Annual Edition 2025

AIML INSIGHTS INK

MALNAD COLLEGE OF ENGINNERING

(An Autonomous Institution under VTU , Belagavi)

A Newsletter from Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning)

AiML

Annual Edition 2025 | Volume 1 | Issue 3

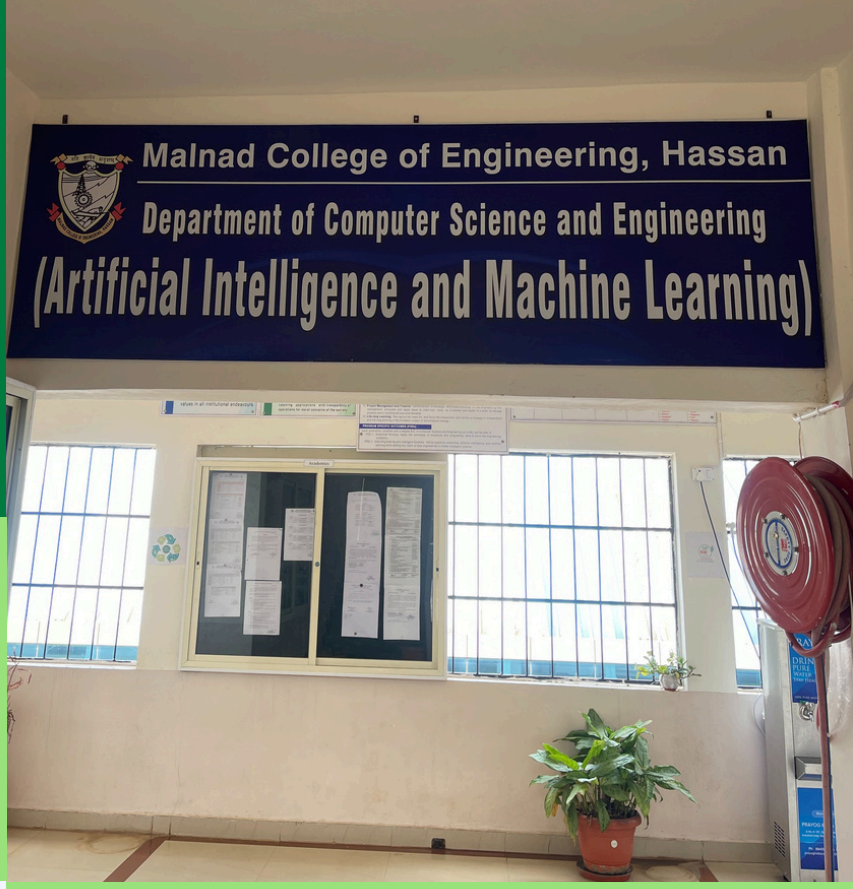
INSTITUTE MISSION

To be an institute of excellence in education and research, producing socially responsible professionals

INSTITUTE VISSION

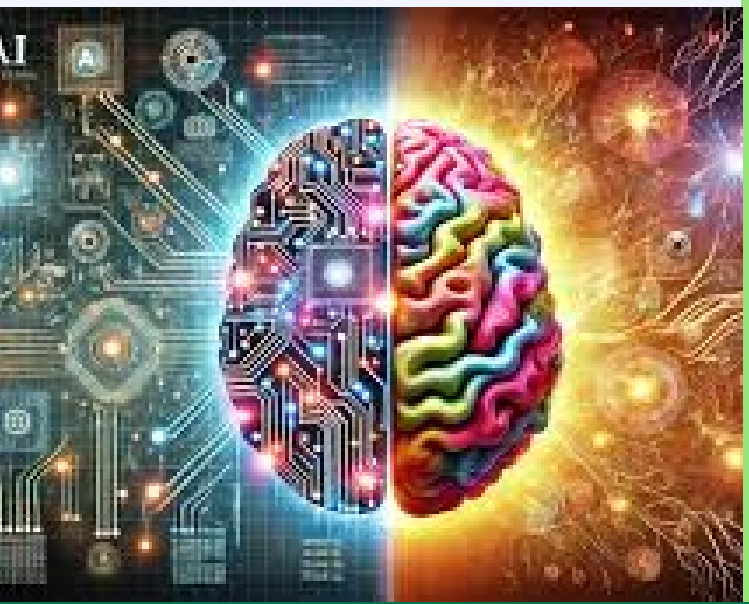
1.Create conducive environment for learning and research.
2. Establish industry and academia collaborations.
3. Ensure professional and ethical values in all institutional endeavours.

