
RESEARCH

APRIL 2024

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“ Research is creating new knowledge. ”

Neil Armstrong

“ If we knew what we were doing, it wouldn't be called research, would it? ”

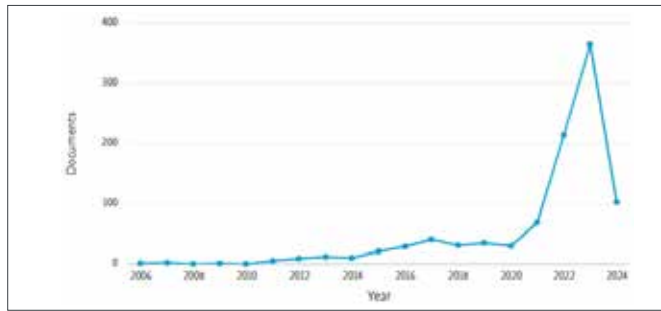
Albert Einstein

“ Research is formalized curiosity. It is poking and prying with a purpose. ”

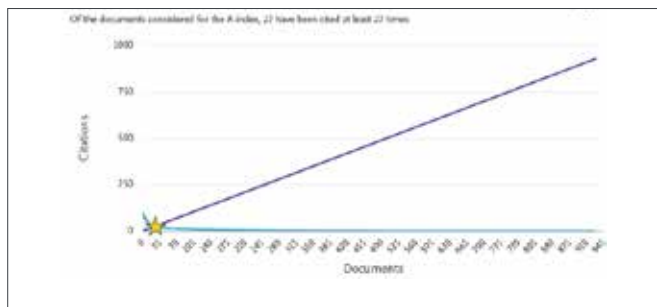
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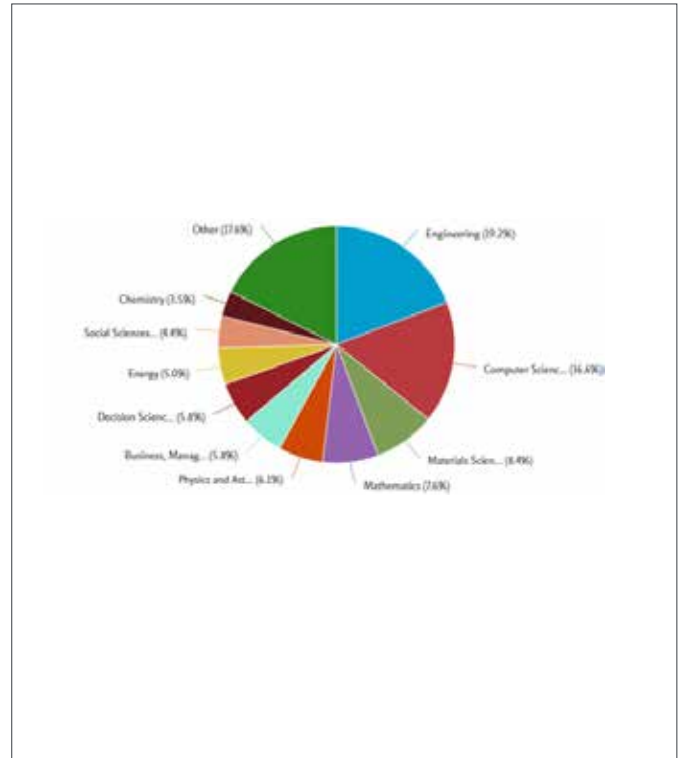
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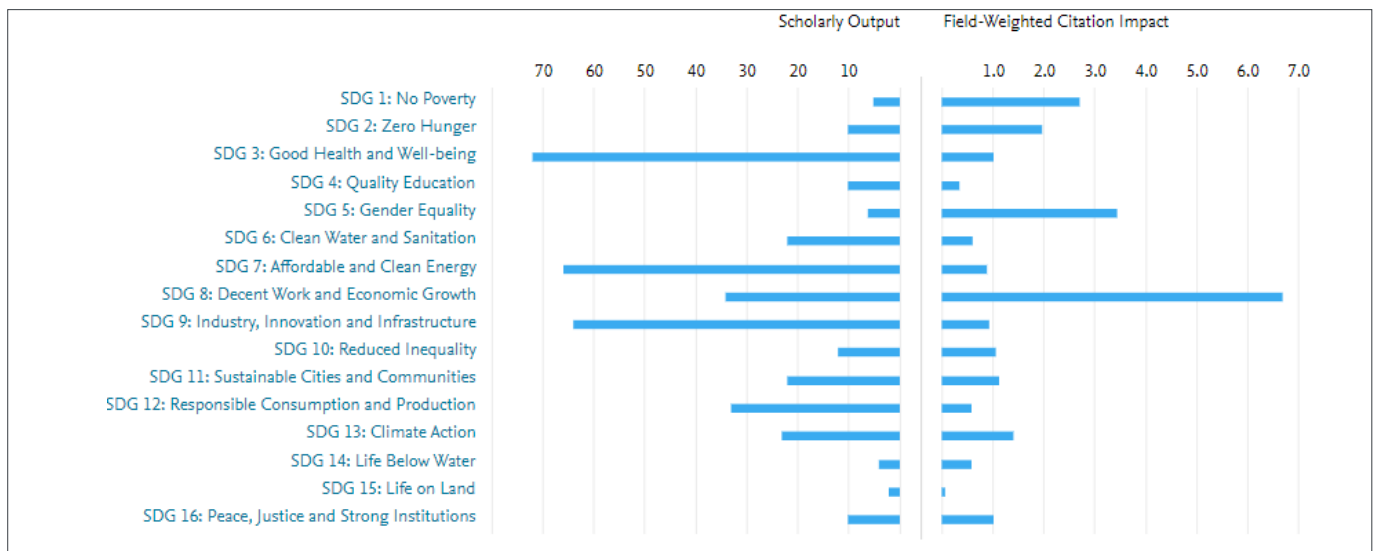
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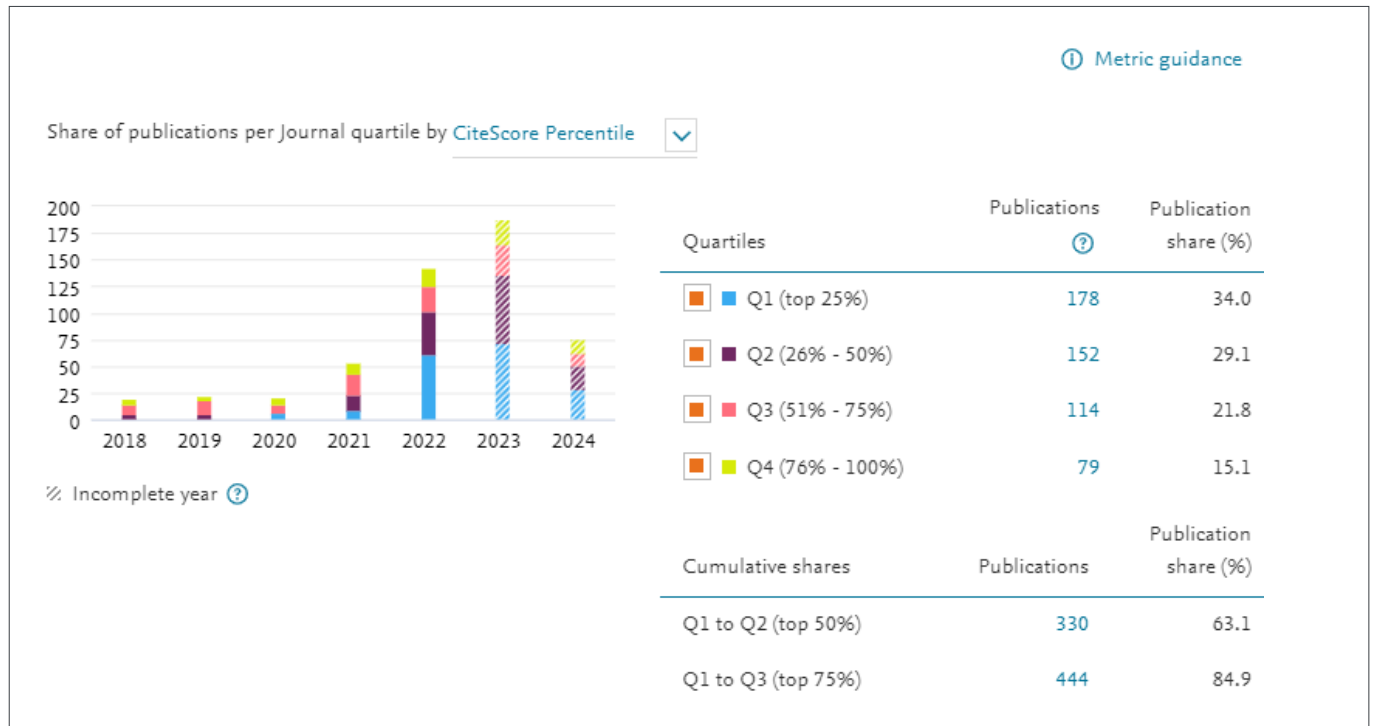
