January-2025

AMITY UNIVERSITY

INNOVATIONS @

Amity Centre for Artificial Intelligence

Building a smarter world with Artificial Intelligence.

OUR MENTORS

DR. ASHOK K. CHAUHAN

Founder President, Ritnand Balved Education Foundation
(The Foundation of Amity Institutions and the sponsoring
body of Amity Universities), Chairman, AKC Group of Companies

DR. ATUL CHAUHAN

Chancellor, Amity University
President, Ritnand Balved Education Foundation
CEO, AKC Group of Companies

PROF. (DR.) BALVINDER SHUKLA

Vice Chancellor
Amity University Uttar Pradesh

DR. W. SELVAMURTHY

President, Amity Science, Technology and Innovation
Foundation (ASTIF), Director General, Amity Directorate
of Science and Innovation (ADSI), Chancellor, Amity University,
Chhattisgarh

AMITY CENTRE FOR ARTIFICIAL INTELLIGENCE

It is my pleasure to welcome you to the Amity Centre for Artificial Intelligence (ACAI), a hub of innovation, research, and academic excellence in the field of AI. At ACAI, our mission is to empower the next generation of AI professionals, researchers, and thought leaders by providing world-class education, state-of-the-art computational resources, and an ecosystem that fosters interdisciplinary collaboration.

With cutting-edge infrastructure, including NVIDIA DGX2 A100 GPU servers with 10 petaFLOPS computing power, and dedicated faculty comprising leading experts, we are committed to pushing the boundaries of AI research and education. We take immense pride in being among the first in the country to introduce a full-fledged undergraduate program in Generative AI. Our students have already made a mark by winning prestigious awards, excelling in hackathons, and contributing high-impact research to the AI community.

Artificial Intelligence is transforming industries and redefining the way we interact with technology. As part of Amity University, which encompasses diverse fields like Engineering, Biotechnology, Life Sciences, Management, and Applied Sciences, ACAI is uniquely positioned to integrate AI across disciplines and address real-world challenges through interdisciplinary research and innovation.

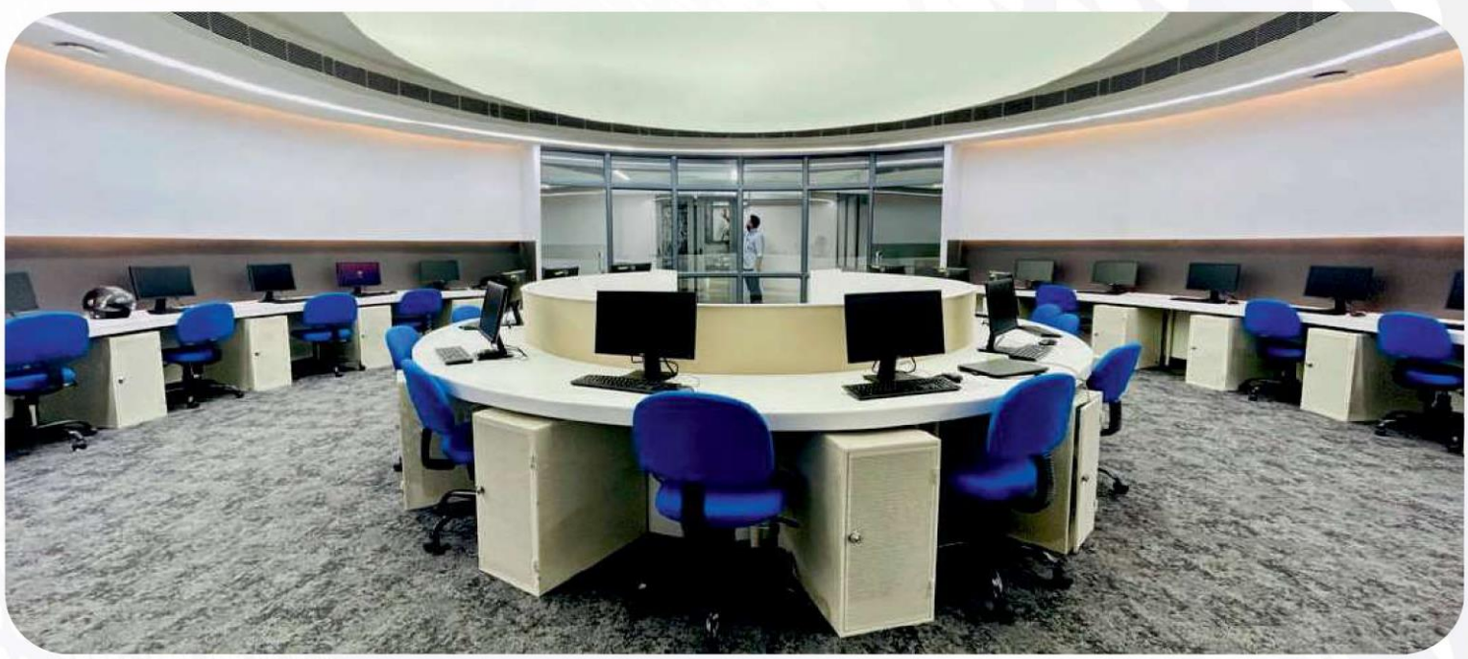
As we move forward, our vision is to establish ACAI as one of the finest AI hubs in the country, where academic excellence meets groundbreaking research to shape a smarter and AI-driven future. I invite students, researchers, and industry professionals to join us in this exciting journey as we explore the limitless potential of AI to create a better world.

Best wishes

PROF. M.K.DUTTA
Director, Amity Centre for Artificial Intelligence (ACAI)
Amity University, Noida.

ACAI-LAB - INFRASTRUCTURE

The Amity Centre for Artificial Intelligence has the most advanced Supercomputing facility, NVIDIA DGX2 A100, the world's most powerful AI system to fuel research, development, and innovation with 16 state-of-the-art NVIDIA A100 GPUs and 10 Petaflop computing power. This high-speed AI server delivers unparalleled performance, speed, and precision, allowing you to accelerate AI workloads and unlock new opportunities. Researchers working on machine learning, deep learning, or data science, this NVIDIA DGX2 A100 server is the perfect tool for the job. Its advanced hardware and software stack provides a seamless and efficient environment for training, inference, and deployment, enabling you to achieve breakthrough results and insights.



Key features and benefits:

- Two NVIDIA DGX2 servers with 16 A100 GPUs for unparalleled performance and efficiency.
- 10 Petaflop computing power for lightning-fast processing and high-bandwidth connectivity.
- High-speed AI server for accelerated workloads and improved productivity.
- Advanced hardware and software stack for seamless and efficient training, inference, and deployment.
- Ideal for machine learning, deep learning, and data science applications.
- Unmatched performance, speed, and precision for breakthrough results and insights.
- DGX A100 which is equipped with eight NVIDIA A100 Tensor Core GPUs, providing a combined total of 320 GB GPU memory

Powered with the Most Advanced Supercomputing Facility

ACAI-LAB – RESOURCES

Resources Available:

Access to Nvidia NGC Catalog: NVIDIA NGC is the hub for GPU-optimized software for deep learning, machine learning, and HPC that provides containers, models, model scripts, and industry solutions so data scientists, developers and researchers can focus on building solutions and gathering insights faster.

Cloud Native Support:

DGX Cloud provides dedicated clusters of NVIDIA DGX AI supercomputing, paired with NVIDIA AI software. The service makes it possible for every enterprise to access its own AI supercomputer using a simple web browser, removing the complexity of acquiring, deploying, and managing on-premises infrastructure.

Hardware Specification:

CPU:

- Dual AMD EPYC 7003 series processors with up to 64 cores per processor
- Support for PCIe Gen4
- Support for up to 4TB of DDR4 memory

GPU:

- NVIDIA A100 Tensor Core GPU with 6,912 CUDA cores and 40GB or 80GB of high-bandwidth memory (HBM2)
- Up to 19.5 teraflops of single-precision (FP32) performance or 156 teraflops of mixed-precision (FP16/FP32) performance
- Support for NVIDIA NVLink and PCIe Gen4 for GPU-to-GPU communication
- Support for NVIDIA Tensor Cores for accelerated AI training and inference
- Support for NVIDIA Multi-Instance GPU (MIG) technology, which allows multiple users to share a single GPU.

Storage:

- Support for up to 12 NVMe SSDs
- Support for up to 8 hot-swappable SAS/SATA drives

Networking:

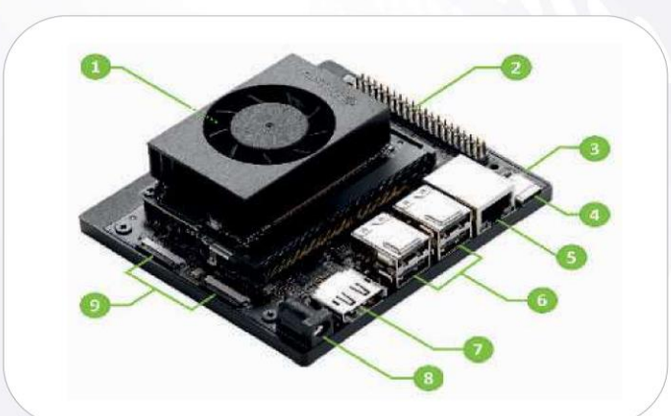
To this end, DGX A100 provides:

- Next generation NVLink-10x faster than 4th generation PCIe.
- NVSwitch - 8 Mellanox ConnectX-6 HDR InfiniBand adapters, each of them running at 200 GB/s.
- Magnum IO software SDK-makes it possible to distribute workloads across

NVIDIA® Jetson Nano Module:

The Jetson Nano is a small, low-cost, single-board computer developed by NVIDIA for AI and robotics applications.

- It is specifically designed for tasks related to artificial intelligence (AI) and robotics,
- The Jetson Nano features a 128-core Maxwell GPU, which provides hardware acceleration for AI and deep learning workloads, significantly improving performance.
- It is designed to be cost-effective, making it accessible to hobbyists, students, and developers interested in AI and robotics.

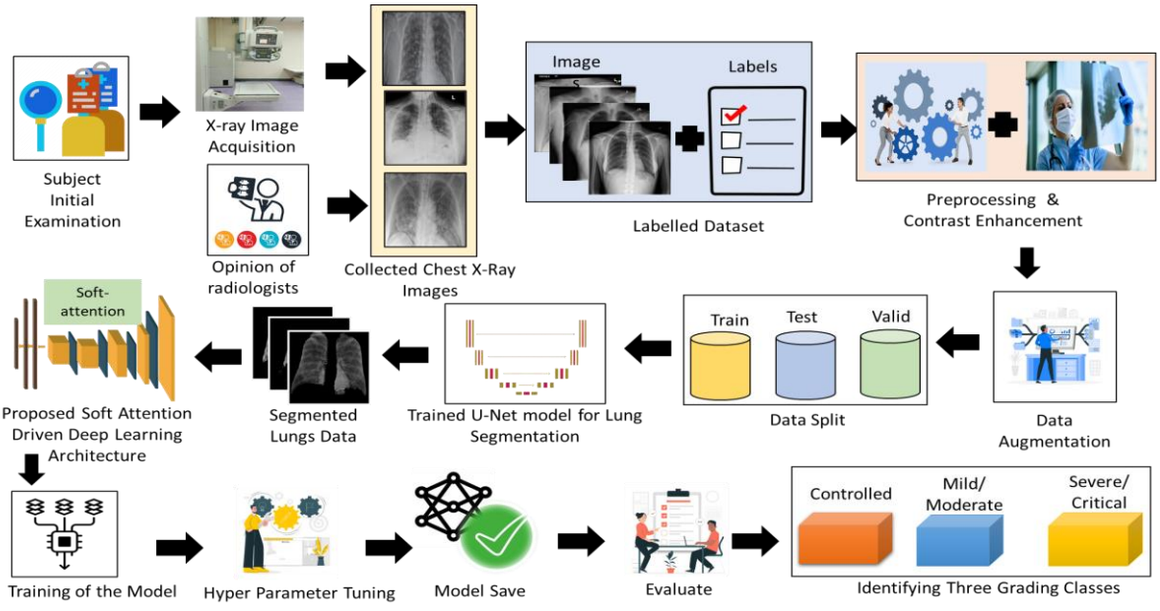


Jetson Nano Module Key Features:

- 1x Gbe, 4x Usb 3.0, 1x 4kp60 Hdmi Outputs, 1x Dp.
- Stacked Outputs.
- 2x2 Lane Mipi Csi-2.
- 1x4 Lane Mipi Csi-2.
- 40-pin Expansion Header.
- 12-pin Button Header.
- 1x Micro-SD Card Slot.
- Operating Temperature: 0oC ~ 65oC

AI Innovations @ ACAI

1. Advanced COVID-19 Severity Assessment: Deep Soft Attention Networks and Chest X-Ray Image Segmentation for Precision Grading



"Precision in Pandemic: AI-Powered COVID-19 Severity Grading with Deep Soft Attention Networks."