Computer Science and Engineering (Artificial Intelligence & Machine Learning)



VISION

To be a Center of Excellence for innovative teaching, learning and research to produce socially responsible professionals in the field of Artificial Intelligence and Machine Learning to address real-world problems.



MISSION

1. Fostering innovation through cutting-edge teaching, transformative learning, and innovative research in field of artificial intelligence and machine learning with foundations of Computer Science and Engineering.

2. Impart latest technology by establishing industry-academia collaboration.

3. Maintain high standards of ethical values involved in AI and ML applications with transparency of operations for moral concerns of the society

PROGRAM EDUCATIONAL OBJECTIVIES (PEOs)

PEO1: *Acquire the fundamentals and expertise in basic science, Computer Science and Engineering, Artificial Intelligence and Machine Learning principles and excel as an IT professional or an entrepreneur.*

PEO2: *Pursue Higher Studies and Research*

PEO3: *Adapt to the technological advancements by engaging in lifelong learning and exhibit professional ethics, teamwork and leadership qualities*

PROGRAM SPECIFIC OUTCOMES(PSOs)

PSO1 *Analytical Thinking: Apply the principles of analytical and programing skills to solve the engineering problems.*

PSO2 Data Engineering and Intelligent Systems: *Utilize cognitive computing, artificial intelligence, and machine learning skills within the realm of data engineering to create intelligent systems.*

PROGRAM OUTCOMES (POs)

PO1 Engineering knowledge: *Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.*

PO2 Problem analysis: *Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.*

PO3 Design/development of solutions: *Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.*

PO4 Conduct investigations of complex problems: *Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.*

PO5 Modern tool usage: *Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.*

PO6 The engineer and society: *Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.*

PO7 Environment and sustainability: *Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.*

PO8 Ethics: *Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.*

PO9 Individual and team work: *Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.*

PO10 Communication: *Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.*

PO11 Project management and finance: *Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments*

PO12 Life-long learning: *Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.*

DEPARTMENT OF CSE(AI&ML)

Dr. Balaji Prabhu B V

HEAD OF THE DEPARTMENT and ASSOCIATE PROFESSOR

- Dr Balaji Prabhu B V - B.E., M.Tech., Ph.D., Postdoctorate (IISc.)
- HOD - Department of CSE(Artificial Intelligence and Machine Learning)
- *Expertise : Artificial Intelligence and Machine Learning*
- *Research Interest : Artificial Intelligence, Computer Vision, Data Science, Blockchain, Remote Sensing*
- *Coordinator - ICT, NIRF, IUCEE*

Dr. Swathi H Y

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- ***Specialization*** : *Artificial Intelligence*

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- ***Mobile*** : 6362757752
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- ***Specialization*** : *Information Technology*

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- ***Qualification*** *: M.Tech (Ph.D)*
- ***Specialization*** *: Computer Science*

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- ***Qualification*** *: Diploma, BE, M.Tech, (Ph.D)*
- ***Specialization*** *: Computer Science & Engineering*

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- ***Mobile*** : 6361232303
- ***Qualification*** : B.E, MTech
- ***Specialization*** : *Computer Science & Engineering*

Mr. Manikanta Prasad

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- ***Mobile*** :7795985955
- ***Qualification*** : B.E, M.Tech
- ***Specialization*** : *DEVOPS, Cloud Computing using Cloud Services, Computer Networks, Artificial Intelligence*

Mrs. Sheetal D N

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- ***Mobile*** :8123614503
- ***Qualification*** :*B.Tech, M.Tech*
- ***Specialization*** : *Machine Learning*

INDUSTRY PARTNERS

EXCELR
Raising Excellence

Department Of AI&ML has an MOU with ExcelR to bring new learning opportunities in many fields.