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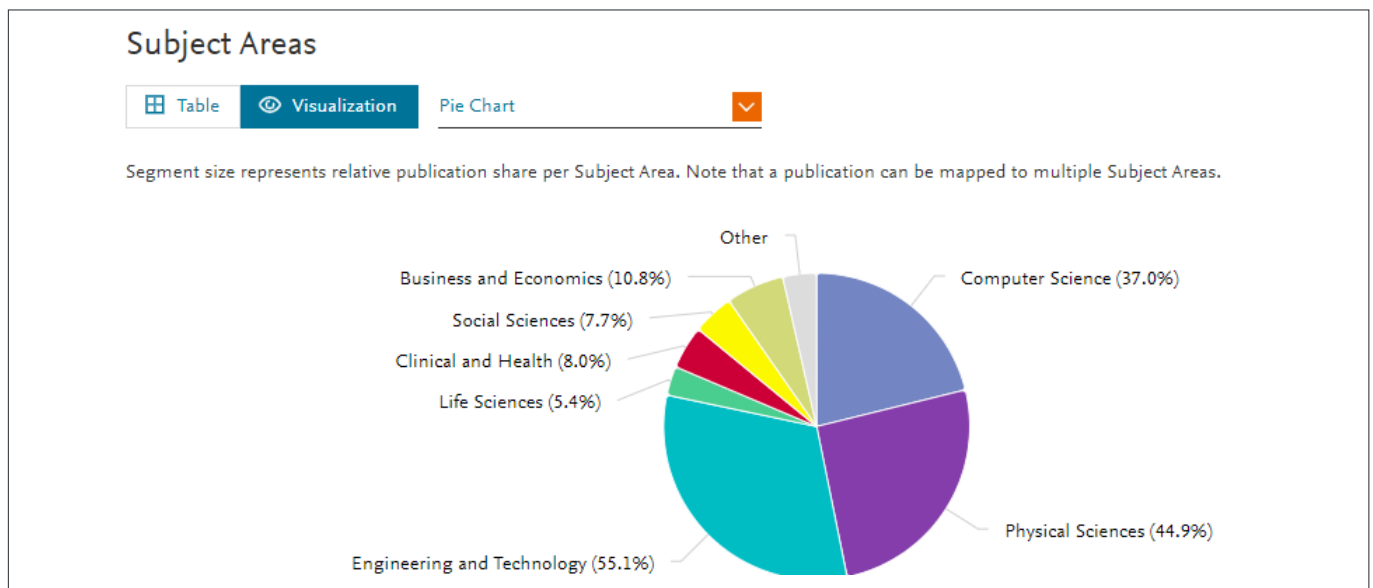
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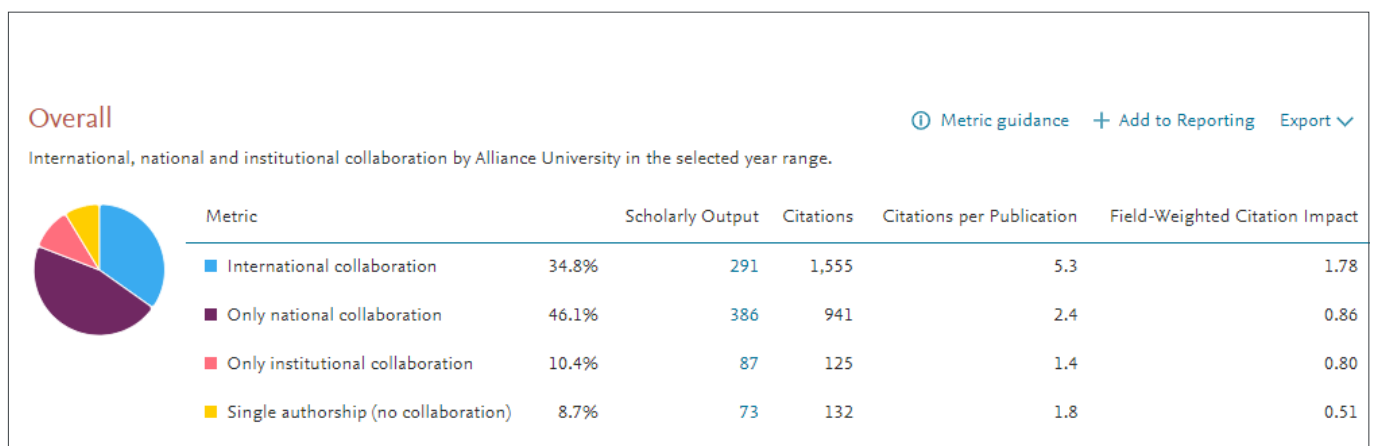
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**ULTRA STRONG FLEXIBLE
BA0.7SR0.3ZR0.02TI0.98O3/MWCNT/PVDF NANOCOMPOSITES:
PIONEERING MATERIAL WITH REMARKABLE ENERGY STORAGE FOR
SELF-POWERED DEVICES,**

