existing knowledge by providing a non-invasive, real-time system using cameras and machine learning to detect distress signs like facial expressions and postures, unlike prior reactive or invasive methods. The system comprises cameras (101), AI processor (102), database (103), alert system (104), and interface (105), enabling prompt interventions in schools to prevent suicides. Principal use is proactive monitoring in educational settings.

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