Faculty of Computing
Sabaragamuwa University of Sri Lanka

ICARC

ABSTRACTS
OF THE GRADUATE COLLOQUIUM 2025

in parallel to the

INTERNATIONAL CONFERENCE ON ADVANCED RESEARCH IN COMPUTING

Converging Horizons: Uniting Disciplines in Computing Research Through AI Innovation

19th February, 2025
FACULTY OF COMPUTING
SABARAGAMUWA UNIVERSITY OF SRI LANKA

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Message from the Vice Chancellor

It is with immense pleasure that I extend my heartfelt appreciation to the Faculty of Computing for organizing the 5th International Conference on Advanced Research in Computing – ICARC 2025. Centered around the theme **"Converging Horizons: Uniting Disciplines in Computing Research Through AI Innovation,"** this conference underscores our commitment to integrating economic and sustainable perspectives into computing research—an essential step in navigating today's rapidly evolving technological landscape.

ICARC has established itself as a vital platform for advancing cutting-edge scientific knowledge across various disciplines within our teaching and research domains. It serves as a beacon of our dedication to exploring the transformative opportunities and challenges presented by information and communication technology in the modern world.

I take great pride in recognizing the Faculty of Computing for their unwavering commitment to excellence in organizing this prestigious event. The collaboration and technical co-sponsorship from IEEE, along with the submission of accepted papers to the IEEE Xplore Digital Library, demonstrate the high academic and research standards upheld by the Faculty. This accomplishment not only aligns with our vision of becoming a world-class academic institution but also strengthens our role in addressing global technological demands.

ICARC 2025 will spotlight key research areas such as Artificial Intelligence, Machine Learning, and Computer Vision, among others. By doing so, it will not only contribute to Sri Lanka's national vision but also position us to lead and influence global discussions on emerging trends in computing.

I am confident that this conference will foster meaningful knowledge exchange, promote interdisciplinary research collaborations, and open avenues for product commercialization. As we embark on this collective journey, I hope ICARC 2025 serves as a catalyst for pioneering innovations and shaping a future driven by technological excellence.

I look forward to witnessing the profound impact and success of ICARC 2025. My sincere gratitude goes to all researchers, session chairs, sponsors, and contributors for their invaluable efforts in making this event a resounding success.

Wishing you all a productive and insightful conference.

Professor M. Sunil Shantha
Vice-Chancellor
Sabaragamuwa University of Sri Lanka

Message from the Dean of the Faculty

Greetings,

It is my great pleasure to extend a warm welcome to all of you to the 5th International Conference on Advanced Research in Computing (ICARC), organized by the Faculty of Computing at Sabaragamuwa University of Sri Lanka for the fourth consecutive year. Scheduled for the 19th and 20th of February 2025, this hybrid event brings together academics, researchers, industry professionals, and students to explore advancements in computing and technology.

This year's theme, *"Converging Horizons: Uniting Disciplines in Computing Research Through AI Innovation,"* highlights a transformative shift in the AI landscape. It emphasizes the importance of integrating diverse fields of computing to foster interdisciplinary collaboration. Leveraging AI as a unifying force, this theme focuses on addressing complex global challenges, driving innovation, and pushing the boundaries of research.

ICARC 2025 is technically co-sponsored by IEEE Global, IEEE Sri Lanka Section, IEEE Computer Society Sri Lanka Chapter, IEEE Communication Society, IEEE Signal Processing Chapter, IEEE EMBS Chapter, and IEEE IAS Chapter. Additionally, the Sri Lanka Medical Association joins as the Knowledge and Innovation Partner, introducing a unique interdisciplinary approach to this year's event.

Over the past five years, ICARC has established itself as a flagship event for the Faculty of Computing. It has significantly enhanced the faculty's research profile while creating opportunities for global collaboration. ICARC is proud to maintain a strong tradition of publishing high-quality, indexed proceedings, ensuring international visibility for its contributors. Achieving eight indexed publications within four years reflects its growing prominence within the academic community.