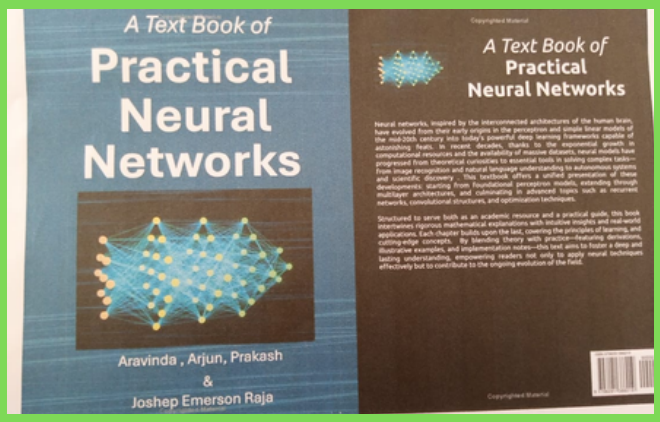
ExcelR is a global leader delivering technical training over 40 countries

- *Training for students*
- *Faculty Development*
- *Curriculum Enhancement*
- *Skill Development & Guest Lectures*

FACILITIES

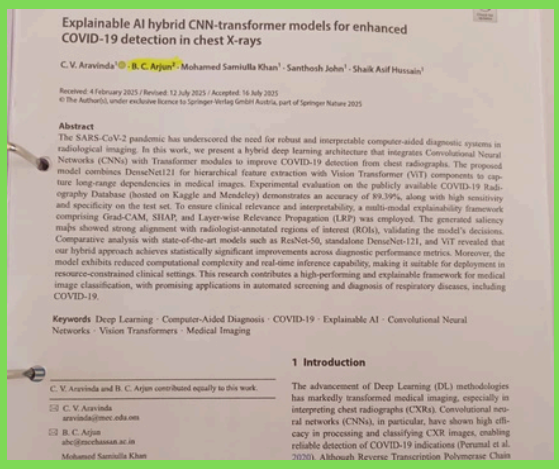
HOD office– 1 (AI304)
Staff Rooms – 2 (AI305, AB205)
Class Rooms - 3 (AI301, AI302, AI303)
Lab - 1 (MB 202)
No. of Systems : 70 (8 GB- 50,16 GB-20)
Configuration- Processor- I5 13th
Gen Speed – 2.5 GHZ
OS-Windows 10
RAM- 8 GB HDD- 512 GB
Monitor- DELL
Processor- I5 13th
Gen Speed – 2.5 GHZ
OS- UBUNTU RAM- 16 GB

PUBLICATIONS



Arjun B. C.

"A Textbook of Practical Neural Networks"
1st Edition, 304 Pages
Publication Date: *6 July 2025*
ISBN: 979-8291386019
ASIN: B0FGXYK95V


Explainable AI hybrid CNN-transformer models for enhanced COVID-19 detection in chest X-rays

C. V. Aravinda · B. C. Arjun · Mohamed Samiulla Khan · Santhosh John · Shaik Asif Hussain

Abstract
The SARS-CoV-2 pandemic has underscored the need for robust and interpretable computer-aided diagnostic systems in radiological imaging. In this work, we present a hybrid deep learning architecture that integrates Convolutional Neural Networks (CNNs) with Transformer modules to improve COVID-19 detection from chest radiographs. The proposed model combines DenseNet121 for hierarchical feature extraction with Vision Transformer (ViT) components to capture long-range dependencies in medical images. Experimental evaluation on the publicly available COVID-19 Radiography Database (hosted on Kaggle and Mendeley) demonstrates an accuracy of 89.39%, along with high sensitivity and specificity on the test set. To ensure clinical relevance and interpretability, a multi-modal explainability framework comprising Grad-CAM, SHAP, and Layer-wise Relevance Propagation (LRP) was employed. The generated saliency maps showed strong alignment with radiologist-annotated regions of interest (ROIs), validating the model's decisions. Comparative analysis with state-of-the-art models such as ResNet-50, standalone DenseNet-121, and ViT revealed that our hybrid approach achieves statistically significant improvements across diagnostic performance metrics. Moreover, the model exhibits reduced computational complexity and real-time inference capability, making it suitable for deployment in resource-constrained clinical settings. This research contributes a high-performing and explainable framework for medical image classification, with promising applications in automated screening and diagnosis of respiratory diseases, including COVID-19.