Mukherjee, Anindita, Dasgupta Ghosh, Barnali, Dasgupta Ghosh B, Roy,
Sunanda, Roy S, Lim Goh, Kheng Chemical Engineering Journal Volume 48815
May 2024 Article number 151014

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Chemical Engineering Journal
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Abstract

anced power systems due to their lightweight, flexible nature, high dielectric permittivity, strong thermal stability, and good energy storage density. However, the energy storage capacity remains insufficient for practical applications. This paper reports a robust PVDF/Ba0.7Sr0.3Zr0.02Ti0.98O3 (f-BSZT)/f1-MWCNTs nanocomposite with high energy storage density, energy storage efficiency (η), stable dielectric permittivity (ϵ) and piezoelectric response using a simple solution casting process. The composite was designed in such a way it holds a 204 % increment (14 J/cm³) in energy storage density compared to the pristine PVDF (4.6 J/cm³). The energy storage efficiency (η) was measured at 89.6 % at a breakdown strength of 2000 kV/cm and a stable

dielectric permittivity (ϵ) of approximately 41.5 at 100 Hz. When evaluating the composite's strength, an incredible increase in tensile strength (144%) and Young's Modulus (71.3%) was achieved. This remarkable property enhancement is attributed to superb filler dispersion and filler-matrix interfacial bonding achieved through selective surface functionalization of the fillers. Upon fabricating a nanogenerator with this nanocomposite, the device exhibited an electrical output of 25.7 V and 1.86 μ A, surpassing many contemporary results. The device also showed outstanding sensitivity and performance under various biomechanical forces, making it a promising futuristic material for self-powered energy harvesting devices. © 2024 Elsevier B.V.

Author keywords- Dielectric properties; Interfacial interaction; Nanogenerator; Piezoelectric material; Polymer composite; Wearables



NANOCELLULOSE AS AN ECOFRIENDLY SOURCE IN NANOSCIENCE: SYNTHESIS, CHARACTERIZATION, PROPERTIES, AND APPLICATIONS—A REVIEW

Vijayan, Jyothy G., Prabhu, T. Niranjana, **Jineesh A.G**, *Macromolecular Symposia*, Volume 413, Issue 2 April 2024 Article number 2300113

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Macromolecular Symposia

Editor-in-Chief: Sibylle Meyer, Publisher: Kirsten Severing, Deputy Editors: David Huesmann, Anne Pfisterer, Stefan Spiegel, Mara Staffilani, Bo Weng

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Abstract

Nanocellulose is a promising future material which has got attention due to its unique characteristics. Properties which make nanocellulose special are the eco-friendliness, high strength, stiffness, renewability, abundance, tunable surface characteristics, and low weight. This review addresses major factors like processing of nanocellulose, modification, properties, preparation of nanocomposites from nanocellulose, and their application in different fields. This review facilitates the selection of biomass sources, processing techniques for NC synthesis, application, and challenges. This review also emphasizes on different applications of nanocellulose reinforced polymer composites in different areas such as biomedical, packaging, electronic and environmental

remediation, etc. Recent developments in the processing of cellulose nanocomposites using solution casting and other complex methods have been highlighted. As an emerging functional polymeric material, nanocellulose has become a research hotspot. The importance of nanocellulose in future includes the design of nanocellulose as per the specific user requirements, reduction of the production cost, and making customized products using nanocellulose using green processing. Hence this review is intended to provide new insights into the field of eco-friendly fundamental materials with in-depth perspectives and current research trends in its future applications. © 2024 Wiley-VCH GmbH.

Author keywords- biomedical applications; nanocellulose; nanocellulose composites; packaging; renewability



THE COGNITIVE ANALYSIS FOR AN APPROACH TO NEUROSCIENCE

Rajput, Ranjana, **Sukumar B**, V.Patnaik, Preetishree, Garg, Puneet, Ranjan, Mansi, 2024
International Conference on Automation and Computation,
AUTOCOM 2024 Pages 524 - 5282024

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2024 International Conference on Automation and Computation (AUTOCOM)

Mar. 14 - 16, 2024

GRAPHIC ERA HILL UNIVERSITY, Road Society Area, Clement Town, Dehradun - India

Abstract

This study employs cognitive neuroscience methods to investigate the brain underpinnings of decision-making processes. The study aims to clarify how decision-making brain networks relate to behavioral outcomes. We studied the brain activity patterns during decision-making tasks and analyzed their association with choice outcome using a mix of functional magnetic resonance imaging (fMRI) and behavioral paradigms. Our findings have significance for comprehending behavioral patterns in people as well as decision-making disorders because they shed

light on the cognitive and neurological processes involved in decision-making. Genetic bases for cognitive function may be identified in a variety of linked brain activities. Cognitive function is a heritable mental attribute. Traditionally, research has approached these intricate psychological characteristics as separate entities. © 2024 IEEE.

Author keywords- behavioral paradigms; Cognitive imaging; neurological underpinnings; neuroscience



EVALUATING OBESITY AND METABOLIC SYNDROME RISK: A CLOUD-DRIVEN LOGISTIC REGRESSION FRAMEWORK

Saravanan K., **Prabagar S**, Choudri, Subramani Roy, Mishra, Suman, Niranjansimha B., Malathi N, 2nd International Conference on Computer, Communication and Control, IC4 2024

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2nd IEEE International Conference on Computer, Communication and Control (IC4-2024)

08-10 February 2024, Medi-Caps University, Indore, India



Abstract

Worldwide, people are struggling with obesity and metabolic syndrome. For successful preventative interventions, it is necessary to predict and evaluate the risk factors linked to these illnesses. For the purpose of determining the potential of metabolic syndrome and obesity, this research presents a new cloud-driven logistic regression paradigm. Using the power of the cloud, we mined a massive dataset that included a wide range of demographic and clinical details. The cloud platform was used to build logistic regression models that analyzed intricate relationships among variables using powerful machine learning methods. A thorough assessment of risk variables is made possible by the framework's incorporation of data from many sources. Predicting the likelihood of obesity and metabolic syndrome was a strong suit of our cloud-based logistic regression methodology.