This year, we are organizing the Graduate Colloquium for the first time in parallel with ICARC. It provides a supportive and engaging platform specifically designed for early-career researchers in computing. ICARC continues to be a platform where young researchers connect with industry experts and academic mentors. It fosters innovation and professional growth, strengthening its reputation as a premier event in computing research.

I sincerely thank the organizing and technical teams for their tireless efforts, which have made this event possible. It is an honor to lead such a dedicated team.

As we embark on this conference, I encourage all participants to engage actively in sessions and enjoy the atmosphere of Sabaragamuwa University as we celebrate 29 years of service to the nation.

Warm regards,

Professor S. Vasanthapriyan
Dean
Faculty of Computing,
Sabaragamuwa University of Sri Lanka
19-02-2025

Message from the General Chair – ICARC 2025

Greetings and congratulations on the successful organization of the 5th International Conference on Advanced Research in Computing (ICARC 2025). Over the years, ICARC has evolved into a distinguished platform for researchers, practitioners, and industry experts to engage in thought-provoking discussions and present cutting-edge advancements in computing. This year's theme, *"Converging Horizons: Uniting Disciplines in Computing Research Through AI Innovation,"* underscores the transformative role of Artificial Intelligence (AI) in fostering interdisciplinary collaboration and innovation across diverse domains.

The rapid progression of AI is not only enhancing traditional computing paradigms but also forging new hybrid fields that integrate principles from multiple disciplines. At ICARC 2025, we aim to explore the synergy between AI and various computing domains, paving the way for groundbreaking research and impactful technological developments. ICARC 2025 promises an enriching experience, featuring keynote and plenary sessions by esteemed scholars and industry leaders, technical paper presentations, pre-conference workshops, tutorials, and interactive discussions. The conference continues its tradition of excellence, proudly marking its fourth consecutive year with IEEE Technical Co-sponsorship. Notably, accepted papers will be submitted for inclusion in IEEE Xplore, provided they meet IEEE's quality and scope requirements.

The conference encompasses a broad spectrum of technical tracks, including Artificial Intelligence and Machine Learning, Text Analytics and Natural Language Processing, Computer Networks and Internet of Things, Knowledge Management and Software Engineering, Generative AI Enhanced Teaching and Learning, Digital Transformation and Industry 5.0, Digital Transformation in Healthcare, as well as an Open Track and a dedicated Graduate Colloquium. Additionally, ICARC 2025 is honored to have technical co-sponsorship from IEEE Global, IEEE Sri Lanka Section, IEEE Computer Society Sri Lanka Chapter, IEEE Communication Society

Chapter, IEEE Engineering in Medicine and Biology Society (EMBS) Sri Lanka Chapter, and IEEE Industry Applications Society (IAS) Sri Lanka Chapter.

I extend my sincere appreciation to the dedicated organizing committee, reviewers, keynote and plenary speakers, and all participants whose unwavering commitment has contributed to the success of this event. A special note of gratitude goes to the Faculty of Computing, Sabaragamuwa University of Sri Lanka, for their steadfast support and leadership in hosting ICARC 2025. Additionally, we are deeply grateful to our patrons and sponsors, whose generosity and encouragement have been instrumental in making this conference a reality.

As we come together to explore the frontiers of AI-driven computing research, I encourage you to engage in stimulating discussions, foster collaborations, and contribute to shaping the future of computing. I look forward to witnessing the impactful research and innovations that will emerge from this esteemed gathering.

Dr. KPN Jayasena
General Chair, ICARC 2025
19-02-2025

Message from the Graduate Colloquium Chair – ICARC 2025

Greetings and congratulations on the successful organization of the 1st Graduate Colloquium organized parallel to the 5th International Conference on Advanced Research in Computing (ICARC 2025). Throughout its evolution, ICARC has established itself as a prominent forum where researchers, professionals, and industry leaders convene to exchange ideas and showcase the latest breakthroughs in computing. This year's focus on *"Converging Horizons: Uniting Disciplines in Computing Research Through AI Innovation"* emphasizes the pivotal role of Artificial Intelligence (AI) in redefining traditional boundaries, enabling new synergies, and shaping the future of interdisciplinary research.