Key Highlights:

- AI for COVID-19 Severity: This project uses advanced AI (deep soft attention networks) to accurately assess the severity of COVID-19 infections in chest X-ray images.
- Focus on Key Areas: The AI model intelligently focuses on the most important parts of the X-ray images, such as lung abnormalities, to make more accurate diagnoses.
- Improved Accuracy: This approach achieves a high accuracy of 87.33% in assessing COVID-19 severity.
- Faster & More Reliable: It can help doctors quickly and reliably assess the severity of COVID-19, especially in resource-limited settings.
- Broader Applications: This technology has the potential to improve the diagnosis and management of other diseases using medical images.

Relevant Publication: Anshika Chauhan, Rakesh Chandra Joshi, Suzain Rashid, Garima Aggarwal, Vojtech Myska, Radim Burget, Malay Kishore Dutta, "An Advanced COVID-19 Severity Grading Approach using Deep Soft Attention Networks and Segmentation of Chest X-ray Images" accepted in 16th International Congress on Ultra Modern Telecommunications and Control Systems and Workshops (ICUMT), 2024, Spain.

Mentors : Dr. Rakesh Chandra Joshi, Dr. Garima Aggarwal & Prof. M. K. Dutta.

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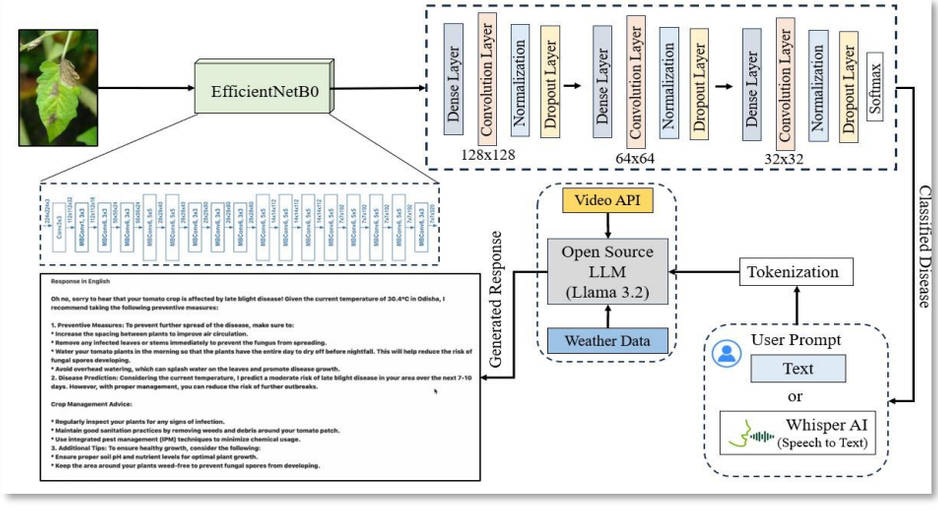
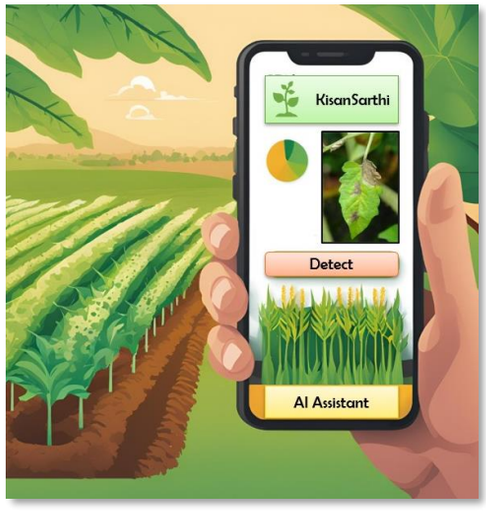
2. Revolutionizing Plant Health: How CNNs and LLMs are Transforming Disease Detection, Diagnosis, and Prevention

Key Highlights:

- AI for Plant Health: This project uses a combination of image recognition (CNN) and language understanding (LLM) to help farmers identify plant diseases.
- Diverse Plant Diseases: The system can recognize 48 different plant diseases, including healthy plants, based on images.
- Easy-to-Use: A user-friendly web application makes it simple for farmers to use the system.
- Accurate Predictions: The AI model is highly accurate, correctly identifying diseases in most cases.
- Helpful Advice: The LLM provides farmers with real-time information and advice on how to treat the identified diseases.

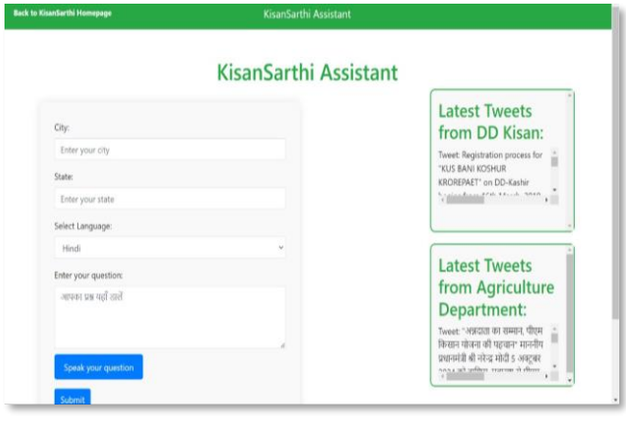
"AI-Powered Precision: New Tool Achieves 99.73% Accuracy in Plant Disease Detection, Revolutionizing Sustainable Farming Practices."





Relevant Publication: Siddharth Sharma, Divyan Tiwari, Avaneesh Garg, Abhishek Kaushal, Anzhelika Mezina, Jakub Frolka, Malay Kishore Dutta, "Enhancing Plant Disease Detection with CNNs and LLMs: A Comprehensive Approach to Diagnosis and Mitigation" accepted in 16th International Congress on Ultra Modern Telecommunications and Control Systems and Workshops (ICUMT), 2024, Spain

Mentors: Dr. Abhishek Kaushal and Prof. M. K. Dutta.



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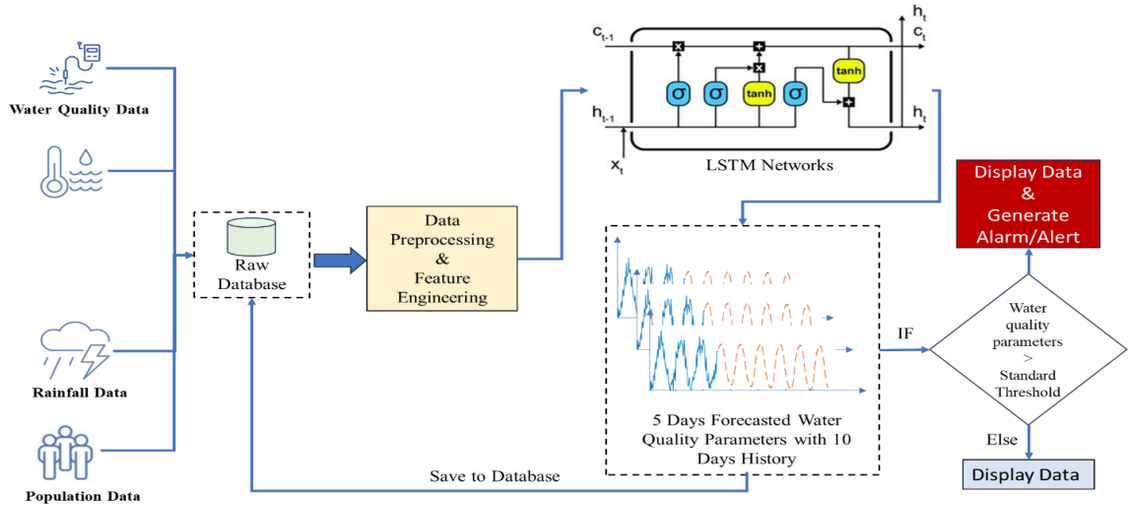
3. Smart Solutions for the Ganga: AI-Powered System Uses IoT Sensors for Real-Time Water Quality Monitoring and Forecasting

Key Highlights:

- AI for Clean Ganga: This research uses advanced AI (LSTM) to predict water quality in the Ganga River.
- Accurate Predictions: The system accurately forecasts key water quality indicators like pH, DO, and BOD with 96.86% accuracy.
- Early Warnings: It provides early warnings of potential water pollution issues, allowing for timely action.
- Adaptable System: The system can adjust to changing conditions like seasons, pollution levels, and industrial discharges.
- Scalable Solution: This approach can be used to improve water quality in other rivers facing pollution problems.



Relevant Publication: Nitya Pillai, Akshara Sharma, Amisha Krishna Gupta, Anoushka Ishi Gupta, Malay Kishore Dutta, Pavel Sikora, Kamil RihaAI, "Driven Decision Support System for Real-Time Ganga River Water Quality Monitoring and Forecasting Using IoT Sensors" accepted in 16th International Congress on Ultra Modern Telecommunications and Control Systems and Workshops (ICUMT), 2024, Spain

Mentor: Prof. M. K. Dutta.

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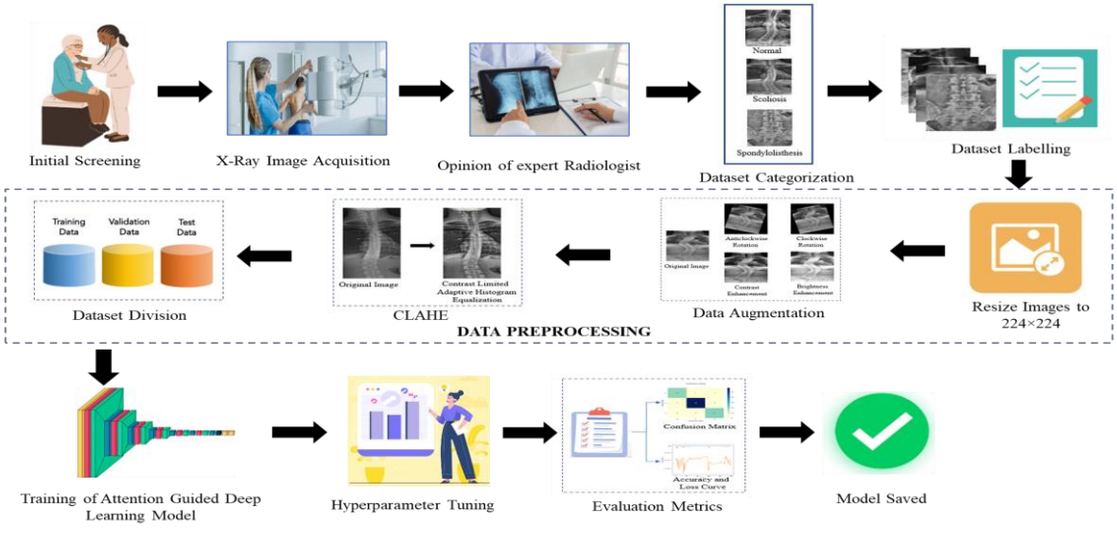
4. SDAG-CNN: An Innovative Attention-Guided Neural Network Advancing Spinal Lesion Diagnosis and Multi-Class Classification of X-Ray Radiographs

Key Highlights:

- AI for Spinal Diagnosis: This project uses a cutting-edge AI model (SDAG-CNN) to analyze X-ray images and accurately diagnose various spinal lesions.
- Improved Accuracy: The AI model achieves a high accuracy of 93.33% in identifying different types of spinal problems.
- Faster & More Reliable: Compared to traditional methods, this AI-powered approach is faster and more consistent, reducing reliance on individual doctor's expertise.
- Efficient & Portable: The model is designed to be compact and efficient, making it suitable for use in resource-limited settings.
- Broader Applications: This technology has the potential to improve diagnosis for various medical imaging tasks beyond spinal problems.

"Revolutionizing spinal lesion diagnosis with 93.33% accuracy—fast, reliable, and accessible for all."



Relevant Publication: Suzain Rashid, Rakesh Chandra Joshi, Anshika Chauhan, Garima Aggarwal, Petr Kriz, Radim Burget and Malay Kishore Dutta, "SDAG-CNN: Attention-Guided Convolutional Neural Network for Spinal Lesion Diagnosis and Multi-Class Classification of X-ray Radiographs" accepted in 16th International Congress on Ultra Modern Telecommunications and Control Systems and Workshops (ICUMT), 2024, Spain.

Mentors : Dr. Rakesh Chandra Joshi, Dr. Garima Aggarwal & Prof. M. K. Dutta.

