

KALANA

School of Computer Engineering
Research Magazine
December 2025
Kalinga Institute of Industrial Technology,
Deemed to be University,
Bhubaneswar, Odisha



Education is the most powerful weapon to bring empowerment.

- Achyuta Samanta



KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY
Deemed to be University U/S - 3 of the UGC Act, 1956
SCHOOL OF COMPUTER ENGINEERING

Editorial Board

We are thankful to Respected Founder Dr. Achyuta Samanta for providing such a conducive environment. We are obliged to honourable vice chancellor Dr. Saranjit Singh, Dr. Samaresh Mishra, Director-General (Student Affairs) for his continued support and Prof. Bhabani Shankar Prasad Mishra, Dean (Academics), School of Computer Engineering, for their continued support.

We thank all faculty colleagues and students for their contribution for this edition of Kalana.

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Prof. Saurabh Bilgaiyan
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Raunaq Ghoshal
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Publications

A deep autoencoder approach for detection of brain tumor images

Brain tumor detection received much attention due to its clinical significance for early treatment. Accurate diagnosis and classification of brain tumors are still challenging despite many major contributions are available. Existing methods mainly focus on accuracy in which classification problems like overfitting and underfitting have remained a major concern. This paper presents a technique for brain tumor identification using a deep autoencoder based on spectral data augmentation. In the first step, the morphological cropping process is applied to the original brain images to reduce noise and resize the images. Then Discrete Wavelet Transform (DWT) is used to solve the data-space problem with feature reduction. Finally, a dense layer is proposed for appropriate feature extraction and classification of the brain tumor images. The comparative analysis shows that the proposed algorithm outperforms with an accuracy of 97% and an AUC ROC score of 99.46%.

***Dillip Ranjan Nayak
Neelamadhab Padhy
Pradeep Kumar Mallick
Ashish Singh***

***Computers and
Electrical
Engineering
Elsevier***

MOSQUITO-NET: A deep learning based CADx system for malaria diagnosis along with model interpretation using GradCam and class activation maps

Malaria is considered one of the deadliest diseases in today's world, which causes thousands of deaths per year. The parasites responsible for malaria are scientifically known as Plasmodium, which infects the red blood cells in human beings. Its diagnostic accuracy is primarily affected by extensive scale screening due to the unavailability of resources. State of the art Computer-Aided Diagnostic techniques based on deep learning algorithms such as CNNs, which perform an end to end feature extraction and classification, have widely contributed to various image recognition tasks. In this paper, we evaluate the performance of Mosquito-Net, a custom made convnet to classify the infected and uninfected blood smears for malaria diagnosis. The CADx system can be deployed on IoT and mobile devices due to its fewer parameters and computation power, making it wildly preferable for diagnosis in remote and rural areas that lack medical facilities. Statistical analysis demonstrates that the proposed model achieves greater accuracy than the previous SOTA architectures for malaria diagnosis despite being 10 times lighter in parameters and inference time. Mosquito-Net achieves an AUC of 99.009% and an F-1 score of 96.7% on the validation set.

***Aayush Kumar
Sanat B. Singh
Suresh Chandra
Satapathy
Minakhi Rout***

***Expert Systems
Wiley***

An Improved Method for Recognizing Pediatric Epileptic Seizures Based on Advanced Learning and Moving Window Technique

In this work, advanced learning and moving window-based methods have been used for epileptic seizure detection. Epilepsy is a disorder of the central nervous system and roughly affects 50 million people worldwide. The most common non-invasive tool for studying the brain activity of an epileptic patient is the electroencephalogram. Electroencephalogram signals belonging to pediatric patients from Children's Hospital Boston, Massachusetts Institute of Technology have been used in this work to validate the proposed method. For determining between seizure and non-seizure signals, feature extraction techniques based on time-domain, frequency domain, time-frequency domain have been used. Four different methods (decision tree, random forest, artificial neural network, and ensemble learning) have been studied and their performances have been compared using different statistical measures. The results show better performance by random forest among all the four classifiers with an accuracy, sensitivity, and specificity of 91.9%, 94.1%, and 89.7% respectively. The proposed method is suggested as an improved method because it is not channel specific, not patient specific and has a promising accuracy in detecting epileptic seizure.