Important factors, such as genetic susceptibility, lifestyle variables, and clinical biomarkers, were discovered by the model. The ability to efficiently handle parallel data sets on the cloud improved the model's predictive powers and made it possible to analyze massive datasets. An efficient and scalable method for large-scale evaluation of obesity and metabolic syndrome risk is provided by the suggested framework. The model may be easily adjusted to new trends and changing datasets using cloud-driven analytics, allowing real-time updates and enhancements. This study provides a powerful instrument for risk assessment and focused preventative actions, which advances public health initiatives and personalized treatment. © 2024 IEEE.

Author keywords- Metabolic syndrome; Obesity; Personalized medicine; Public health interventions; Risk assessment



A FRAMEWORK FOR IDENTIFICATION OF BRAIN TUMORS FROM MR IMAGES USING PROGRESSIVE SEGMENTATION

Narayana M.V., Rao, J. Nageswara, Shrivastava, Sanjeev, **Ghantasala, G. S. Pradeep** Ioannou, Iacovos, Vassiliou, Vasos, Health and Technology, Open Access 2024

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Abstract

Purpose: This study addresses the critical health issue of brain tumors, focusing on enhancing the accuracy of tumor segmentation from Magnetic Resonance Imaging (MRI) images. The primary research question investigates the effectiveness of a novel Hybrid Watershed–Clustering framework and its underlying Progressive Segmentation of the MR Images using the Radius and Intensity Measure (PS-RIM) algorithm. The aim is to improve the detection and segmentation of brain tumors within MR images, surpassing the efficacy of current methodologies. **Methods:** The methodology involves a three-stage process. In the preprocessing stage, noise reduction and intensity normalization techniques are applied to clarify the images. The next stage is region-based segmentation, which includes morphological processing, edge detection, and thresholding to delineate tumor areas accurately. The final post-processing stage enhances segmentation accuracy and reduces false positives by integrating clustering machine learning techniques, specifically the K-Means cluster algorithm, to refine

tumor identification. **Results:** The framework's comprehensive evaluation across various MR images shows a significant improvement in accuracy over existing segmentation methods. The PS-RIM algorithm within the framework effectively captures the diverse presentations of tumor appearances in MR images. The research recorded an impressive accuracy rate of 98.11% in tumor detection, demonstrating enhanced identification and segmentation quality. **Conclusions:** The study concludes that the proposed Hybrid Watershed–Clustering framework, powered by the PS-RIM algorithm, markedly improves the detection and differentiation of brain tumors in MR images. It exhibits exceptional accuracy, resilience, and computational efficiency. These findings hold substantial potential for advancing computer vision and image analysis in medical diagnostics, which could improve patient outcomes in managing brain tumors. Graphical abstract: (Figure presented.) © The Author(s) 2024.

Author keywords- Brain tumor; Framework; Identification; Image processing; MR images; Progressive segmentation

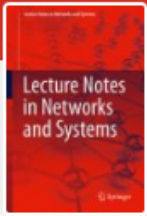


ENHANCING VISUAL PASSWORDS USING A GRID-BASED GRAPHICAL PASSWORD AUTHENTICATION TO MITIGATE SHOULDER SURFING

Mano Paul P., Berin Jeba Jingle I. Diana Jeba Jingle I, Lecture Notes in Networks and Systems Volume 869 LNNS, Pages 447 - 455 2024

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Book series

Lecture Notes in Networks and Systems

Abstract

Surfing Shoulder Surfing is a secret phrase-based attack which is a serious worry of protection in data security. Alphanumeric passwords are more helpless to attacks like shoulder surfing, dictionary attacks, etc., than graphical passwords. The creation of more muddled, challenging to-break passwords can be made simpler for clients with graphical authentication by consolidating the visuals and memory-based strategies like recall and recognition. In an imaged-based password, the user can choose pixels from the image to use as a secret key in the grid-based strategy, the user-selected image would show up on the screen with a framework overlay on it, and the client can pick explicit lattices to set their secret phrase. Besides, graphical passwords are powerless against shoulder surfing attacks, and due to this, clients are given a one-time made password via

email. We investigated the limitations of image-based and grid-based authentication techniques and propose a grid-based graphical authentication system that addresses the limitations of image-based and grid-based techniques. The results of the grid-based graphical technique, as well as the image-based and grid-based approaches, have likewise been differentiated and analyzed. The convenience objective of our authentication system is to assist users in making better password selections, hence boosting security and broadening the usable password field. This method can be employed in many different contexts, such as forensic labs, banking, military, and other scenarios. © The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2024.