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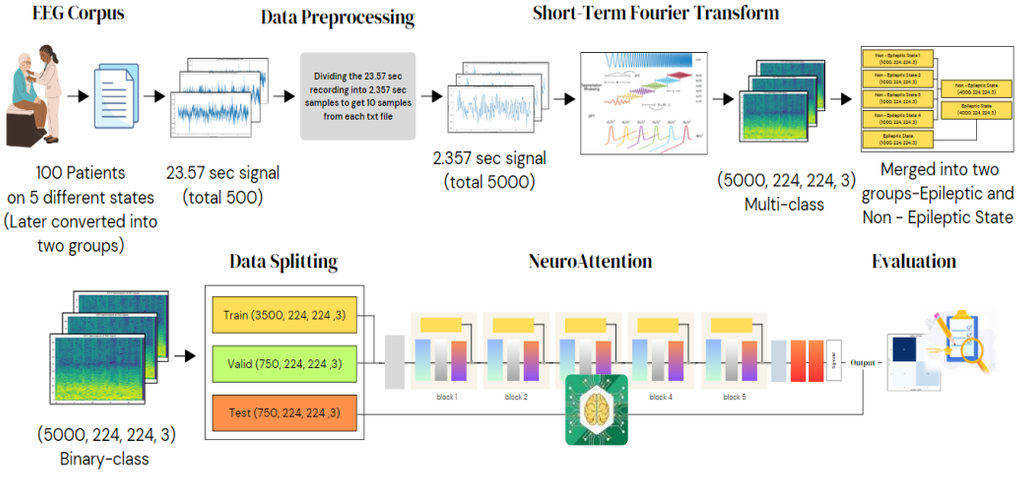
5. NeuroAttention-Net: Cutting-Edge AI with Channel Attention for Accurate Epileptic Seizure Detection from EEG Spectrograms

Key Highlights:

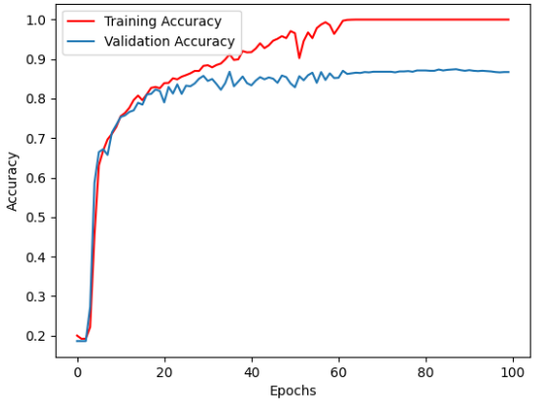
- AI for Seizure Detection: This project uses a cutting-edge AI model (NeuroAttention-Net) to accurately detect epileptic seizures from brainwave recordings (EEG).
- Focus on Key Signals: The AI model intelligently focuses on the most important patterns in the brainwave data to improve seizure detection accuracy.
- High Accuracy: This approach achieves a remarkable accuracy of 99.3% in identifying seizure activity.
- Reduced False Alarms: The model minimizes false alarms, providing more reliable and trustworthy results.
- Improved Patient Care: This technology has the potential to significantly improve the diagnosis and management of epilepsy, leading to better patient outcomes.

"NeuroAttention-Net: 99.3% Accuracy in Epileptic Seizure Detection—Advancing Reliable, AI-Powered Diagnostics for Better Patient Care."



Relevant Publication: Abdullah Habib, Rakesh Chandra Joshi, Atishay Jain, Jitendra Singh Jadon, Vojtěch Myška, and Jan Dorazil, "NeuroAttention-Net: Deep Learning with Channel Attention for Robust Epileptic Seizure Detection from EEG Spectrograms" accepted in 16th International Congress on Ultra Modern Telecommunications and Control Systems and Workshops (ICUMT), 2024, Spain.

Mentors: Dr. Rakesh Chandra Joshi, Dr. Jitendra Singh Jadon.



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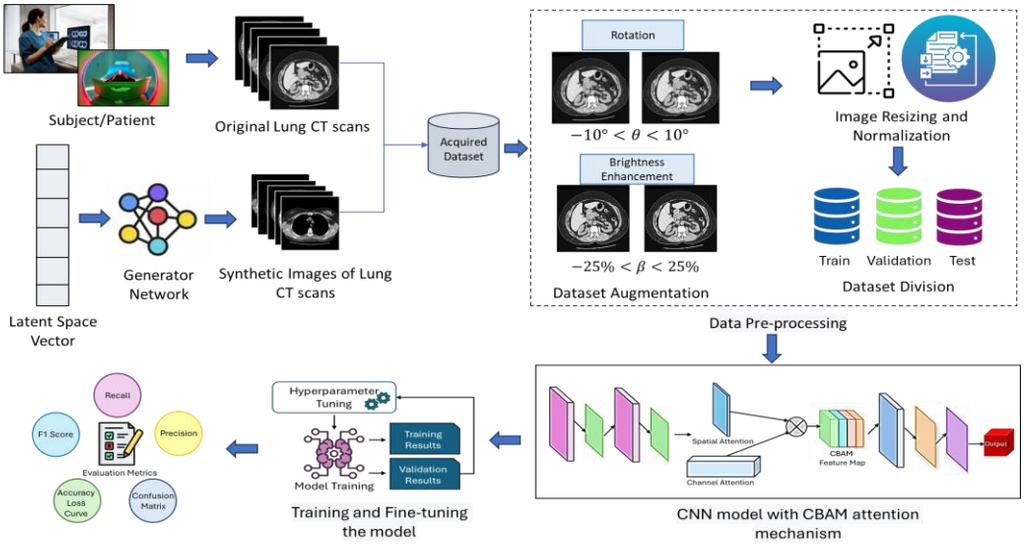
6. Revolutionizing Biomedical Imaging: AI-Driven Automatic Detection of Synthetic Images with Convolutional Block Attention Module

Key Highlights:

- AI Detects Fake Medical Images: This project uses a powerful AI model (CNN with CBAM) to identify fake medical images, such as manipulated CT scans.
- Focused Approach: The AI model intelligently focuses on the most important details in the images to accurately spot the fakes.
- High Accuracy: The model achieves a very high accuracy of 97.12% in detecting fake medical images.
- Improved Patient Safety: This technology helps ensure the accuracy of medical diagnoses and improves patient safety by preventing misdiagnoses based on manipulated images.
- Reliable Solution: This approach provides a fast and reliable solution for detecting fake medical images, contributing to trust in digital healthcare systems.

"AI-Powered Deepfake Detection: Achieving 97.12% Accuracy in Synthetic Medical Image Identification for Safer Healthcare."

"Transforming healthcare with deepfake detection: our CNN-CBAM model ensures trustworthy lung CT scan diagnoses."



Relevant Publication: Suzain Rashid, Rakesh Chandra Joshi, Kumari Samridhi, Vinay Kumar Pathak, Sandesh Gupta, Malay Kishore Dutta, "Automatic Detection of Synthetic Biomedical Images using Convolutional Block Attention Module-Based Deep Neural Network" Accepted in 8th edition of the Annual IEEE International Conference on Information Communication Technology (CICT), 2024 IIIT Allahabad.

Mentors: Dr. Rakesh Chandra Joshi, Dr. Garima Aggarwal & Prof. M. K. Dutta.

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USRF-2024, Fellow,
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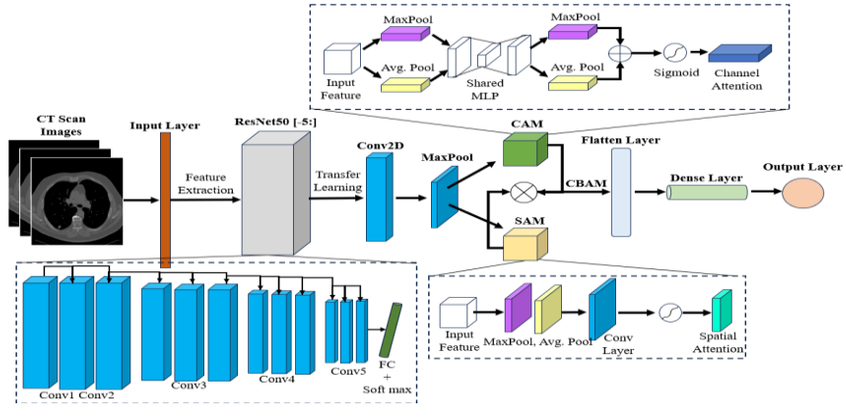
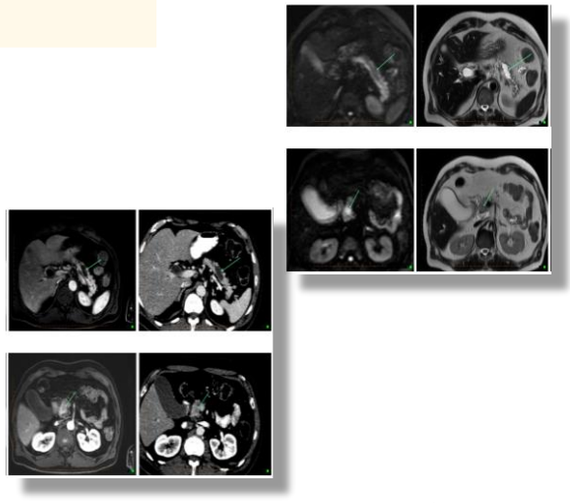
7. DeepMedFuseX: Unveiling the Future of Cancer Detection with Explainable DeepFake CT Scan Classification—Leveraging Multi-Scale Attention and Transfer Learning for Unmatched Precision

Key highlights:

- AI Detects Fake CT Scans: This project uses a sophisticated AI model (DeepMedFuseX) to identify fake CT scans (deepfakes) created using artificial intelligence.
- Focus on Details: The AI model uses a special attention mechanism (CBAM) to focus on the most important details in the CT scans, improving its ability to detect fakes.
- High Accuracy & Reliability: The model achieves high accuracy and reliability in identifying fake CT scans, helping to ensure the accuracy of medical diagnoses.
- Understanding the AI: The model also explains its reasoning, highlighting the specific areas of the CT scan that led to its decision, which is crucial for trust in AI-powered medical diagnoses.
- Improved Patient Safety: This technology helps to prevent misdiagnoses based on manipulated images, improving patient safety in the context of digital healthcare.

"DeepMedFuseX: Cutting-edge AI for reliable cancer CT scan classification, combining deepfake detection with powerful interpretability to safeguard medical diagnostics."





Relevant Publication: Sidharth Gupta, Tuhina Nandi, Abhishek Kaushal, Malay Kishore Dutta, Anzhelika Mezina, Radim Burget, "DeepMedFuseX: Explainable DeepFake Cancer CT Scan Classification with Multi-Scale Attention and Transfer Learning" accepted in 16th International Congress on Ultra Modern Telecommunications and Control Systems and Workshops (ICUMT), 2024, Spain.

Mentors: Dr. Abhishek Kaushal and Prof. M. K. Dutta.

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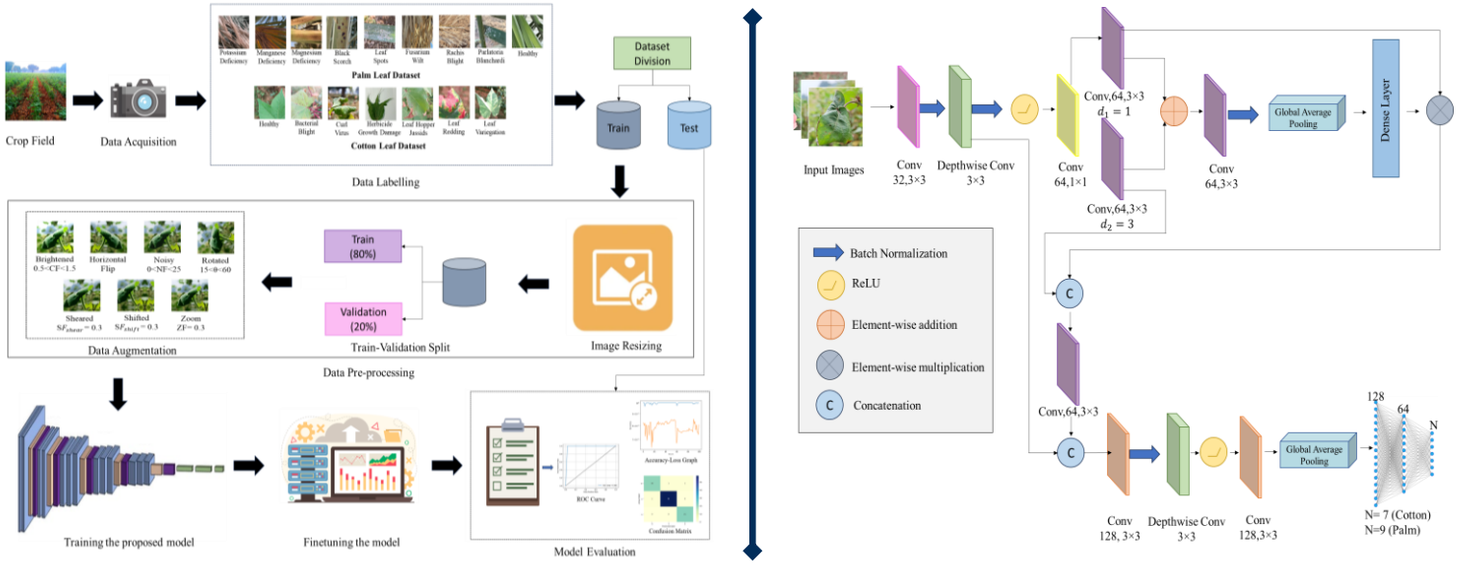
8. Smart Farming with AI: Attention-Augmented Multiscale Deep Neural Networks for Early Detection of Crop Diseases and Nutrient Deficiencies

Key Highlights:

- AI for Healthy Crops: This project uses a sophisticated AI model (attention-augmented multiscale CNNs) to accurately detect diseases and nutrient deficiencies in cotton and date palm plants.
- Seeing the Big and Small Picture: The AI model can analyze both fine and coarse details of plant health, allowing for more accurate diagnoses.
- High Accuracy: The model achieves high accuracy in detecting plant problems, with 96.42% accuracy for cotton and 94.93% for date palms.
- Better Yields: This technology can help farmers identify and address plant problems early, leading to healthier crops and improved yields.