Keywords Deep Learning · Computer-Aided Diagnosis · COVID-19 · Explainable AI · Convolutional Neural Networks · Vision Transformers · Medical Imaging

1 Introduction

The advancement of Deep Learning (DL) methodologies has markedly transformed medical imaging, especially in interpreting chest radiographs (CXRs). Convolutional neural networks (CNNs), in particular, have shown high efficacy in processing and classifying CXR images, enabling reliable detection of COVID-19 indications (Perumal et al. 2020). Although Reverse Transcription Polymerase Chain

C. V. Aravinda and B. C. Arjun contributed equally to this work.

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Mohamed Samiulla Khan

Arjun B. C.

"Explainable AI Hybrid CNN–Transformer Models for Enhanced COVID-19 Detection Using Chest X-Rays"
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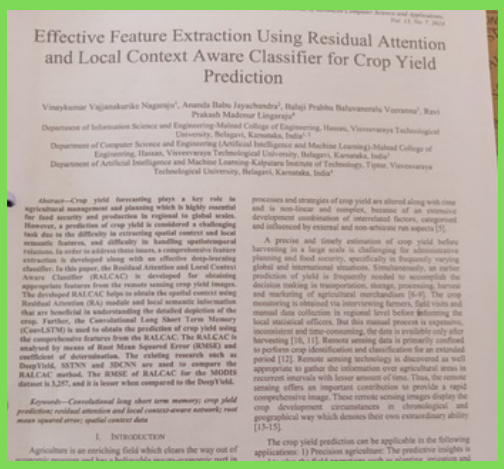
Volume: 14
Year: 2025


Effective Feature Extraction Using Residual Attention and Local Context Aware Classifier for Crop Yield Prediction

Vinaykumar Vajjanakurike Nagaraju, Ananda Babu Jayachandra, Balaji Prabhu Baluvemerala Veeranna, Ravi Prakash Madenur Lingaraja

Department of Information Science and Engineering-Malnad College of Engineering, Hassan, Visvesvaraya Technological University, Belagavi, Karnataka, India

Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning)-Malnad College of Engineering, Hassan, Visvesvaraya Technological University, Belagavi, Karnataka, India

Department of Artificial Intelligence and Machine Learning-Kalpataru Institute of Technology, Tiptur, Visvesvaraya Technological University, Belagavi, Karnataka, India

Abstract—Crop yield forecasting plays a key role in agricultural management and planning which is highly essential for food security and production in regional to global scales. However, a prediction of crop yield is considered a challenging task due to the difficulty in extracting spatial context and local semantic features, and difficulty in handling spatiotemporal relations. In order to address these issues, a comprehensive feature extraction is developed along with an effective deep-learning classifier. In this paper, the Residual Attention and Local Context Aware Classifier (RALCAC) is developed for obtaining appropriate features from the remote sensing crop yield images. The developed RALCAC helps to obtain the spatial context using Residual Attention (RA) module and local semantic information that are beneficial in understanding the detailed depiction of the crop. Further, the Convolutional Long Short Term Memory (ConvLSTM) is used to obtain the prediction of crop yield using the comprehensive features from the RALCAC. The RALCAC is analyzed by means of Root Mean Squared Error (RMSE) and coefficient of determination. The existing research such as DeepYield, SSTNN and 3DCNN are used to compare the RALCAC method. The RMSE of RALCAC for the MODIS dataset is 3.257, and it is lesser when compared to the DeepYield.

Keywords—Convolutional long short term memory; crop yield prediction; residual attention and local context-aware network; root mean squared error; spatial context data

I. Introduction

Agriculture is an enriching field which clears the way out of

processes and strategies of crop yield are altered along with time and is non-linear and complex, because of an extensive development combination of interrelated factors, categorised and influenced by external and non-arbitrate run aspects [5].