This colloquium marks a significant milestone in our commitment to fostering emerging research talent in computing. Designed specifically for early-career researchers, this provides a unique platform to present dissertation work, engage in scholarly discussions, and receive invaluable feedback from distinguished experts in the field.

In today's rapidly evolving technological landscape, interdisciplinary collaboration and innovation are more crucial than ever. The Graduate Colloquium - ICARC 2025 is built on the idea that research thrives in a community that encourages constructive critique, mentorship, and the exchange of diverse perspectives. This Graduate Colloquium is not just about showcasing research, it is about refining ideas, expanding professional networks, and setting the stage for future contributions to the field. Throughout this colloquium, participants will have the opportunity to present their ongoing research in a supportive environment, where senior academics and industry experts will provide guidance to help shape their work.

I strongly encourage all participants to actively engage with their peers, seek constructive feedback, and embrace this opportunity to grow as

researchers. Let this Graduate Colloquium serve as a stepping stone in your academic journey, inspiring new ideas and pushing the boundaries of computing research.

On behalf of the organizing committee, I express my sincere gratitude to all the mentors, reviewers, and contributors who have made this colloquium possible. Your support and dedication play a vital role in shaping the future of computing research.

I look forward to an engaging, insightful, and inspiring colloquium. May this experience ignite new possibilities and set the course for impactful discoveries!

Dr. RAHM Rupasingha
Chair, 1st Graduate Colloquium
ICARC 2025

Content

ABSTRACTS
OF THE GRADUATE COLLOQUIUM 2025

5th International Conference on Advanced Research in Computing (ICARC) 2025
Graduate Colloquium

Paper ID:72

A Comparative Analysis of Deep Learning Algorithms for Formality Classification in Texts Using Linguistic Features

Karunarathna K.M.G.S.[1*], Rupasingha R.A.H.M.[2], Kumara B.T.G.S.[3]

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Because of the wide variety of formal and informal writing styles brought about by the rapid growth of digital communication, the classification of documents based on it becomes a challenging task. Using a variety of variables, this work seeks to increase the accuracy of formality classification algorithms. Grammar, vocabulary, punctuation, and sentence structure are some stylistic components that define various writing styles, and traditional approaches have trouble distinguishing between them. Differentiating between formal and informal language is becoming increasingly important in applications such as research papers, legal documents, informal letters, NEWS, etc. The objective of this approach is to use linguistic features, examines how well deep learning algorithms classify documents as formal and informal. The study collected dataset of 5,000 text samples. The text files contained 2500 formal letters, news items as formal documents, and remaining are personal blogs, personal letters as informal documents. Next pre-processed all data using stop word removal, lemmatization, tokenization and lowercasing. Formal and informal categories which include pronouns, grammar, vocabulary, slang, acronyms, language and initialisms seven linguistic features were targeted for this study and those features are extracted. Then these seven features are combined to generated the feature vector for each document. The generated feature vector was applied and in order to classify documents, three deep learning models Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN), and Long Short-Term Memory (LSTM) networks are trained. Here, ANN learns nonlinear patterns in data, CNN identifies text sections, and LSTM considers word position and those are selected based on the literature review. The performance of each model is compared using different test splitting methods and cross-validation techniques. According to experimental data, the LSTM model outperforms ANN and CNN in terms of precision, recall and f-measure metrics, achieving the highest classification accuracy of 89.4% with an epoch size of 100 and a batch size of 32 with lowest error rate for Mean Absolute Error and Root Mean Squared Error. The results highlight how well LSTM can detect linguistic subtleties and offer suggestions for improving formality recognition in Natural Language Processing applications, which will help with more context-sensitive text classification.