"Revolutionizing Crop Health: 96% Accurate AI for Early Detection of Diseases and Nutrient Deficiencies in Cotton and Palms."

Relevant Publication: Suzain Rashid, Rakesh Chandra Joshi, Vinay Kumar Pathak, Pankaj Sharma, Malay Kishore Dutta, "Attention-Augmented Multiscale Dilated Deep Neural Networks for Early Detection of Diseases and Nutrient Deficiencies in Crops" Accepted in 8th edition of the Annual IEEE International Conference on Information Communication Technology (CICT), 2024 IIIT Allahabad.

Mentors: Dr. Rakesh Chandra Joshi, Dr. Garima Aggarwal & Prof. M. K. Dutta.

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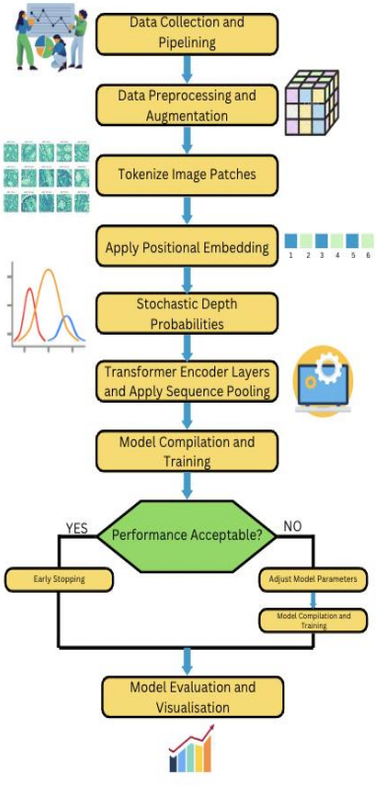
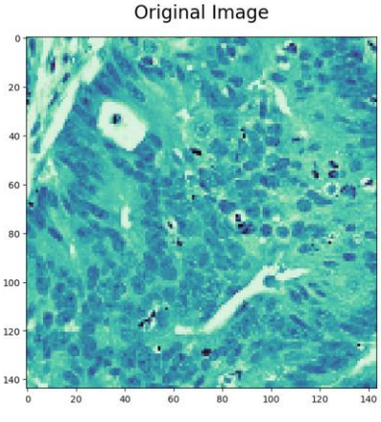
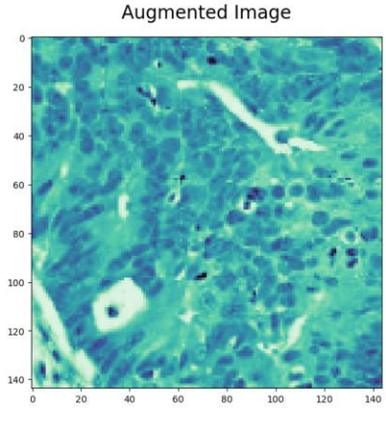
9. ColNet: A Cutting-Edge Convolutional Transformer Revolutionizing Colon Cancer Prediction from Endoscopy Images.

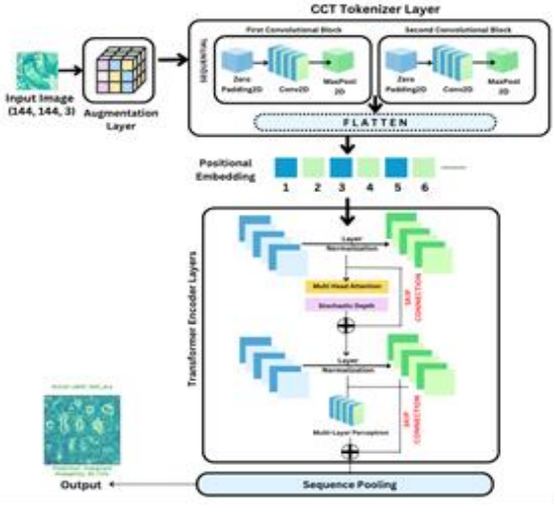


Key Highlights:

- AI for Colon Cancer: This research uses a cutting-edge AI model (Compact Convolutional Transformers) to accurately detect colon cancer in images from colonoscopies.
- High Accuracy: The AI model achieves exceptional accuracy in identifying cancerous polyps, significantly improving the chances of early detection.
- Efficient Design: The model is designed to be efficient, requiring fewer resources, which can make it more practical for real-world use.
- Robust Development: The model was developed using a rigorous process, including data augmentation and advanced techniques to ensure its accuracy and reliability.
- Improved Patient Outcomes: This technology has the potential to significantly improve the early detection and treatment of colon cancer, leading to better patient outcomes.







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Relevant Publication: Pragya Pandey, Garima Aggarwal, Malay Kishore Dutta, Vojtech Myska, Anzhelika Mezina "ColNet : A Compact Convolutional Transformer Framework for Automated Colon Cancer Prediction from Endoscopy Images" (Submitted)

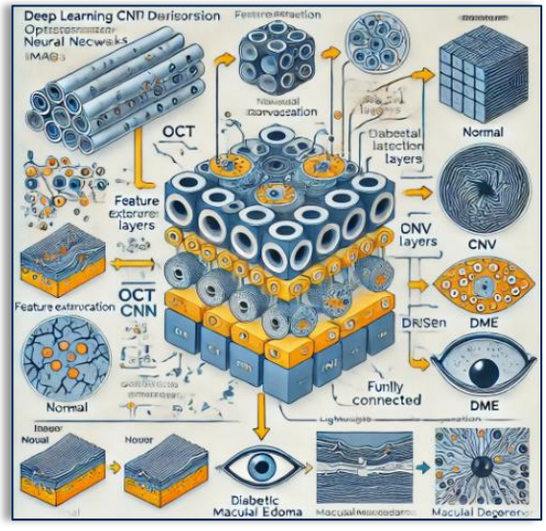
Mentors: Dr. Garima Aggarwal & Prof. M. K. Dutta.

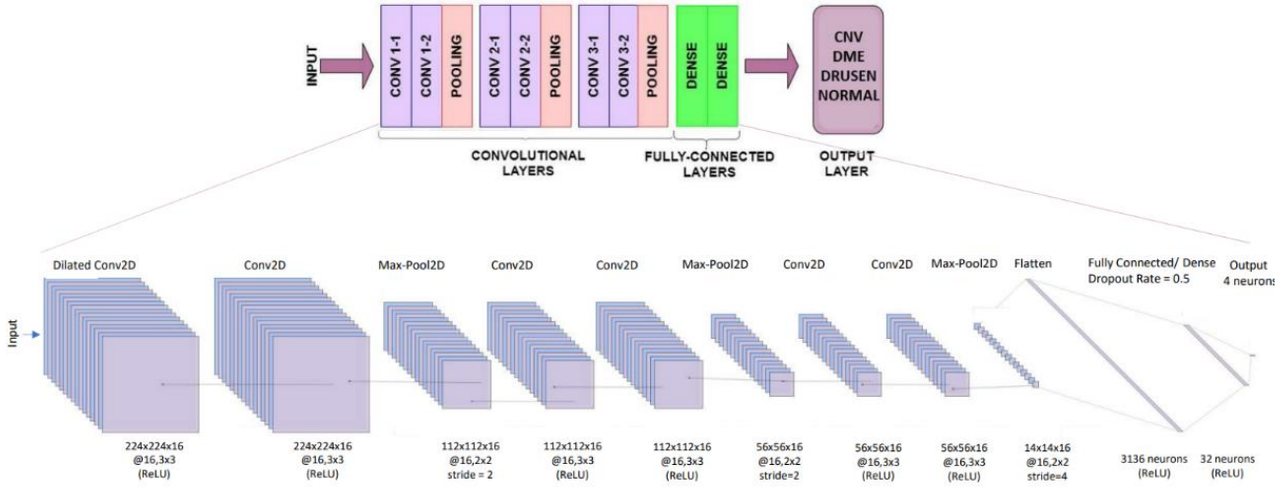
"Revolutionizing Colon Cancer Detection with Compact Convolutional Transformers: Achieving 97.5% Accuracy in Early Diagnosis."

10. RetiNet: A Cutting-Edge Lightweight CNN Architecture for Early Detection of Retinal Disorders Using Optical Coherence Tomography Images

Key Highlights:

- AI for Eye Disease Detection: This research uses a specialized AI model (RetiNet) to accurately detect and classify various retinal diseases from Optical Coherence Tomography (OCT) images.
- High Accuracy: The RetiNet model achieves a remarkable accuracy of 97.52% in classifying retinal disorders, including CNV, DME, and DRUSEN.
- Improved Efficiency: RetiNet automates the analysis of OCT images, significantly speeding up the diagnostic process compared to manual methods.
- Improved Patient Care: This technology has the potential to significantly improve the early detection and treatment of retinal diseases, leading to better patient outcomes and preserving vision.





Relevant Publication: Drishti Arora, Garima Aggarwal, Vojtech Myska, Stepan Jezek, and Prof. Malay Kishore Dutta. "SDAG-CNN: Attention-Guided Convolutional Neural Network for Spinal Lesion Diagnosis and Multi-Class Classification of X-ray Radiographs" (Submitted).

Mentors: Dr. Garima Aggarwal & Prof. M. K. Dutta.

Student Authors :

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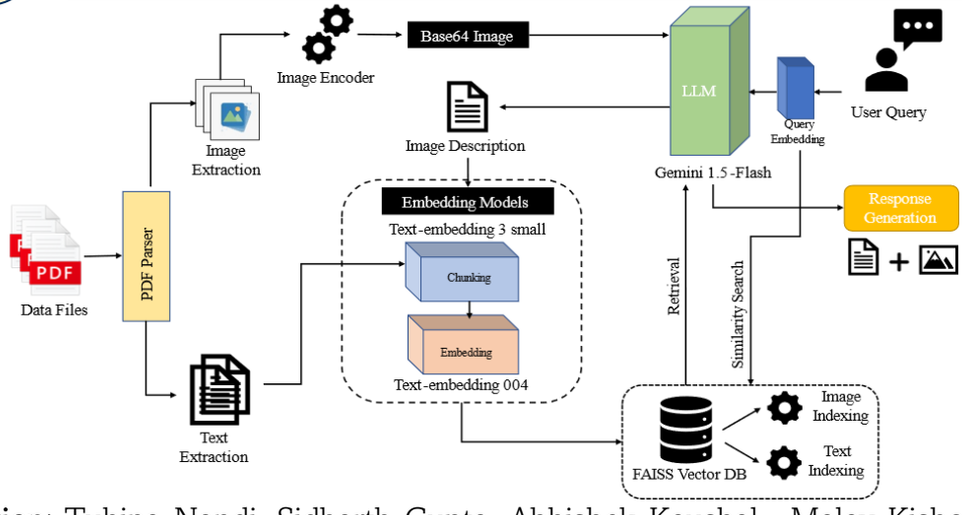
"Transforming Ocular Health with AI: RetiNet Achieves 97.52% Accuracy in Retinal Disease Classification."

11. Semantic Fusion Unleashed: A Breakthrough Multimodal-RAG Framework for Advanced Document Analysis.

"Multimodal RAG: Transforming document analysis with seamless text-image fusion for fast, accurate insights. Discover next-gen retrieval with FAISS and Gemini power."

Key Highlights:

- AI that "Sees" and "Reads": This project combines a powerful AI model (Gemini 1.5 Flash) with a super-fast search engine (FAISS) to analyze both text and images within PDF documents.
- Smart Searching: The system can quickly find the most relevant pieces of text and images based on user queries.
- Comprehensive Answers: The AI then uses the found information to generate comprehensive and informative answers, combining insights from both text and images.
- Efficient Processing: The system is designed to work efficiently even with large amounts of data.
- Versatile Tool: This powerful approach has many applications, especially in fields that require analyzing information from various sources like text and images.



Relevant Publication: Tuhina Nandi, Sidharth Gupta, Abhishek Kaushal, Malay Kishore Dutta, Radim Burget, Stepan Jezek, " Semantic Fusion of Text and Images: A Novel Multimodal-RAG Framework for Document Analysis" accepted in 16th International Congress on Ultra Modern Telecommunications and Control Systems and Workshops (ICUMT), 2024, Spain.

Mentors: Dr. Abhishek Kaushal & Prof. M. K. Dutta.