Author keywords- Authentication; Graphical; Security; Shoulder-surfing; Usability



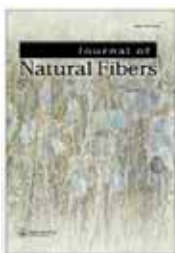
AN EXPERIMENTAL STUDY ON THE HARDNESS, INTER LAMINAR SHEAR STRENGTH, AND WATER ABSORPTION BEHAVIOR OF HABESHIAN BANANA FIBER REINFORCED COMPOSITES

Shahapurkar, Kiran, Gebremaryam, Gezahgn, Kanaginahal, Gangadhar, Ramesh S, Nik-Ghazali, Nik-Nazri, **Chenrayan, Venkatesh**, Soudagar, Manzoore Elahi m. Fouad, Yasser, Kalam M.A, Journal of Natural Fibers Open Access Volume 21, Issue 12024

Dr. C Venkatesh

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Journal of Natural Fibers

An open access journal

Publishes research in processing natural raw materials, particularly fibers; related lifecycle assessment; sustainable agriculture; bioreclamation.

Enter keywords, authors, DOI, etc

This journal



Abstract

The current study examines the effect of NaOH treatment on the hardness, inter-laminar shear strength (ILSS) and water absorption behavior of epoxy composites reinforced with banana pseudostem fibers. Using the hand-lay-up method, six distinct samples are created that are composed of layers of woven and short banana fibers in both a plain and hybrid form. Plain-treated woven composites reveal the highest hardness and ILSS properties followed by the hybrid and short fiber composites. The random

orientation of the fiber structure in short fiber composites results in the largest moisture absorption; this behavior is further supported by elucidating the kinetic parameters and diffusion coefficient parameters. SEM analysis confirms the improved surface of the NaOH-treated composite material. © 2024 The Author(s). Published with license by Taylor & Francis Group, LLC.

Author keywords- Banana fiber; ILSS, hardness; sandwich composites; water absorption



CERTAIN INVESTIGATION ON PERFORMANCE IMPROVED NOVEL HEXAGONAL SHAPED MICROSTRIP PATCH ANTENNA

Sengottaiyan N, Kalyanasundaram P, Govindaraju P, Sathesh M, Gurusamy, Ravikumar, Rajasekar M, 2nd International Conference on Intelligent Data Communication Technologies and Internet of Things, IDCIoT 2024

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Abstract

The aim of this research is to perform an improved novel Hexagonal Shaped Microstrip Patch Antenna (MPA). The performance analysis is carried out with Square Shaped Microstrip Patch Antenna (MPA) using High Frequency Structural Simulator. Materials and Methods: The Frequency and gain the Group 1 Hexagonal Shaped Microstrip Patch Antenna were measured using a sample size of $(n=26)$. It was compared with the frequency and gain the Group 2 Square Shaped Microstrip Patch Antenna which was measured using a sample size of $(n=26)$. The confidence interval is 95%, the threshold is 0.05%, and the G power value is

80%. Results: The improved novel Hexagonal Shaped MPA has a much greater gain of -0.16 dB to -1.32 dB than the Square Shaped Microstrip Patch Antennas, which has a gain of -39.97 dB to -27.39 dB. The improved novel Hexagonal Shaped Microstrip Patch Antennas while Square Shaped Microstrip Patch Antennas performed better in the desired frequency spectrum. Conclusion: The improved novel Hexagonal Shaped Microstrip Patch Antenna gives greater gain enhancement at 3.0 GHz range than the square Shaped MPA, within the confines of this study. © 2024 IEEE.

Author keywords- FR4 Epoxy; Hexagonal Shaped Microstrip Patch Antenna; MPA High Frequency Structural Simulator; Novel; Square Shaped Microstrip Patch Antenna; Wireless Communication

Quartile – SCOPUS

Percentile –

Impact Factor –

SDG :



ANALYZING THE IMPACT OF SERVICE QUALITY ON PUBLIC TRANSPORT PERFORMANCE: A PANEL DATA ANALYSIS WITH AN ONLINE RECOMMENDATION SYSTEM

Rajagopal R, Arjun Suryawanshi, Mahesh, Akbar, Shaik, Chandra Sekhar Rao B, Patil, Harshal, Kalra, Gourav, 2nd International Conference on Intelligent Data Communication Technologies and Internet of Things, IDCIoT 2024 Pages 1364 - 1369

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Abstract

The government of India launched programs like Smart Cities and the Clean Development Mission to build eco-friendly and technologically advanced cities. Solid waste management (SWM) is becoming more important to these types of programs. Because of unplanned urbanization and the fast increase of urban populations (as a result of migration), the dynamics of urban waste are changing, making it extremely difficult for local authorities in urban areas to design an efficient SWM policy. The development of a long-term SWM plan that is in line with the goals of government initiatives requires an in-depth knowledge of the waste qualities, quantities, and present management

processes. Data preprocessing, feature extraction, and training the model ought to take precedence. Data from the characterization are linked to the entire magnitude of that influence for the relevant area and period in this step of preprocessing, which is where normalization is applied. It employs principal component analysis (PCA) for feature extraction. Feature selection is an essential first step in training unified CNN-LSTM models. Compared to the current front-runners, CNN and LSTM, the proposed technique performs far better. The accuracy was increased by 95.85% when the method was used. © 2024 IEEE.