***Satarupa Chakrabarti
Aleena Swetapadma
Prasant Kumar Pattnaik***

***Journal of
Ambient
Intelligence and
Smart
Environments***

A Resilient Protection Scheme for Common Shunt Fault and High Impedance Fault in Distribution Lines Using Wavelet Transform

The studies conducted in this article suggest an application of discrete wavelet transform to obtain discriminative features of faulty current signals and the development of a threshold-based scheme to discriminate between faulty and nonfaulty situations. The first-level approximate wavelet coefficients are extracted and used to calculate the standard deviation features using a recursive moving window. With the help of these features, faulted phase is also identified simultaneously apart from fault detection. The efficacy of the scheme is tested on a modified IEEE-13 bus test feeder system incorporated with distributed generators. The algorithm has been compared with the conventional HIF detection schemes and the results proved the efficiency and robustness of the proposed scheme to detect the fault under a variety of fault conditions. The main contributions of the proposed scheme are viz., it can correctly differentiate between HIF/LIF and switching events and works well on both grid-connected or islanding mode. Finally, validation with real field fault events captured by digital fault recorder confirms that the proposed framework can assist utility engineers in detecting the HIF/LIF and switching events securely.

***Maanvi Bhatnagar
Anamika Yadav
Aleena Swetapadma***

***IEEE Systems
Journal***

A sustainable data-driven energy consumption assessment model for building infrastructures in resource-constrained environments

As per economic development and urbanization, there is a touchy impact on energy consumption for commercial building infrastructures. Therefore, a sustainable energy consumption approach is highly significant and effective. With advancements in technology, it is feasible to design and deploy an intelligent computational model that can efficiently perform in a limited resources-driven territory. In our work, we applied different data pre-processing techniques to handle huge input data and standardized our model using z-score and min-max normalization techniques. The results show that the random forest regressor model performs optimum results for commercial building energy consumption. Our model training and validation latency is only 0.82 sec and 1.14 sec respectively. Predicted accuracy with data pre-processing followed by data standardization and optimization is 0.9375. Regarding the error rate, the recorded R square value, median absolute error, and mean absolute error were 0.82, 0.22, and 0.29 respectively. Therefore, the proposed computationally optimized data-driven model can be more productive in regulating energy consumption in urban building infrastructures with limited computing resources.

***Sunil Kumar Mohapatra
Sushruta Mishra
Hrudaya Kumar Tripathy
Ahmed Alkhayyat***

***Sustainable
Energy
Technologies and
Assessments
Elsevier***

Towards Crafting Optimal Functional Link Artificial Neural Networks with Rao Algorithms for Stock Closing Prices Prediction

The Medical Cyber-Physical Systems (MCPS) are composed of several medical devices and low-cost sensors for real-time diagnosis, monitoring, and decision-making. Often, the MCPS sensitive data are processed by a trusted third party. Thus, the movement of MCPS sensitive data from the data owner to the third party becomes vulnerable to many malicious activities. Also, insider attacks can be easily performed, leaking the patient's confidential data. To overcome such security issues, the MCPS needed an Intrusion Detection System (IDS) to identify malicious activities and monitor network traffic in real-time. This paper proposes an IDS based on the behavioural trust of the Smart Medical Device (SMD) like the Medical Smart Phone (MSP). The trust value of the SMD/MSP can be evaluated using different behavioural parameters with the beta reputation model. A set of decision rules based on the dynamically computed trust degree has been proposed to check the node's intrusive level and alert generation process. The performance of the proposed model shows 93.9% accuracy.

***Subhranginee Das
Sarat Chandra Nayak
Biswajit Sahoo***

***Computational
Economics
Springer***

UBMTR: Unsupervised Boltzmann machine-based time-aware recommendation system

Visual media, in today's world, has swept across most forms of day to day communication. In this paper, we implement an unsupervised Boltzmann machine-based time-aware recommendation system (UBMTR) which detects underlying hidden features in user-movie ratings data in connection with the time at which each rating was made (temporal information). The model takes ratings and time as a dual-input and outputs binary values via the contrastive divergence algorithm which samples from a Monte Carlo Markov Chain. Arguably, there exists a correlation between the content requested and the temporal conditions, which is exactly what our model tries to exploit. There is seldom any work in the field of recommender systems built using Boltzmann machines that incorporate temporal information, which necessitates research in this domain. RBMs are adept at pattern completion to tackle missing values, and can deal with imbalanced datasets and unstructured data by encoding raw data into latent variables. Using RBM, the UBMTR outperforms many earlier made attempts made at recommendation systems done through CF and deep learning or their hybridized models.