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Tuhina Nandi
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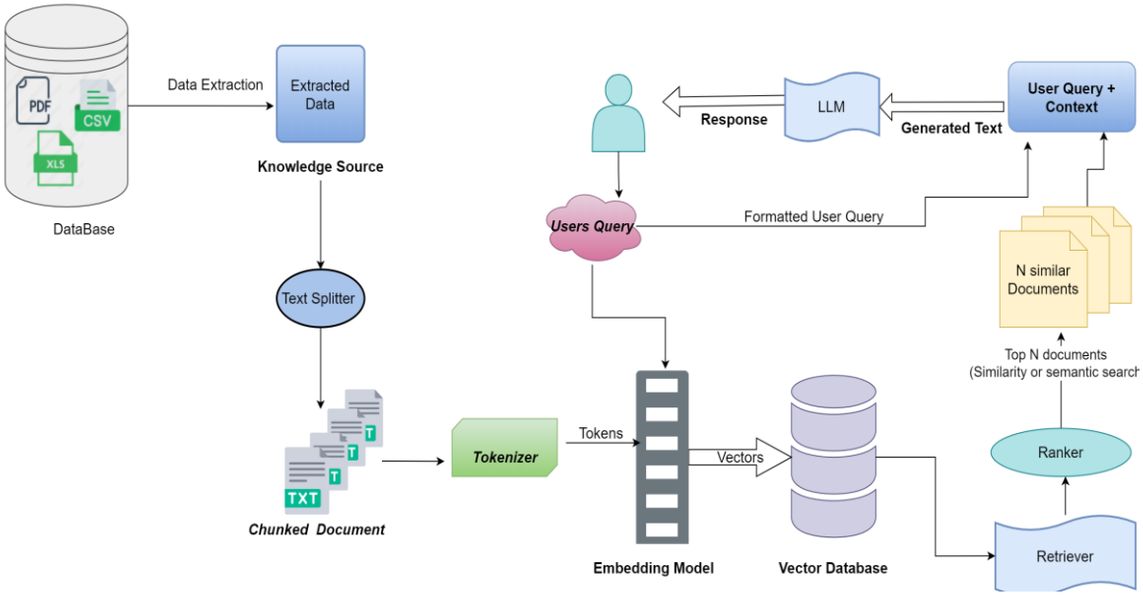
A key innovation of this research is its dual-modality framework. By integrating large language models (LLMs) for text summarization with advanced vision models for image understanding, this system operates within a unified architecture that enhances both retrieval and generation capabilities.

12. Revolutionizing Public Health Response with AI-Powered, Retrieval-Augmented Generation Frameworks and Large Language Models



"Empowering Health Decisions with Real-Time AI Insights: Transforming Disease Surveillance and Response."

Key Highlights:

- AI for Healthcare Emergencies: This project develops a powerful AI system to quickly access and analyze vast amounts of medical information, crucial during emergencies like pandemics.
- Improved Information Access: The system uses advanced techniques (RAG and vector databases) to quickly find the most relevant information from various sources, including research papers, guidelines, and public health data.
- Accurate and Reliable Information: The system aims to provide healthcare professionals with accurate and reliable information, minimizing the risk of misinformation and improving decision-making.
- Enhanced Disease Surveillance: This technology can significantly improve disease surveillance and monitoring by providing real-time insights into disease trends and outbreaks.
- Transforming Public Health: By empowering healthcare professionals with reliable information, this system has the potential to transform how we respond to public health emergencies.

Relevant Publication: Shivam Bhardwaj, Rakesh Chandra Joshi, Abhishek Kaushal, Kamil Riha, Pavel Sikora, Malay Kishore Dutta. "AI-Powered Retrieval-Augmented Generation Framework with Large Language Models for Enhanced Public Health Response" (Submitted).

Mentors: Dr. Rakesh Chandra Joshi, Dr. Abhishek Kaushal & Prof. M. K. Dutta.

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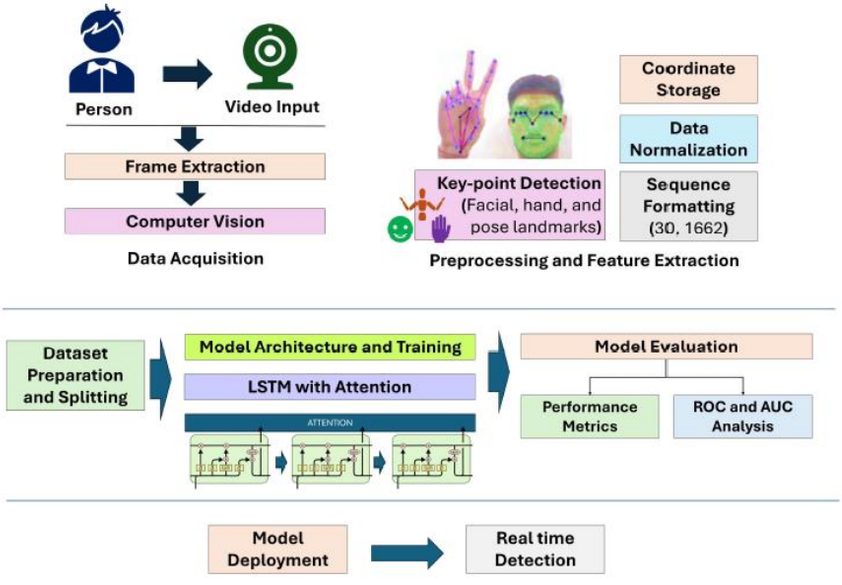
13. AI-Powered Sign Language Recognition Using Attention-Enhanced LSTM Networks

Fig. 1. Gestures for each of the 14 sign language gestures included in the dataset, (a) Hello, (b) Thanks, (c) Food, (d) Thirsty, (e) No / Dislike, (f) Good / Nice, (g) Danger, (h) Call, (i) Washroom, (j) Wait, (k) Help, (l) God Bless You, (m) Won, (n) Bye



"Empowering Communication: An Affordable AI Approach to Sign Language Recognition Achieving 92% Accuracy."

Key Highlights:

- AI for Sign Language: This research develops an AI model that can recognize sign language gestures from videos captured by everyday devices like smartphones.
- Affordable and Accessible: The system is designed to be affordable and accessible, requiring no expensive sensors or specialized hardware.
- High Accuracy: The model achieves a high accuracy of 92.1% in recognizing 14 common sign language gestures.
- Improved Communication: This technology has the potential to significantly improve communication between the deaf-mute community and the broader population.
- Increased Inclusivity: By making sign language recognition more accessible, this technology can help to increase inclusivity and improve the quality of life for deaf-mute individuals.

Relevant Publication: Tushar Vij, Rakesh Chandra Joshi, Vansh Tiwari, Paurush Bhulania, and Malay Kishore Dutta. "An Artificial Intelligence-based Sign Language Recognition using Attention-Enhanced Long Short- Term Memory Networks" (Submitted).

Mentors: Dr. Rakesh Chandra Joshi, & Prof. M. K. Dutta.

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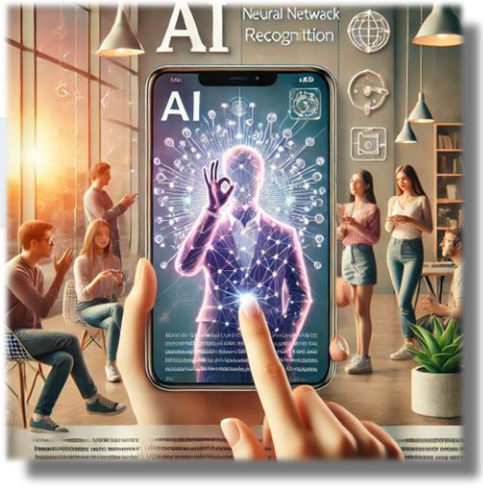
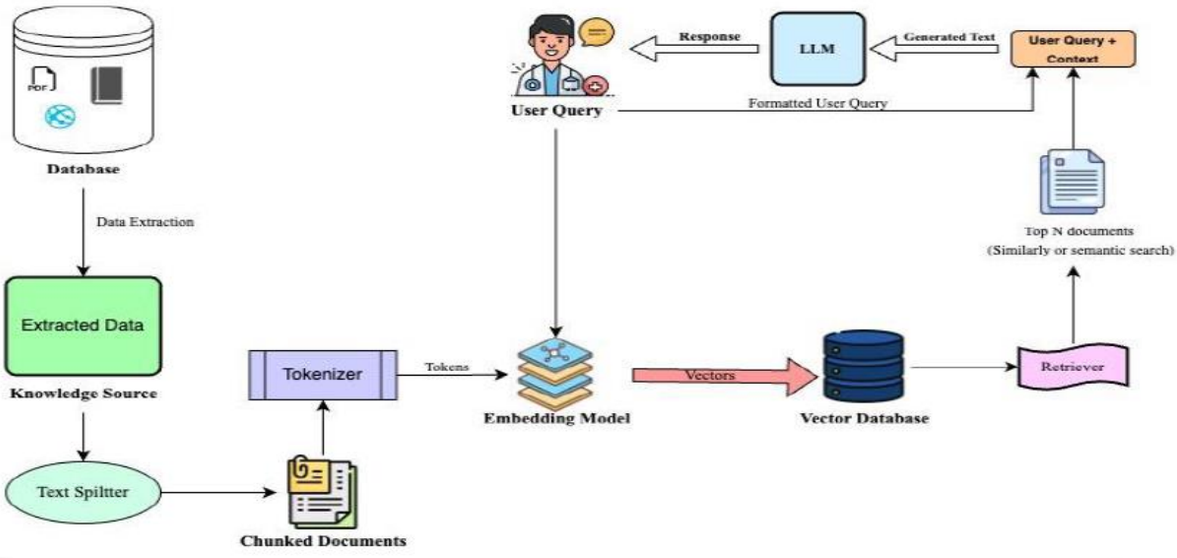


14. AyuRAG: Lightweight Ayurvedic LLM using Retrieval Augmented Generation



"Ayurveda Meets Innovation: AI for Accessible, Actionable Insights. Empowering Modern Healthcare with Timeless Knowledge."

Key Highlights:

- AI for Ayurveda: This project uses a powerful AI system (LLMs with RAG) to make it easier to access and use the vast knowledge of Ayurveda.
- Improved Access to Knowledge: The system helps doctors and researchers easily find and use relevant information from ancient Ayurvedic texts.
- Accurate and Personalized Information: The system provides accurate and personalized information, tailored to specific patient needs and conditions.
- Bridging Tradition and Modern Medicine: This technology can help bridge the gap between traditional Ayurveda and modern medicine, leading to better healthcare outcomes.
- Future of Ayurvedic Care: This system has the potential to revolutionize Ayurvedic care by providing a more accessible and efficient way to use this ancient system of medicine.

Relevant Publication: Anhad Swaroop, Umar Salman, Mihika Yadav, Abhishek Singhal, Rakesh Chandra Joshi, Malay Kishore Dutta "AyuRAG: Ayurvedic Knowledge Integration with Retrieval-Augmented Lightweight Large Language Models" Accepted and Presented at the 8th IEEE Conference on Information Communication Technology (CICT), held at Indian Institute of Information Technology Allahabad, Prayagraj, India, during December 6-8, 2024.

Mentors: Dr. Rakesh Chandra Joshi, & Prof. M. K. Dutta.

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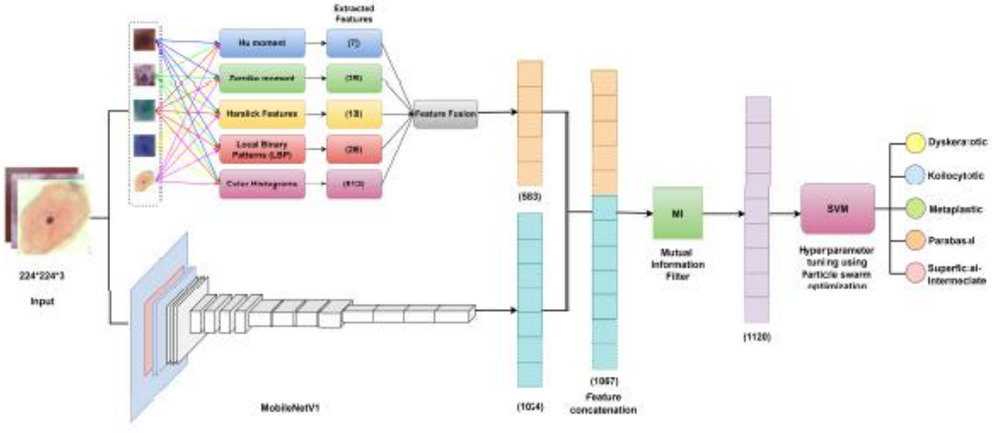
15. "Revolutionizing Cervical Cancer Detection: AI-Driven SVM Enhanced by Particle Swarm Optimization"

Key Highlights:

- AI for Cervical Cancer Detection: This research develops an AI model to help doctors accurately diagnose cervical cancer from Pap smear images.
- Combined Approach: The model combines different types of features (deep features, shape, texture, color) for a more comprehensive analysis.
- Improved Accuracy: The model achieves a high accuracy of 97.9% in classifying cervical cells, improving the accuracy of diagnosis.
- Efficient Feature Selection: The model uses a technique called mutual information to select the most important features, improving the efficiency and accuracy of the model.
- Enhanced Diagnosis: This technology has the potential to significantly improve the early detection and treatment of cervical cancer, leading to better patient outcomes.