Keywords: *Classification, Deep Learning, Formal documents, Informal documents, Linguistic Features*

5th International Conference on Advanced Research in Computing (ICARC) 2025
Graduate Colloquium

Paper ID:80

Towards Ethical Inference in Language Models: Integrating Religious Data and Enhancing Responsible LLM Development

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Large Language Models (LLM) have emerged as the most powerful tools to perform various aspects in daily life. These models are capable of diverse tasks including text understanding and generating, image generation, language translation and sentiment analysis. Continual advancements in LLM are expanding the scope of their capabilities enabling wide range of applications. Although LLMs have made significant progress, still there are challenges and limitations that needs to be addressed. As the existing LLM models generally focus on the natural language processing related tasks, it is crucial to emphasize the training and fine-tuning of ethical LLMs. When developing and fine-tuning LLMs, issues such as biased responses and lack of moral consistency can arise. This could lead to significant ethical challenges, particularly because the data used for training heavily influences the model's outputs. Developing a specific ethical LLM by establishing a benchmark for ethical performance could help overcome this problem. The primary goal of this research is to implement an ethical inferences language model which can make the predictions based on the religious data. Religious data is used for the fine-tuning and Llama-2-7B-chat model is used along with Low Rank Adaptation techniques. The fine-tuned model was tested by generating the responses to prompts related to ethical scenarios and the accuracy of the model can be calculated. The model trained with 5000 Bible data. During the training loss decrease gradually by denoting the model learns well with the data. The fine-tuned model provides reliable performance when working with ethics-related data. Further the Fine-tuned model demonstrated the ability to generate text based on ethical prompts, showing a positive trend in the generated ethical inferences indicating that this model can be developed further by training with more religious data from Bible, Quran, Hindu scriptures and Tripitaka. In future the model will be refined further using Supervised Fine Tuning to obtain more accurate model with enhanced ethical inference capabilities.

Keywords: *Fine-tuning, Large Language Model, Llama 2, Religious Data*

5th International Conference on Advanced Research in Computing (ICARC) 2025
Graduate Colloquium

Paper ID:81

Advanced Hate Speech Detection in Social Media Content Using LSTM and CNN

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Hate speech is an offensive communication aimed at a certain group. It refers to online mass media in which people communicate information, ideas, messages, and other stuff. Social media platforms and online forums enable user interaction with user-generated material, making them indispensable in everyday life. Individuals must be protected from harmful behavior by enhanced surveillance and effective policies. Hate speech is commonly characterized as "a deliberate act of assault directed against a specific group to harm them due to specific characteristics of their identity". The research gaps are listed below. Existing techniques for identifying and classifying hate speech are insufficient. It highlights the need for improved methods to address the evolving nature of hate speech. Second, existing techniques have limited adaptability. Finally, established models face challenges with complex social media terminology; this study seeks to enhance English hate speech detection using advanced deep learning techniques. This research aimed to build models with deep neural networks and embedded words. Our approach uses transformer-based models with hyperparameter tuning and generative configurations to enhance precision and efficacy. GPU acceleration is used for efficient training models and execution. This research proposes methods such as replacing emojis with text descriptions and removing special characters while retaining emojis to improve interpretation and context preservation. Data is acquired from social media via APIs and data providers before being preprocessed for noise removal, deduplication, normalization, tokenization, stop word removal, and lemmatization. With text features designed for analysis, the data is separated into training, validation, and testing sets. Numerical representations are constructed utilizing TF-IDF and word embeddings, such as Word2Vec and GloVe. Convolutional Neural Networks (CNNs) were used to detect specific sentences and Long Short-Term Memory Networks (LSTMs) to grasp the context. Both models are trained and optimized, and their efficiency is measured using accuracy, precision, recall, and F1-score. NLTK (Natural Language Toolkit) is a powerful Python tool for developing NLP baseline models. The baseline model, the Gradient Boosting Classifier, achieved an accuracy of 0.93, demonstrating excellent performance in traditional machine learning techniques. Our strategy will soon improve hate speech identification using code-mixed languages.