***GM Harshvardhan
Mahendra Kumar
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Manjusha Pandey***

***Journal of King
Saud University -
Computer and
Information
Sciences
Elsevier***

Deep learning-based system to predict cardiac arrhythmia using hybrid features of transform techniques

An early and accurate detection of arrhythmias is essential to reduce the mortality rate due to cardiac diseases. Manual screening of the electrocardiogram (ECG) signals are time consuming, strenuous, and liable to human errors. This article proposes a deep learning approach for automated detection of cardiac arrhythmia using RCG signals from MIT-BIH database. Various decomposition techniques namely: discrete wavelet transform (DWT), empirical mode decomposition (EMD) and variational mode decomposition (VMD) are used to de-noise the ECG signal. The time-frequency based multi-domain features are extracted from the various coefficients of the sub-bands from de-noised signals. These obtained features are ranked based on Chi-squared test and particle swarm optimization (PSO) based methods to select the best informative features for better classification accuracy. The hybrid features were classified with deep neural network (DNN) with ten-fold cross validation strategy in classifying five types of ECG beats. The best results were obtained with an accuracy of 99.75% with less computational complexity of 0.14 s using Chi squared selection approach. Thus the proposed model can be used in the hospitals set-up to automatically screen the abnormal ECG beats.

***Santanu Sahoo
Pratyusa Dash
B.S.P. Mishra
Sukanta Kumar Sabut***

***Intelligent
Systems with
Applications
Elsevier***

Deep learning techniques for observing the impact of the global warming from satellite images of water-bodies

Global warming is a threat to modern human civilization. There are different reasons for speed up the global average temperature. The consequences are catastrophic for human existence. Seafloor rise, drought, flood, wildfire, dry riverbed are some of the consequences. This paper analyzes the changes in boundaries of different water bodies such as fresh-water lakes and glacial lakes. Over time, the area covered by a water body has been varied due to human interventions or natural causes. Here, variants of Detectron2 instance segmentation architectures have been employed to detect a water-body and compute the changes in its area from the time-lapsed images captured over 32 years, that is, 1984 to 2016. The models are validated using water-bodies images taken by the Sentinel-2 Satellite and compared based on the average precision (AP), 99.95 and 94.51 at and metrics, respectively. In addition, an ensemble approach has also been introduced for the efficient identification of shrinkage or expansion of water bodies.

***Rajdeep Chatterjee
Ankita Chatterjee
SK Hafizul Islam***

***Multimedia tools
and applications
Springer***

An improvised deep-learning-based mask R-CNN model for laryngeal cancer detection using CT images

Recently, laryngeal cancer cases have increased drastically across the globe. Accurate treatment for laryngeal cancer is intricate, especially in the later stages. In recent years, diverse diagnosis approaches and tools have been developed by researchers for helping clinical experts to identify laryngeal cancer effectively. However, these existing tools and approaches have diverse issues related to performance constraints such as lower accuracy in the identification of laryngeal cancer in the initial stage. In this paper, the authors present a novel and enhanced deep-learning-based Mask R-CNN model for the identification of laryngeal cancer and its related symptoms by utilizing diverse image datasets and CT images in real time. Furthermore, our suggested model is capable of capturing and detecting minor malignancies of the larynx portion in a significant and faster manner in the real-time screening of patients. The outcome of the suggested model is enhanced and pragmatic and obtained an accuracy of 98.99%, precision of 98.99%, F1 score of 97.99%, and recall of 96.79% on the ImageNet dataset. been performed in recent years on laryngeal cancer detection by using diverse approaches from researchers.

Pravat Kumar Sahoo
Sushruta Mishra
Ranjit Panigrahi
Akash Kumar Bhoi
Paolo Barsocchi

Sensors
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