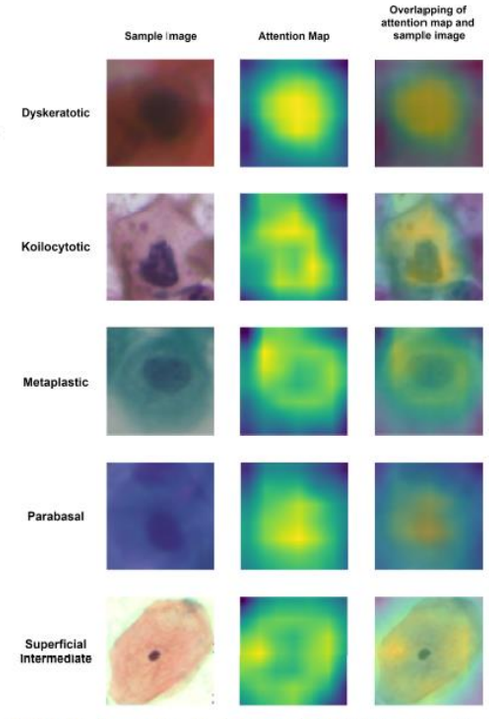


FIGURE 5. A visual representation of heat maps generated from the last convolutional layer of MobileNetV1, highlighting regions of interest and their overlap on the original images.

Relevant Publication: Ritesh Maurya, Lucky Rajput, And Satyajit Mahapatra "Deep and Domain Specific Feature-Based Cervical Cancer Classification Using Support Vector Machine Optimized With Particle Swarm Optimization" Published in: IEEE Access (Volume: 12), December, 2024,

DOI: 10.1109/ACCESS.2024.3519806

Mentor: Dr. Ritesh Maurya

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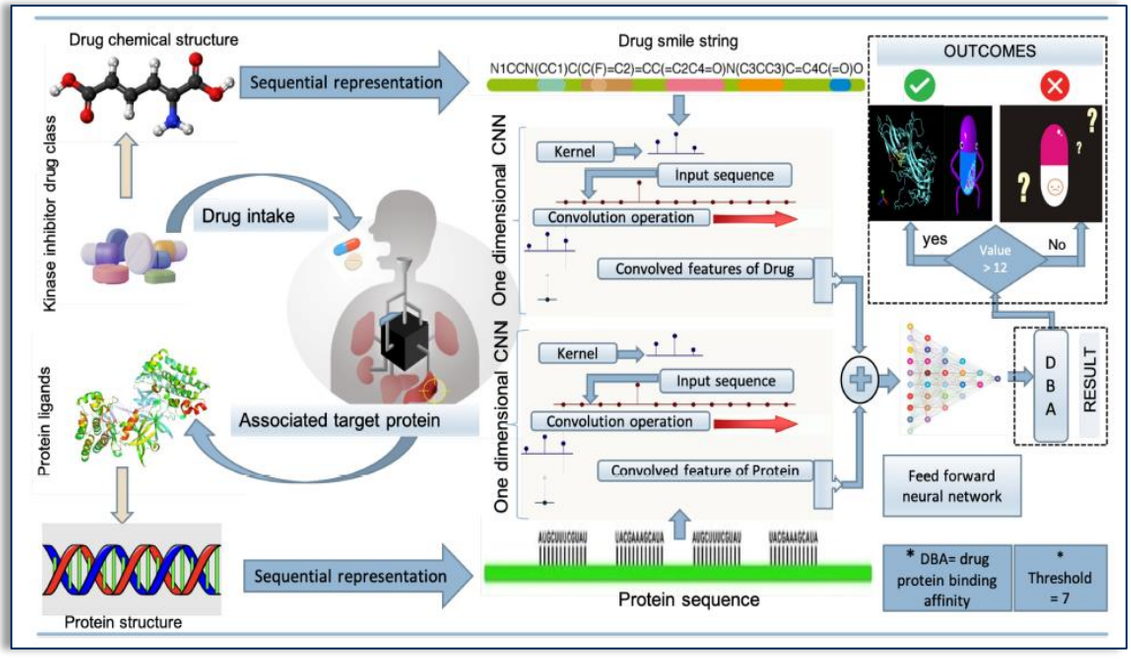
"AI-powered cervical cancer detection achieves 97.9% accuracy by blending deep learning with domain-specific features. This cutting-edge method revolutionizes early diagnosis and classification."

16. "SeqDPI: Harnessing 1D-CNN to Unlock Kinase Inhibitor Binding Potential"



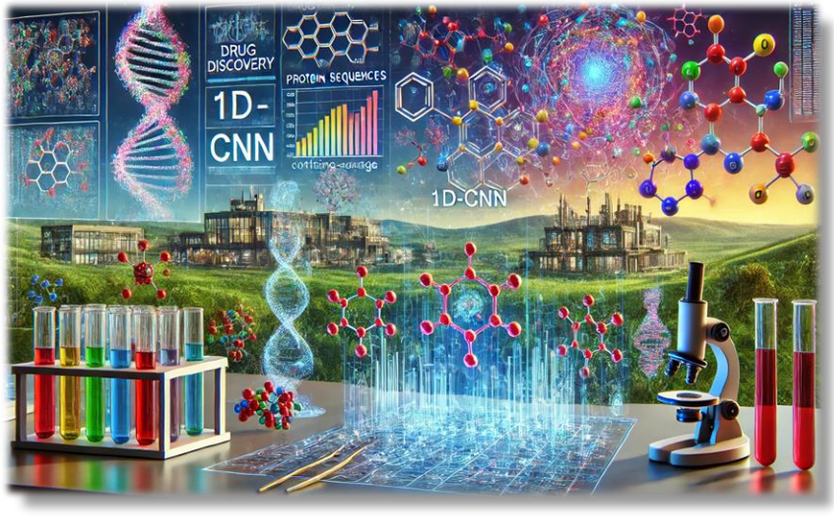
"AI meets drug discovery: SeqDPI leverages cutting-edge 1D-CNN technology to revolutionize binding affinity predictions.."

Key Highlights:

- AI for Drug Discovery: This research develops an AI model (SeqDPI) to predict how well drugs bind to their target proteins, a crucial step in drug discovery.
- Efficient and Accurate: SeqDPI uses a novel approach that analyzes simplified 1D representations of drug and protein data, making it faster and more cost-effective than existing methods.
- Improved Predictions: SeqDPI outperforms existing models in predicting binding affinities, achieving higher accuracy and lower errors.
- Crucial for Drug Development: Accurate prediction of drug-target binding is essential for developing new drugs and repurposing existing ones, which can significantly impact healthcare.
- Cost-Effective Solution: SeqDPI offers a robust and cost-effective solution for drug discovery, accelerating the process and potentially reducing the cost of drug development.

Relevant Publication: Vinay Priy Mishra, Yogendra Narain Singh, Feroz Khan, Malay Kishore Dutta "SeqDPI: A 1D-CNN approach for predicting binding affinity of kinase inhibitors" Journal of Computational Chemistry, Wiley Publishers, December, 2024, DOI: https://doi.org/10.1002/jcc.27518.

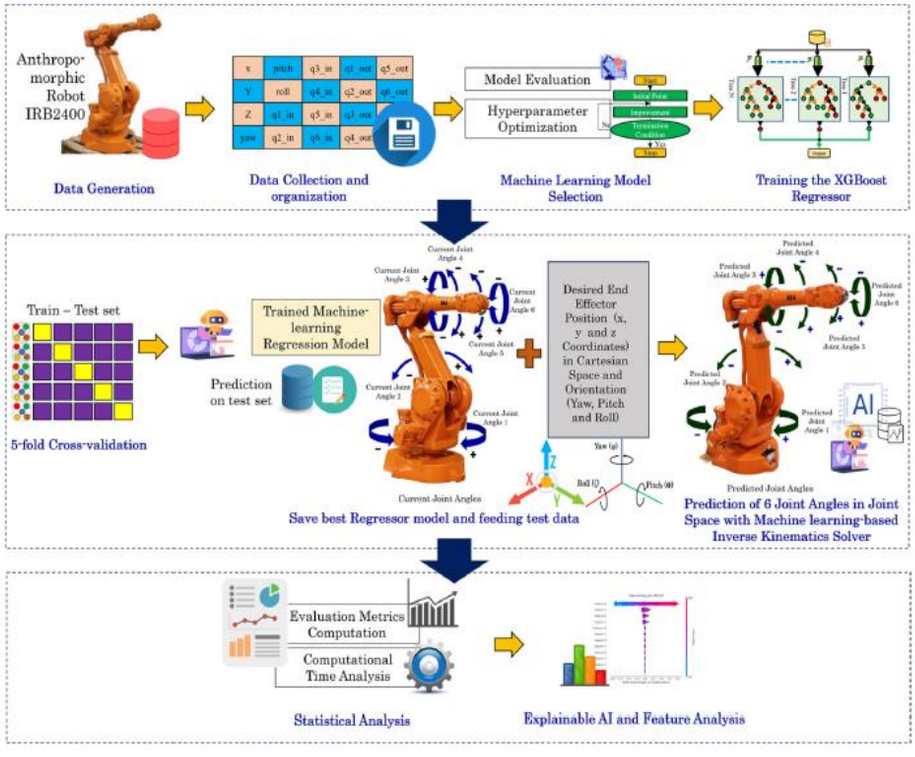
Investigator: Prof. M. K. Dutta.



17. Optimized Inverse Kinematics and Joint Angle Prediction for Six-Degree-of-Freedom Anthropomorphic Robots Using Explainable AI

Key Highlights:

- AI for Robot Control: This research uses AI to solve a complex problem in robotics: calculating the precise movements needed for robotic arms with six joints.
- Improved Accuracy and Speed: The AI model achieves high accuracy in predicting robot movements while also being very fast, making it suitable for real-world applications.
- Understanding the AI: The researchers used a technique called SHAP to understand how the AI model makes its decisions, which is crucial for trust and reliability.
- Efficient and Practical: The model is designed to be efficient and practical, making it a valuable tool for developing more advanced and capable robots.
- Advancing Robotics: This research advances the field of robotics by providing a more efficient and accurate solution for controlling complex robot arms.

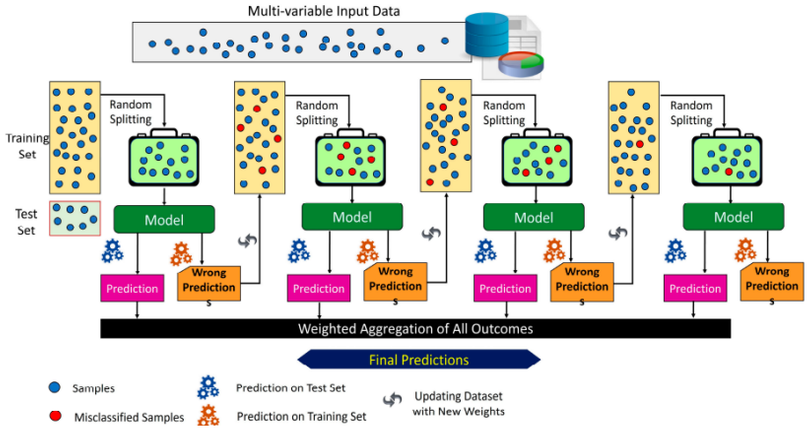


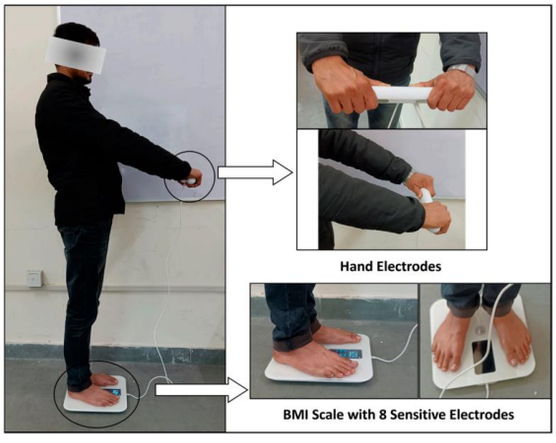
Revolutionizing Robotics: AI-Driven Precision for Six-DoF Anthropomorphic Arms and Explainable AI unlocks efficiency and interpretability in robotic kinematics.

Relevant Publication: Rakesh Chandra Joshi, Jaynendra Kumar Rai, Radim Burget, Malay Kishore Dutta, "Optimized inverse kinematics modeling and joint angle prediction for six-degree-of-freedom anthropomorphic robots with Explainable AI" ISA Transactions, Elsevier Publishers, December, 2024, DOI: https://doi.org/10.1016/j.isatra.2024.12.008

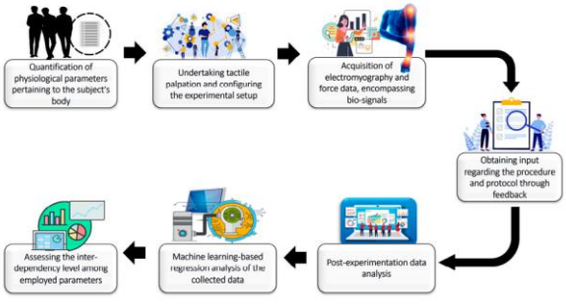
Investigators: Dr. Rakesh Chandra Joshi & Prof. M. K. Dutta.