A precise and timely estimation of crop yield before harvesting in a large scale is challenging for administrative planning and food security, specifically in frequently varying global and international situations. Simultaneously, an earlier prediction of yield is frequently needed to accomplish the decision making in transportation, storage, processing, harvest and marketing of agricultural merchandises [6-9]. The crop monitoring is obtained via interviewing farmers, field visits and manual data collection in regional level before informing the local statistical officers. But this manual process is expensive, inconsistent and time-consuming, the data is available only after harvesting [10, 11]. Remote sensing data is primarily confined to perform crop identification and classification for an extended period [12]. Remote sensing technology is discovered as well appropriate to gather the information over agricultural areas in recurrent intervals with lesser amount of time. Thus, the remote sensing offers an important contribution to provide a rapid comprehensive image. These remote sensing images display the crop development circumstances in chronological and geographical way which denotes their own extraordinary ability [13-15].

The crop yield prediction can be applicable in the following applications: 1) Precision agriculture. The predictive insights is

Balaji Prabhu B. V.

"Effective Feature Extraction Using Residual Attention and Local Context Aware Classifier for Crop Yield Prediction"
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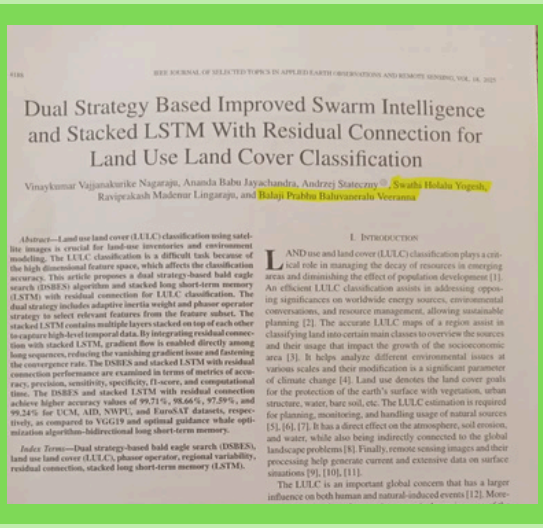
PUBLICATIONS



Dual Strategy Based Improved Swarm Intelligence and Stacked LSTM With Residual Connection for Land Use Land Cover Classification

Vinaykumar Vajjanakurike Nagaraju, Ananda Babu Jayachandra, Andrzej Stateczny, Swathi Holalu Yogesh, Raviprakash Madenur Lingaraju, and Balaji Prabhu Baluvaneralu Veeranna

Abstract—Land use land cover (LULC) classification using satellite images is crucial for land-use inventories and environment modeling. The LULC classification is a difficult task because of the high dimensional feature space, which affects the classification accuracy. This article proposes a dual strategy-based bald eagle search (DSBES) algorithm and stacked long short-term memory (LSTM) with residual connection for LULC classification. The dual strategy includes adaptive inertia weight and phasor operator strategy to select relevant features from the feature subset. The stacked LSTM contains multiple layers stacked on top of each other to capture high-level temporal data. By integrating residual connection with stacked LSTM, gradient flow is enabled directly among long sequences, reducing the vanishing gradient issue and fastening the convergence rate. The DSBES and stacked LSTM with residual connection performance are examined in terms of metrics of accuracy, precision, sensitivity, specificity, f1-score, and computational time. The DSBES and stacked LSTM with residual connection achieve higher accuracy values of 99.71%, 98.66%, 97.59%, and 99.24% for UCM, AID, NWPU, and EuroSAT datasets, respectively, as compared to VGG19 and optimal guidance whale optimization algorithm–bidirectional long short-term memory.

Index Terms—Dual strategy-based bald eagle search (DSBES), land use land cover (LULC), phasor operator, regional variability, residual connection, stacked long short-term memory (LSTM).

I. Introduction

LAND use and land cover (LULC) classification plays a critical role in managing the decay of resources in emerging areas and diminishing the effect of population development [1]. An efficient LULC classification assists in addressing opposing significances on worldwide energy sources, environmental conversations, and resource management, allowing sustainable planning [2]. The accurate LULC maps of a region assist in classifying land into certain main classes to overview the sources and their usage that impact the growth of the socioeconomic area [3]. It helps analyze different environmental issues at various scales and their modification is a significant parameter of climate change [4]. Land use denotes the land cover goals for the protection of the earth's surface with vegetation, urban structure, water, bare soil, etc. The LULC estimation is required for planning, monitoring, and handling usage of natural sources [5], [6], [7]. It has a direct effect on the atmosphere, soil erosion, and water, while also being indirectly connected to the global landscape problems [8]. Finally, remote sensing images and their processing help generate current and extensive data on surface situations [9], [10], [11].