Author keywords- Principal Component Analysis (PCA); Solid waste management (SWM); Waste Treatment

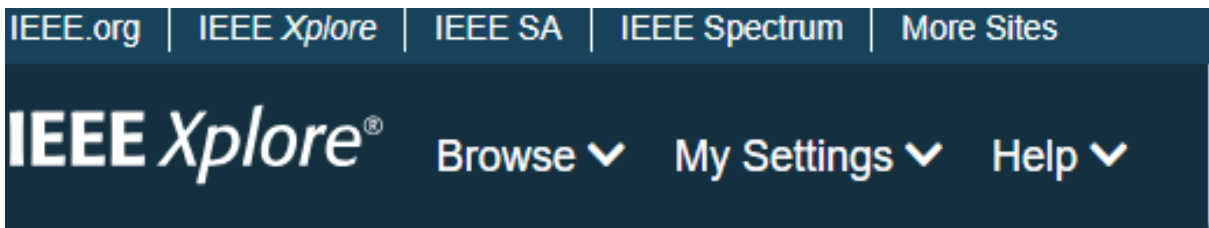


SIMPLE ENCRYPTION AND DECRYPTION OF PASSWORD FOR CYBER SECURITY APPLICATION

Devi, Supriya, Vinay Kumar H.S., 2024 4th International Conference on Advances in Electrical, Computing, Communication and Sustainable Technologies, ICAECT 2024.

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Abstract

Information about encryption and a dozen practical importance of it can be visualized in the last three decades due to the development in the field of computer science data resource and Internet sharing. Re-visiting the concept says in short sentences, to convert your given information to a different source format which is only recognized or repacked by its required receiver. This research paper is about a simple encryption that can be made using elementary programming languages rather than any other official encryption methods on the internet which indeed are hard and require large steps to understand. This algorithm can be used when the device could be

customized or old enough to access communication services like email but, not a communication application because any access through them while using the internet is usually universally programmed and implemented which could be traceable in the end by an unknown source or program. The main aim of the program is to implement through offline and send the encrypted data totally programmed manually for cyber security applications. © 2024 IEEE.

Author keywords- account login; binary algorithm; Decryption; easy; Encryption; Internet redundancy; Programmable; protection; Simple; Supercomputer



NEXT GENERATION HEFFRON-PHILLIPS MODEL FOR DAMPING POWER SYSTEM OSCILLATIONS BASED ON A NOVEL META-HEURISTIC SNAKE OPTIMIZATION ALGORITHM

Agrawal, Niharika, Khan, Faheem Ahmed, **Mahapatra Sheila**, Science and Technology Asia Volume 29, Issue 1, Pages 160 - 181 January-March 2024

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Professor & Associate Director - Research (Academics), HOD
Electrical & Electronics Engineering

Abstract

Low-Frequency Oscillations (LFO) created due to various disturbances affect the integrity, security, efficiency, and safety of the power system. The traditional Heffron-Phillips (HP) Model of a power system has 6-K-Constants and the state vector is composed of only four state variables. In the present work, a higher-order Synchronous Machine Model 1.1 is used to develop the next-generation HP Model called an Advanced Heffron-Phillips Model (AHPM). There are now 5 state variables and 10 K-Constants including the dynamics of d and q-axis internal voltages. A novel meta-heuristic snake optimization algorithm (SOA) with the key features of exploration and exploitation is used for optimizing the parameters of PSS, TCSC, and Coordinated PSS and TCSC, and the results are compared. The coordinated model

based on AHPM produced excellent stability results. The system oscillations died out fastest, with a settling time of less than 2 seconds, and a damping ratio as high as 99.30% is achieved with the coordinated model. Together with the graphical responses, the dominant eigenvalues are mentioned to highlight this notable shift in performance. The system's power transfer capacity is also improved along with stability. The integration of renewables into the grid creates new stability issues and challenges. This AHPM based on SOA is capable of meeting these challenges. The power grid with AHPM is more efficient, robust, secure, and safe against unpredictable operating conditions with renewables. © 2024, Thammasat University. All rights reserved.