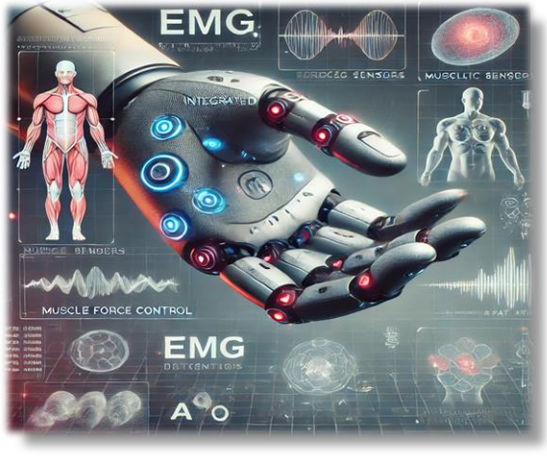
18. AI-Enhanced Analysis to Investigate the Feasibility of EMG Signals for Prosthetic Hand Force Control Incorporating Anthropometric Measures





The calculation of the weight and other body parameters with the help of the BIA approach.





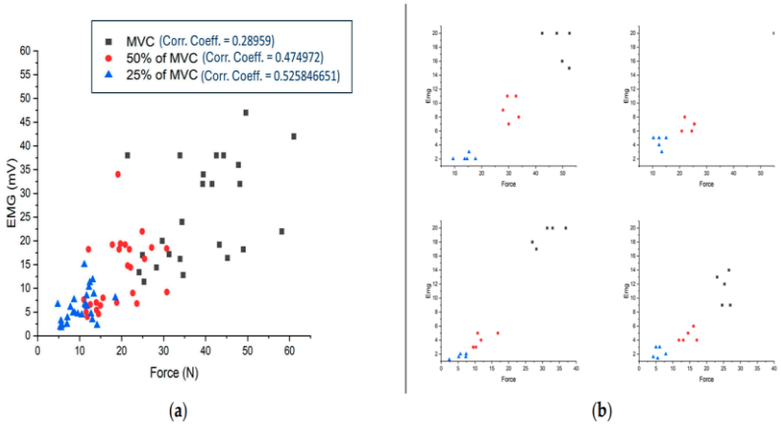
Key Highlights:

- EMG-Based Force Control – The study investigates the feasibility of using electromyography (EMG) signals for precise force control in prosthetic hands, beyond traditional gesture detection.
- Impact of Physiological Factors – The research highlights the influence of body composition, including muscle mass, fat percentage, and subcutaneous fat, on EMG signal quality and force output.
- Machine Learning Application – An extreme gradient boosting (XGBoost) algorithm was employed to model the relationship between EMG amplitude and grip force, achieving high correlation values (R^2 up to 0.93).
- Enhanced Prosthetic Functionality – The study supports the integration of anthropometric measures in EMG-based prediction algorithms to improve the precision of prosthetic control.
- Standardized Data Collection – The research employs the maximum voluntary contraction (MVC) method for EMG normalization, ensuring consistency in force control across individuals.

Relevant Publication: Joshi, D.C.; Kumar, P.; Joshi, R.C.; Mitra, S. AI-Enhanced Analysis to Investigate the Feasibility of EMG Signals for Prosthetic Hand Force Control Incorporating Anthropometric Measures. Prosthesis 2024, 6, 1459–1478. DOI: 10.3390/prosthesis6060106.

Investigator: Dr. Rakesh Chandra Joshi.

Enhancing Prosthetic Hand Control with Advanced EMG Signals.

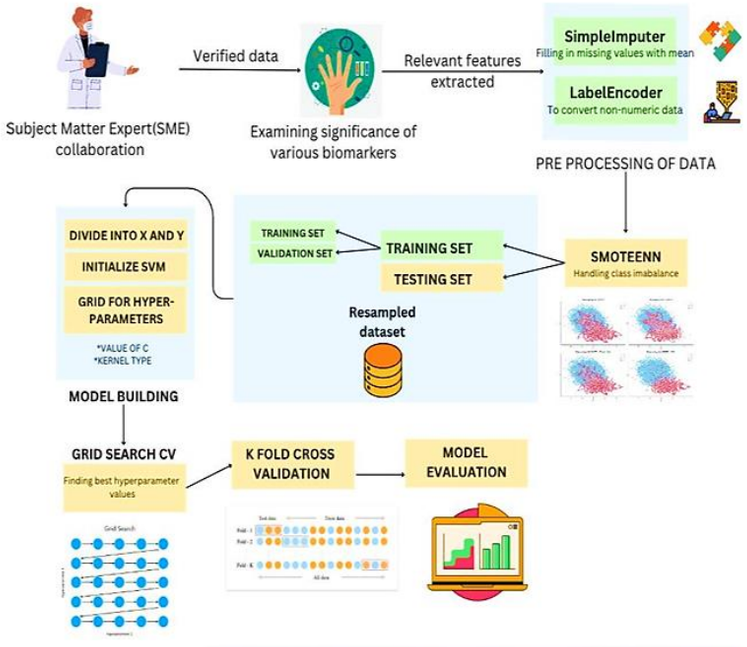


EMG values vs. the force: the force vs. EMG data with all the subjects combined;

19. Machine Learning Pipeline for Multi-Grade Classification in Pancreatic Cancer Detection Using Urinary Biomarkers

Key Highlights:

- The model introduces a machine learning pipeline, designed to utilize demographic data and crucial urinary biomarkers for a holistic approach to pancreatic cancer detection.
- The work underscores the pivotal role played by urinary biomarkers in advancing the early identification of pancreatic cancer, aligning with the primary focus on these biomarkers.
- Early Detection: Utilizes urinary biomarkers to detect PDAC at an early stage.
- Two-Stage Machine Learning: Differentiates PDAC from benign cases and further classifies PDAC into grades I–IV.
- High Accuracy: Optimized SVM classifier achieves 99.7% accuracy.
- Enhances early diagnosis and treatment precision.

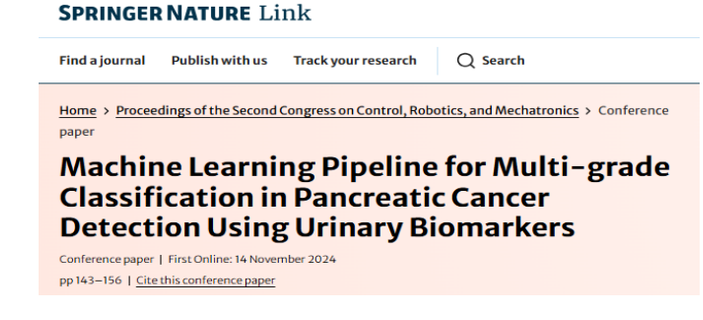


Revolutionizing Pancreatic Cancer Detection: AI-Powered Urinary Biomarkers for Early Diagnosis.

Relevant Publication: Pragya Pandey, Param Verma, Garima Aggarwal & Malay Kishore Dutta, Machine Learning Pipeline for Multi-grade Classification in Pancreatic Cancer Detection Using Urinary Biomarkers, Smart Innovation, Systems and Technologies, vol 409, Publisher: Springer, Singapore, pp 143–156, November 2024. DOI: https://doi.org/10.1007/978-981-97-7094-6_11.

Mentors: Dr. Garima Aggarwal & Prof M. K. Dutta.

Parameter	Control Subjects			Benign Diagnosis			PDAC Diagnosis		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
age	55.00	58.00	56.66	52.00	77.00	68.08	53.00	82.00	65.71
Plasma_CA19_9	10.00	11.00	10.66	0.60	5335	1070.434	654.00	654.00	654.00
creatinine	0.44	1.73	0.88	0.13	1.62	0.61	0.56	2.23	1.01
LYVE1	0.63	2.83	2.03	0.56	12.24	3.06	7.84	11.99	9.97
REG1B	33.40	188.25	87.42	7.08	535.28	128.81	66.83	1293.81	503.06
TFF1	138.63	529.98	330.59	0.04	1529.18	564.47	138.32	2921.50	1467.85
REG1A	155.27	735.28	366.91	39.911	7301.55	1183.79	110.98	4066.13	1417.72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Machine Learning Pipeline for Multi-grade Classification in Pancreatic Cancer Detection Using Urinary Biomarkers

Conference paper | First Online: 14 November 2024

pp 143–156 | Cite this conference paper

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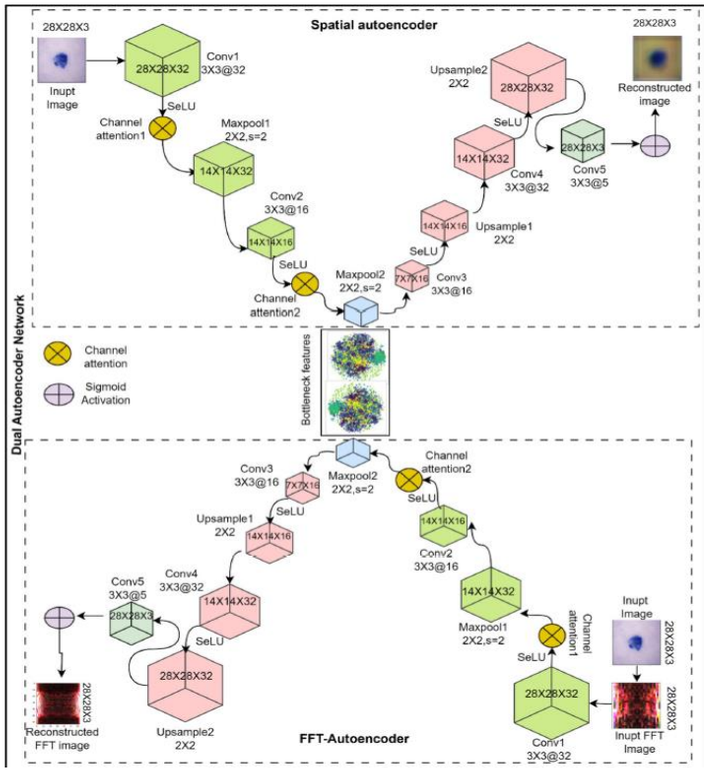
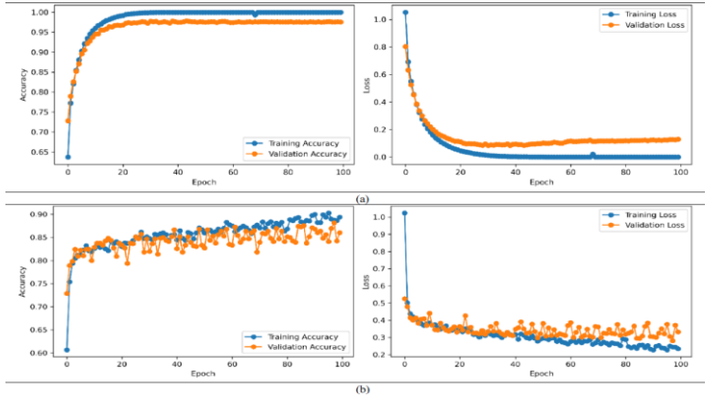
20. Skin cancer detection through attention guided dual autoencoder approach with extreme learning machine

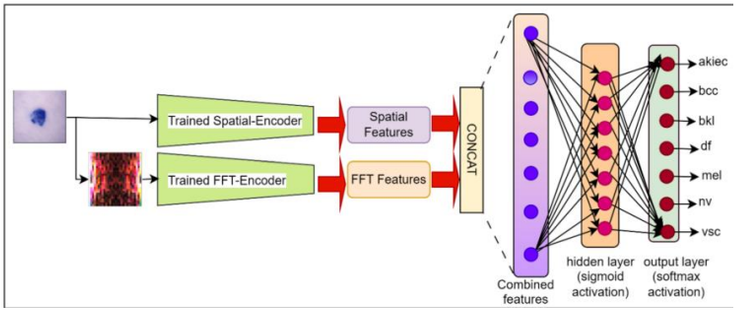


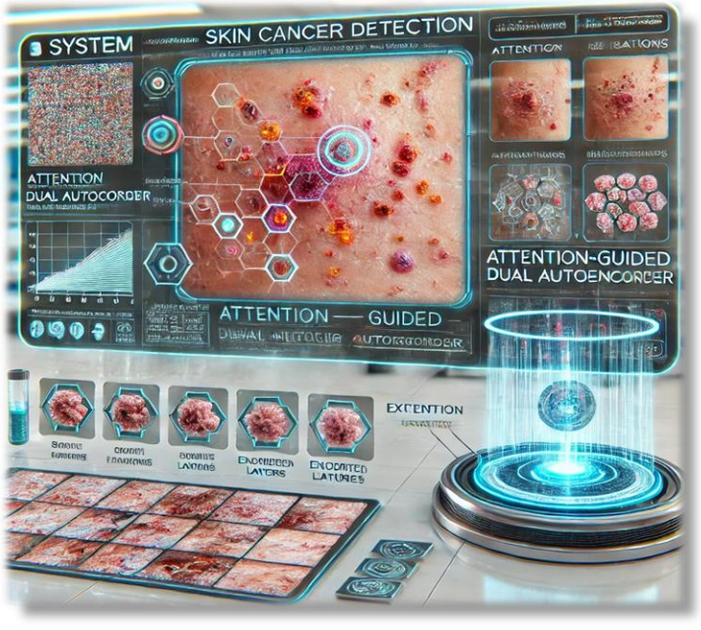
Skin Cancer Detection with AI-Powered Precision.