The LULC is an important global concern that has a larger influence on both human and natural-induced events [12]. More-

Swathi H. Y.

"*Dual Strategy Based Improved Swarm Intelligence and Stacked LSTM with Residual Connection for Land Use–Land Cover Classification*"
Published in: *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*
Volume: 18, *pp.* 4188–4198, 2025

Moogambigai Charitable And Educational Trust
RAJARAJESWARI COLLEGE OF ENGINEERING
(An Autonomous Institution, Under Visvesvaraya Technological University, Belagavi)
No. 14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru - 560074

International Conference on Recent Research in Computational Sciences & Engineering (ICRRCE -2025)

CERTIFICATE OF PARTICIPATION

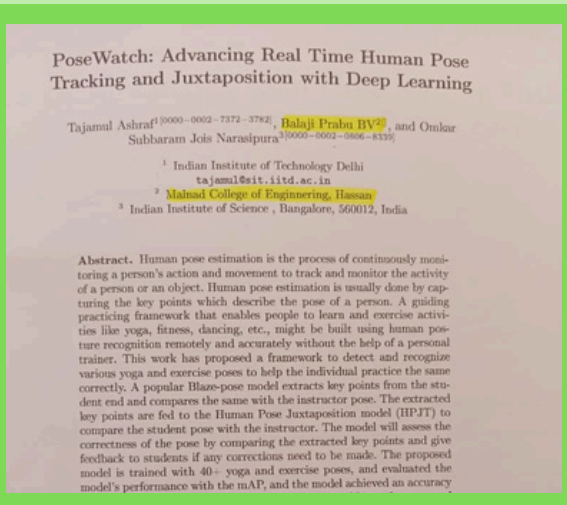
This is to certify that Mr./Ms./Dr./Prof. Megha H.C.
From Malnad College of Engineering, Hassan has presented the paper entitled An aggressive parallel pattern mining algorithm for predicting user behaviour in sensor application data in the International Conference on Recent Research in Computational Sciences and Engineering (ICRRCE -2025) held on 12th April 2025 organized by Rajarajeswari College of Engineering, Bangalore-560074.

Dr. L. Rangaiah
Convener

Dr. R Balakrishna
Conference Chair

Megha H. C.

"*An Aggressive Parallel Pattern Mining Algorithm for Predicting User Behavior in Sensor Application Data*"
Conference: International Conference on Electronics & Communication Engineering, ICRACE-2025
Publication Date: 12 April 2025



PoseWatch: Advancing Real Time Human Pose Tracking and Juxtaposition with Deep Learning

Tajamul Ashraf[1][0000-0002-7372-3782], Balaji Prabu BV[2], and Omkar Subbaram Jois Narasipura[3][0000-0002-0806-8339]

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tajamul@sit.iitd.ac.in
[2] Malnad College of Enginnering, Hassan
[3] Indian Institute of Science , Bangalore, 560012, India

Abstract. Human pose estimation is the process of continuously monitoring a person's action and movement to track and monitor the activity of a person or an object. Human pose estimation is usually done by capturing the key points which describe the pose of a person. A guiding practicing framework that enables people to learn and exercise activities like yoga, fitness, dancing, etc., might be built using human posture recognition remotely and accurately without the help of a personal trainer. This work has proposed a framework to detect and recognize various yoga and exercise poses to help the individual practice the same correctly. A popular Blaze-pose model extracts key points from the student end and compares the same with the instructor pose. The extracted key points are fed to the Human Pose Juxtaposition model (HPJT) to compare the student pose with the instructor. The model will assess the correctness of the pose by comparing the extracted key points and give feedback to students if any corrections need to be made. The proposed model is trained with 40+ yoga and exercise poses, and evaluated the model's performance with the mAP, and the model achieved an accuracy

Balaji Prabhu B. V.