Keywords: *Hate Speech, Deep Learning, LSTM, Text Embedding*

5th International Conference on Advanced Research in Computing (ICARC) 2025
Graduate Colloquium

Paper ID:94

Annotate Ease: PDF Metadata Extraction Application Specializing in Research Publications

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Annotate Ease is an innovative software application designed to address the challenges of extracting metadata from research publications, predominantly in Portable Document Format (PDF). Utilizing advanced artificial intelligence (AI) models, Annotate Ease automates the extraction of critical information such as titles, authors, abstracts, affiliations, and bibliographic data, organizing it into structured JavaScript Object Notation (JSON) files for seamless integration with other research tools and databases. By incorporating Open Researcher and Contributor Identifiers (ORCIDs), the tool enhances the accuracy of author identification and affiliation validation, achieving a tested precision rate of over 95%. Annotate Ease specializes in processing structured PDFs, providing reliable outputs with consistent formatting and significantly reducing the effort required for manual extraction. Although bulk processing is not yet supported, the tool can process up to 10 structured PDFs in approximately 20 minutes, making it well-suited for smaller-scale academic workflows. Future versions aim to enhance throughput, enabling the handling of larger document batches. However, Annotate Ease faces challenges with corrupted or poorly formatted PDFs, which may require preprocessing to ensure optimal performance. Addressing these issues is a priority for ongoing development, along with cost optimization strategies to reduce API-related expenses. Comparative analysis demonstrates that Annotate Ease excels in accuracy, user-friendliness, and efficiency when compared to other metadata extraction tools. Many competing solutions struggle with academic workflows, lack intuitive interfaces, or deliver inconsistent outputs. Annotate Ease's structured JSON outputs seamlessly integrate with downstream tools such as citation managers and analytics platforms, positioning it as a transformative solution for academic research. Beyond its technical advantages, Annotate Ease saves researchers time by automating repetitive tasks and enabling them to focus on critical analysis and discovery. Future enhancements will aim to expand the tool's applicability to a broader range of academic documents, such as white papers, theses, and conference proceedings while introducing preprocessing steps to handle variability in document formatting. These improvements will ensure Annotate Ease remains an indispensable resource for researchers, publishers, and database administrators, driving efficiency and innovation in academic workflows.

Keywords: *Artificial Intelligence, Academic Tools, Metadata Extraction, ORCID Validation, PDF Processing, Research Publications*.

5th International Conference on Advanced Research in Computing (ICARC) 2025
Graduate Colloquium

Paper ID:96

Analyzing Public Sentiment and Engagement Dynamics Across Global Protests

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This study explored the temporal dynamics, public engagement, and sentiment patterns on social media during three major global protests: The Black Lives Matter Movement (BLMM), the South African Unrest (SAU), and the Masha Amini Protest (MAP). By analysing tweet distributions, Google Trends data, and sentiment trends, it revealed how public interest evolved in response to these socio-political events. The findings indicated that tweet activity often peaked on the third day of key events, followed by varied post-peak engagement patterns. For instance, BLMM sustained prolonged interest and engagement, MAP exhibited intermittent resurgences in public attention, while SAU experienced a sharper decline after its initial peak. Sentiment analysis revealed unique emotional responses across these movements. BLMM maintained predominantly positive sentiment, with peaks during significant events and anniversaries. In contrast, SAU displayed a volatile sentiment landscape, with sharp drops into negativity followed by recovery phases. MAP demonstrated relative stability but also saw notable sentiment fluctuations, with critical moments evoking both positive and negative emotions. These insights underscored the diversity in public emotional engagement across different socio-political contexts. The study also examined the synchronization between social media activity and traditional news coverage, showing that social platforms often acted as early indicators of public interest, amplifying discourse before mainstream media responded. This highlighted the role of social media as both a reflection and a driver of public discourse during socio-political movements. Furthermore, the research introduced archetypes for social media protests by analysing tweet volumes and sentiment distributions. Using LOESS smoothing techniques, it proposed generalized models to predict and understand the dynamics of future protest events in the digital space. These archetypes enhanced the ability to analyse, compare, and anticipate patterns of online activism, offering valuable insights into the evolving influence of social media on public opinion and mobilization. To refine these findings, the study suggested incorporating advanced time-series analyses and region-specific datasets to validate and expand the proposed archetypes, providing a more localized perspective on global protest dynamics.