Author keywords- Algorithm; Damping; Model; Objective function; Oscillations; Stability



PERFORMANCE COMPARISON OF OBJECT DETECTION NEURAL NETWORK MODELS BASED ON ACCURACY AND LATENCY

Gomathy B, **Sengottaiyan N**, Aarthi K, Thirumoorthy P, Tamizharasu K, Kalyanasundaram P
2nd International Conference on Intelligent Data Communication Technologies and Internet of Things, IDCIoT 2024

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Abstract

Aim: The purpose of this study is to compare the object detection performance of You Only Look Once V4 (YOLOv4) and Single Shot Multibox Detector (SSD) algorithms with respect to metrics like accuracy and latency. Materials and method: Twenty sample photos in all, from different classifications and labels, were gathered. These samples were divided into training dataset (60 %) and test dataset (40 %). To measure the performance, values for accuracy and latency were computed for YOLOv4 and SSD with G power 0.8. Result: The accuracy in prediction of the

object in the image was higher in the YOLOv4 algorithm (97 %) compared to the SSD algorithm (84 %). After running a t-test on an independent sample of the two groups under consideration. It is observed that YOLOv4 reported greater preference than the SSD algorithm having p value 0.166 ($p > 0.05$). It was proven that the YOLOv4 reported greater preference than SSD in terms of accuracy. © 2024 IEEE.

Author keywords- Convolutional neural networks; Machine Learning; Novel Custom Dataset; Object Detection; Single Shot Multibox Detector; You Only Look Once V4



PREDICTIVE AND EXPERIMENTAL ANALYSIS OF FORCES IN DIE-LESS FORMING USING ARTIFICIAL INTELLIGENCE TECHNIQUES

Kumar, Ajay, **Shrivastava, Virendra Kumar**, Kumar, Parveen, Kumar, Ashwini, Gulati, Vishal Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering 2024

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Abstract

The use of a novel technology for producing the components of lightweight materials and to reduce the requirements of power utilized during manufacturing processes can be a great aspect to decrease pollution and save resources. Single point incremental forming (SPIF) is the viable and novel approach for manufacturing the parts of high strength and lightweight materials without involving dedicated tools and dies economically. This die-less forming technique outperforms the conventional forming techniques by saving the energy and materials. In this work, the estimation and investigation of forming forces have been accomplished to ensure the secure uses for the SPIF machines for performing this process for the designed conditions on AA2024 sheets which is a lightweight aluminum alloy being widely used in aerospace and automotive sectors. To predict the peak deforming load, machine learning (ML) techniques are employed in the current work along with the artificial neural network (ANN) by

taking experimental results as the input dataset. The proposed ML model revealed better accuracy (99%) than previous work performed using similar approaches. The proposed ANN model produced lower mean absolute percentage error 4.35 as compared to other models. Authors also calculated the computing time taken during estimation of forming force. Combination of the Flatend-R1 tool and the 1.6 mm blank thickness increased the deforming loads drastically and can become the limiting factor for forming machine which should be avoided whereas the combination of hemispherical tool and lower blank thickness (0.5 mm) reduced the deforming loads that are needed to manufacture the conical frustum. It was also noticed that as the tool shape was changed from hemispherical-end to Flatend-R1, the axial peak forces were increased by 13.16%, 16.59%, 20.43%, and 22.78% for the levels 1, 2, 3, and 4 of the blank thickness, respectively. © IMechE 2024.

Author keywords- aluminum alloy; artificial neural networks; forming force; machine learning; Single point incremental forming



GENOME-WIDE IDENTIFICATION AND CHARACTERISATION OF AQUAPORINS IN ROSA CHINENSIS

Mandlik, Rushil, Sharma, Shivani, Rout, Priyadarshini, Singh, Shweta, Raturi, Gaurav, Rana, Nitika, Sonah, Humira, Deshmukh, Rupesh, **Shivaraj S.M.**, Nanda, Satyabrata, Kawar, Prashant G, Journal of Horticultural Science and Biotechnology Volume 99, Issue 3, Pages 311 - 325 2024

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The Journal of Horticultural Science and Biotechnology

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Abstract

Aquaporins (AQPs) are small integral membrane proteins that facilitate the efficient transport of small solutes like water, metalloids, urea, and CO₂ across the membrane. Plant aquaporins are known to be involved in vital physiological processes like seed germination, stomatal movement, cell elongation, and reproductive growth. In the present study, 36 AQPs were identified through genome-wide computational analysis performed in the rose genome. Subsequent phylogenetic analysis classified the AQPs into five subfamilies, including 10 Plasma membrane intrinsic proteins (PIPs), 8 Tonoplast intrinsic proteins (TIPs), 9 Nodulin intrinsic proteins (NIPs), 3 Small intrinsic proteins (SIPs), and 6 uncharacterised intrinsic proteins (XIPs). Based on the prediction of silicon

solute specificity, one of the NIPs is predicted to be a silicon transporter. Structural analysis revealed the characteristic six trans-membrane domains and two-half alpha helix harbouring two conserved NPA motifs in the majority of the predicted AQPs. The protein tertiary structures predicted with homology-based modelling were used to study the pore lining remains and to predict the solute transport activity of the AQPs. Expression profiling of the rose AQPs showed tissue-specific expression of many members. The data provided here will help in understanding the AQP-based solute transport system in roses and other related species. © 2023 Journal of Horticultural Science & Biotechnology.

Author keywords- Aquaporins; Rosaceae; rose; silicon; solute specificity



RESEARCH

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PUBLICATIONS

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