"*PoseWatch: Advancing Real-Time Human Pose Tracking and Juxtaposition with Deep Learning*"
Conference: *8th International Conference on Computer Vision and Image Processing (CVIP)*
Volume: 2009
Year: 2024
ISBN: 978-3-031-58180-9

ACADEMIC ACHIEVEMENTS

Ms. Kumuda D.P., a student of Computer Science and Engineering (AI & ML) at Malnad College of Engineering, Hassan, was honored with the prestigious "MYTHREE-83 Best Academic Performance Award" for her outstanding academic excellence up to the 5th semester.


Malnad College of Engineering
Hassan-573 202, Karnataka
(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

MYTHREE-83

BEST ACADEMIC PERFORMANCE AWARD

This is to Certify that

Ms. Kumuda D.P.

bearing USN : 4MC22CI014 is the Student of

Computer Science and Engineering (AI&ML) has been conferred the Best Academic-Performance Award in recognition of her academic excellence upto 5th Semester.

MCE

Dean (S.A.)
(Dr. Dushyanth Kumar K.R.)

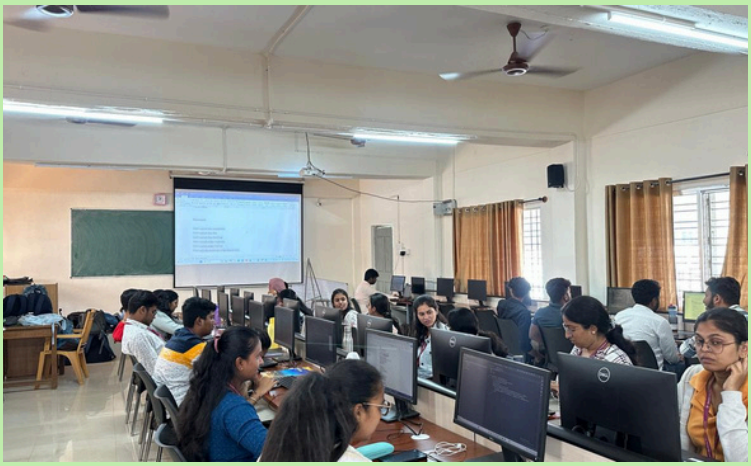
Principal
(Dr. A.J.Krishnaiah)

A GLIMPSE INTO DEPARTMENT EVENTS

STEP INTO WEB DEVELOPMENT IN MERN

by: Rajat Ravindra Koorse
Web Developer and Automation Engineer,
Tata Elxsi, Trivandrum

- *The workshop introduced students to full-stack JavaScript development using the MERN stack.*
- *Core technologies—MongoDB, Express.js, React.js, and Node.js—were demonstrated with practical examples.*
- *Students learned how to design interactive user interfaces using React.js.*
- *The session showcased creating backend APIs with Node.js and Express.js and handling data through MongoDB.*
- *Hands-on activities helped participants understand the complete workflow of building real-world MERN applications.*



MOBILE APPLICATION DEVELOPMENT USING KOTLIN

by – Mr. Shankar M, Software Developer,
Accenture, Bangalore

- *The 5-day workshop introduced students to Android development using Kotlin.*
- *Students learned core concepts of Android Studio, project structure, and activity lifecycle.*
- *Participants created simple mobile applications such as login pages and basic calculators.*
- *Practical demonstrations covered intents, UI layouts, and database handling using SQLite.*
- *Hands-on exercises and project work helped students understand the complete workflow of building Android applications.*

AI IN DENTISTRY MASTER CLASS

by – Dr. Balaji Prabhu B V, Malnad College of Engineering, Hassan

- *The master class explored how Artificial Intelligence can be integrated into dental practice, research, and education.*
- *Participants learned how AI supports diagnosis, treatment planning, and patient management through clinical decision-making tools.*
- *The session demonstrated methods to incorporate AI into everyday dental workflows for improved efficiency and accuracy.*
- *Important legal, ethical, and publication-related considerations of using AI in dental research were discussed.*
- *The interactive format encouraged active engagement from dental practitioners, PG students, and researchers, enhancing their understanding of AI's real-world impact in dentistry.*