Keywords: *Social Media Dynamics, Public Sentiment Analysis, Global Protests, Online Activism, Temporal Engagement Patterns*

5th International Conference on Advanced Research in Computing (ICARC) 2025
Graduate Colloquium

Paper ID:135

AI-Powered Automated Fashion Design System: Revolutionizing Creativity and Sustainability in Fashion

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The integration of Artificial Intelligence (AI) into the fashion industry is reshaping traditional design processes, addressing challenges such as high costs, inefficiency, and environmental impact. This research presents an AI-powered automated fashion design system that leverages cutting-edge technologies, including Machine Learning (ML), Generative Adversarial Networks (GANs), Natural Language Processing (NLP), and Computer Vision. The system enables the generation of innovative, personalized designs, virtual prototypes, and accurate three-dimensional (3D) simulations based on user measurements or scanned data. Key functionalities include real-time pattern generation, virtual try-ons, and trend analysis informed by vast datasets of historical designs and consumer preferences. The study emphasizes a user-centric approach, combining advanced AI algorithms with intuitive tools to democratize design processes and reduce material waste. Results demonstrate that the system enhances design productivity by 35%, reduces production time by 40%, and achieves 95% accuracy in 3D body simulations. By contrasting existing solutions with the proposed system, this research highlights its superior integration of design generation, trend prediction, and customization. Unlike standalone tools, the system unifies these features to provide a comprehensive solution for designers and consumers alike. The findings underscore the potential of AI to bridge creativity and technology, fostering collaboration between human designers and AI systems. Additionally, the study addresses critical ethical considerations, such as data privacy and inclusivity, ensuring responsible AI adoption. It explores socio-economic implications, including the democratization of fashion and the promotion of sustainable practices. This research contributes a novel methodology that not only enhances the creative and production workflows of designers but also empowers consumers with personalized, interactive experiences. Future research will focus on refining AI-generated outputs, expanding datasets to minimize bias, and broadening the system's applicability to diverse markets and user groups.

Keywords: *Artificial Intelligence, Generative Adversarial Networks, Machine Learning, Personalization, Sustainable Fashion, Trend Analysis*

Paper ID:217

Predicting the Severity of Liver Cirrhosis with Image Processing Based Machine Learning Models

Prabazhini K.[1*], Jayakody J.A.U.S.[1], and Sivatharshan M.[2]

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Liver Cirrhosis (LC) is a significant global health concern characterized by a range of liver conditions resulting from chronic alcohol consumption. Over recent decades, LC has contributed to a significant increase in mortality rates worldwide. It states from studies that machine learning and Image processing approaches produce higher accuracy. This study seeks to improve the accuracy of LC detection by developing a robust predictive model. The methodology involves gathering a comprehensive dataset from Kaggle, which includes medical imaging data such as ultrasound, CT scans and MRI scans of both LC-positive and LC-negative patients. Normalization of image dimensions and intensity values ensures dataset consistency followed by liver region segmentation and extraction of texture features like gray level co-occurrence matrices (GLCM) to detect abnormalities. Data preparation includes partitioning the dataset into training and testing sets. Utilizing K-nearest neighbors (KNN) imputer for missing value handling, outlier detection methods and addressing class imbalance with Synthetic Minority Oversampling Technique (SMOTE). Feature selection has enhanced through Principal Component Analysis (PCA) and ensemble techniques. The proposed model is evaluated using two machine-learning classifiers: Artificial Neural Network Classifier (ANN) and the Support Vector Machine Classifier (SVM). In the context of LC Prediction, the SVM model outperformed the other model. The ANN model achieved a training score of 0.9738 and a testing score of 0.9478 while the SVM model yielded a training score of 0.9664 and a testing score of 0.9627.The SVM model's superior testing performance reflects its more reliable real world application. This marks a significant advancement over existing models. In comparison with state of the art techniques, this model's ability to integrate diverse imaging modalities to addressing common challenges like class imbalance and feature selection provides a robust and effective tool for LC prediction. The ability to predict LC severity with high accuracy can greatly enhance early diagnosis. The integration of this model into clinical settings could provide healthcare professionals with a non-invasive diagnostic tool. Future research may focus on incorporating ultrasonography (USS) images into the current model framework to refine diagnostic accuracy. The application will enhance with a more intuitive, user-friendly interface and enabling more precise disease diagnosis.

Keywords: *Image Processing, Image Acquisition Modalities, Liver Cirrhosis, Liver Diagnosis, Machine Learning.*

5th International Conference on Advanced Research in Computing (ICARC) 2025
Graduate Colloquium

Paper ID:243

Privacy-Protected Iris Recognition Using Block-Feature Fusion

Wickramaarachchi W.A.W.U.[1,2*], Zhao D.[1], Zhou J.[1], Xiang J.[1]

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There is a strong correlation between individuals and their iris patterns and those patterns are unchanged throughout human life. Therefore, the iris biometric is regarded as a distinct, reliable biometric that can be utilized as an authentication element. The privacy of users and the security of iris biometric systems can be seriously threatened if attackers gain access to users' enrolled biometric information. The recognition accuracy and privacy of enrolled iris templates of an iris recognition system are two essential aspects required to maintain at a higher level. Information distortion is one of the convenient ways to provide privacy on an iris template. However, this would result in degrading the recognition accuracy of the iris recognition system. When an authentication system tries to provide both concurrently, there is a trade-off between recognition accuracy and privacy aspects. It would be a significant result if the research could make a well-balanced trade-off between the recognition accuracy and privacy of iris templates. Transforming iris features is one strategy to achieve privacy in iris templates. We propose an approach that processes the features of an iris template block-wise. However, the block size is limited to the size of a column to control the degradation of discriminatory information of original iris templates. The XOR operation is applied to three adjacent columns in two steps in the fusion process. In this process, the first XOR operation is applied between a column and its' next adjoining column. The second XOR operation is applied between the previous result and the next adjacent column. This process continues up to the end of the input iris template. Two datasets were used to test the three proposed approaches. The proposed approach achieved higher recognition accuracy meantime keeping privacy at an acceptable status. Based on the results of dataset 1, the proposed approach accepts genuine users at a rate of 99.11% while it accepts 0.01% of imposters. For dataset 2, the Genuine Acceptance Rate (GAR) is depicted as 81.12% while FAR is at 0.01%. As further improvements, the research can be extended to more widespread databases and higher-quality iris samples.

Keywords: *Biometric Authentication, Feature transformation, Irreversibility, Bit Fusion, XOR operation.*

5th International Conference on Advanced Research in Computing (ICARC) 2025
Graduate Colloquium

Paper ID:255

Machine Learning Approach to Predict University Students' Not Completing Degree on the First Attempt based on Influential Factors

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There are various types of factors that influence the university students' not completing the degree on the first attempt such as financial, health or stress, academic/institutional, social and personal, economical, and disposition factors. This study's goal is to analyze the university students' decisions to complete the degree on the first attempt or not and to introduce a model-based approach to predict the university students' not completing the degree on the first attempt in terms of the identified most influential factors, which will be useful in the implementation of more effective individual, group-specific or institutional prevention measures. Machine learning is used for the analysis since it has shown tremendous potential for the interpretation of complex data sets. Five different models have been trained and the trained models provided a comparatively better performance in predicting the University students' not completing the degree on the first attempt in terms of influencing factors since all the built models gave more than 84 % accuracy. Among them, the Naïve Bayes classifier was identified as the model with the highest of 92.75 %. An Ensemble approach was introduced and this model demonstrated an accuracy of 93.65 % which provided the best performance in predicting the University students' completion of the degree on the first attempt in terms of influencing factors considered. Further correlation coefficients which are between r = 0.03 and r = 0.7 and ß- coefficients which are between r = 0.03 and r = 0.72 were calculated among all the variables to determine the contribution of each variable towards the University students' not completion of the degree on the first attempt.

Keywords: *Not-Completing Degree, University Students, Machine Learning, Correlation Coefficients*

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