Key Highlights:

- Innovative AI-Based Detection – The study introduces 'DualAutoELM,' a novel AI-driven technique for early and accurate skin cancer detection.
- Dual Autoencoder Technology – Utilizes a unique dual-autoencoder network to extract spatial and frequency domain features from skin lesion images.
- Enhanced Accuracy and Performance – Achieves high classification accuracy (97.66% for HAM10000 and 86.68% for ISIC-2017 datasets) using an Extreme Learning Machine classifier.
- Attention-Guided Analysis – Incorporates multi-level attention mechanisms to improve feature selection and reduce noise for better diagnostic precision.
- Potential for Clinical Application – The proposed model offers a promising low-cost, AI-powered alternative for dermatologists in early skin cancer diagnosis.



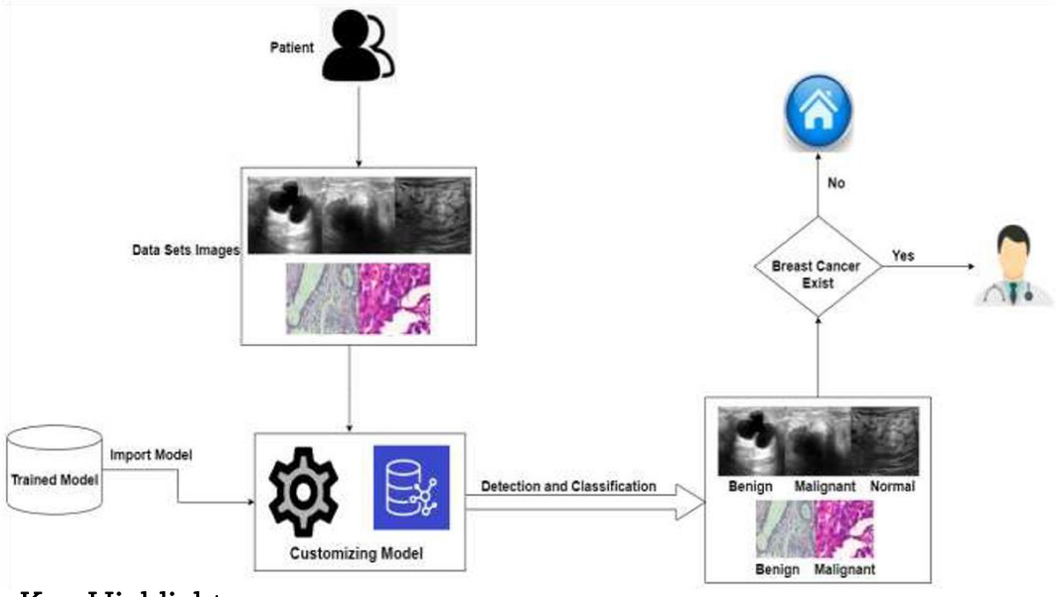


Relevant Publication: Ritesh Maurya, Satyajit Mahapatra, Malay Kishore Dutta, Vibhav Prakash Singh, Mohan Karnati, Geet Sahu & Nageshwar Nath Pandey, "Skin cancer detection through attention guided dual autoencoder approach with extreme learning machine." Sci Rep 14, 17785, July, 2024.

DOI: https://doi.org/10.1038/s41598-024-68749-1

Investigator: Dr. Ritesh Maurya & Prof M. K. Dutta.

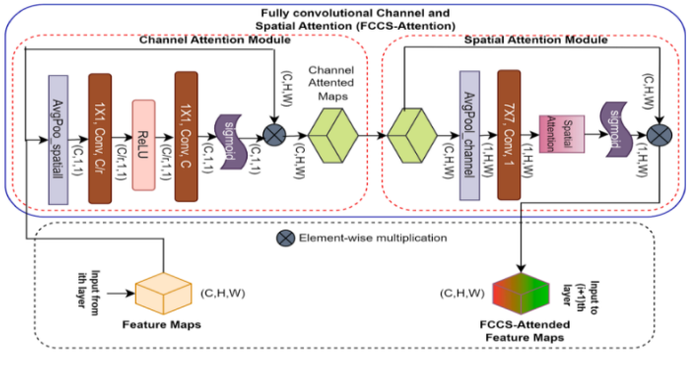
21. FCCS-Net: Breast Cancer Classification Using Multi-Level Fully Convolutional-Channel and Spatial Attention-based Transfer Learning Approach



Advancing Breast Cancer Diagnosis with AI-Powered Precision

Key Highlights:

- FCCS-Net for Breast Cancer Detection – The study proposes a novel deep learning model, FCCS-Net, designed for accurate breast cancer classification using histopathology images.
- Multi-Level Attention Mechanism – Employs a fully convolutional attention mechanism focusing on both spatial and channel features for improved detection performance.
- High Classification Accuracy – Achieves 99.25% accuracy on the BreakHis dataset and 90.58% accuracy on the IDC dataset, outperforming existing methods.
- Residual Connections for Enhanced Learning – Integrates supplementary residual connections to maintain smooth gradient flow, reducing information loss.
- Potential for Clinical Implementation – The model's high accuracy, efficiency, and robustness make it a promising tool for aiding pathologists in early breast cancer detection.



Biomedical Signal Processing and Control
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FCCS-Net: Breast cancer classification using Multi-Level fully Convolutional-Channel and spatial attention-based transfer learning approach

Ritesh Maurya, Nageshwar Nath Pandey, Malay Kishore Dutta, Mohan Karnati

Relevant Publication: Ritesh Maurya, Nageshwar Nath Pandey, Malay Kishore Dutta, Mohan Karnati, "FCCS-Net: Breast Cancer Classification Using Multi-Level Fully Convolutional-Channel and Spatial Attention-based Transfer Learning Approach" Biomedical Signal Processing and Control 94(3):106258, August 2024.

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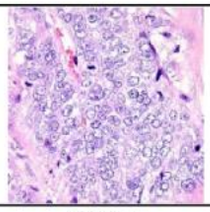
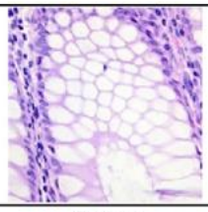
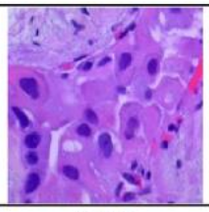
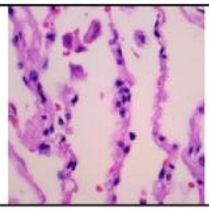
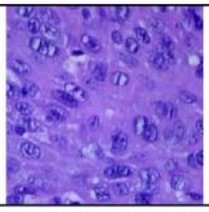
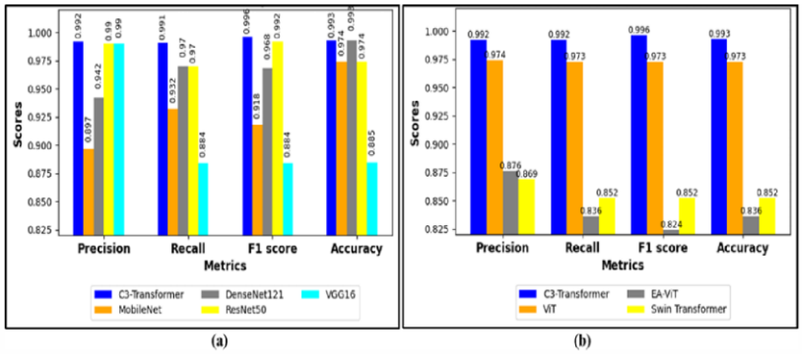
Investigator: Dr. Ritesh Maurya & Prof M. K. Dutta.

22. Breaking Barriers in Cancer Diagnosis: Super-Light Compact Convolution Transformer for Colon and Lung Cancer Detection

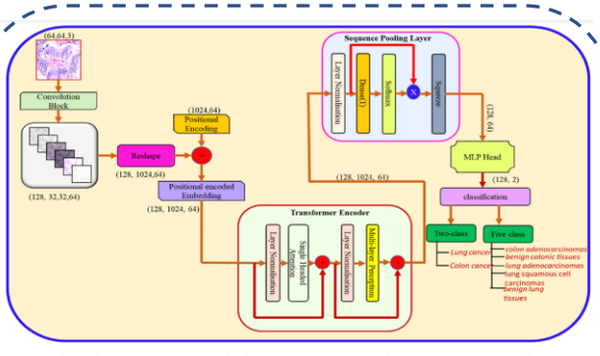
Sample image					
Class name	Colon adenocarcinomas	Colon Benign	Lung adenocarcinomas	Lung Benign	Lung squamous cell carcinoma

Key Highlights:

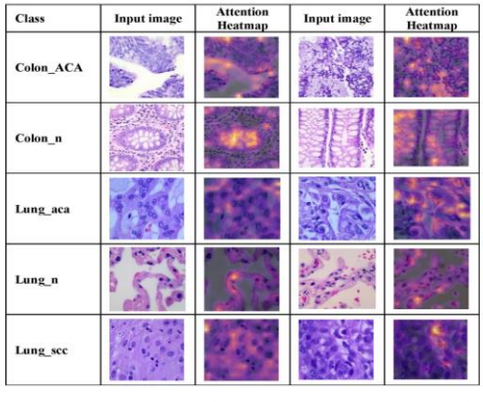
- Introduction of C3-Transformer: The work proposes a novel architecture called the Customized Compact Convolution Transformer (C3-Transformer) that effectively combines the strengths of Convolutional Neural Networks (CNNs) and Transformer models. This hybrid approach allows the model to capture both local and global patterns in histopathology images, which is crucial for accurate cancer detection.
- Lightweight Architecture: One of the standout features of the C3-Transformer is its remarkably lightweight design, consisting of only 0.0316 million parameters. This makes it highly suitable for deployment on mobile devices, such as smartphones and laptops, without the need for dedicated GPUs.
- High Performance Metrics: The proposed model demonstrates exceptional performance, achieving an average classification accuracy of 99.30%, precision of 0.9941, and recall of 0.9950 across five different classes of colon and lung cancer. These metrics indicate the model's effectiveness in accurately diagnosing these cancers using histopathological images.
- Efficient Use of Data: The C3-Transformer addresses the challenge of limited availability of histopathology images by maintaining a low parameter count while still achieving high accuracy. This is particularly important in the context of developing computer-aided detection systems where data scarcity is a common issue.



Comparison of performance metrics obtained with the proposed C3- Transformer model with the other (a) state- of- the- art transformer models; (b) fine- tuned deep convolution neural networks



Architecture of the proposed customised compact convolution transformer



Attention heatmaps for the sample image from each class of the LC25000 dataset.

Relevant Publication: Ritesh Maurya, Nageshwar Nath Pandey, Mohan Karnati, Geet Sahu, "Breaking Barriers in Cancer Diagnosis: Super-Light Compact Convolution Transformer for Colon and Lung Cancer Detection" International Journal of Imaging Systems and Technology · August 2024, Wiley Publishers
DOI: https://doi.org/10.1002/ima.23154,
SCI Indexed Impact Factor – 3.
Area: Deep Learning, Computer Vision.
Investigator: Dr. Ritesh Maurya.

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63. Ritesh Maurya, Divyam Aggarwal, T. Gopalakrishnan, Nageshwar Nath Pandey, "Enhancing Deep Neural Network Convergence and Performance: A Hybrid Activation Function Approach by Combining ReLU and ELU Activation Function" ICI-2023 (International Conference on Informatics (ICI-2023)), Noida, India. Publisher: IEEE Xplore Digital Library, DOI: 10.1109/ICI60088.2023.10421353.

List of Publications – (Contd.)

64. Ritesh Maurya, Anant Krisn Bais, Tirumoorthy Gopalakrishnan, Ankita Deshpande, Malay Kishore Dutta, “Skin Lesion Classification using Deep Feature Fusion and Selection Using XGBoost Classifier, International Students' Conference on Electrical, Electronics and Computer Science (SCEECS), Bhopal, India, 2024. Publisher: IEEE Xplore Digital Library, DOI: 10.1109/SCEECS61402.2024.10481955.

65. Ritesh Maurya, Rudra Shaurya, T. Gopalakrishna, "Acute Ischemic Brain Stroke Classification Using Attention-Augmented Ensemble Approach", IEEE World Conference on Applied Intelligence and Computing (AIC 2024) a, Gwalior, India. Publisher: IEEE Xplore Digital Library. (Accepted for Publication)

66. Ritesh Maurya, Ambica Pradhan, Gopala Thirumoorthy, P. Saravanan, Geet Sahu and Mohan Karnati, "FourierCNN: Skin cancer Classification using Convolution Neural Network Fortified with Fast Fourier Transform," 2024 IEEE International Conference on Interdisciplinary Approaches in Technology and Management for Social Innovation (IATMSI), Gwalior, India, 2024, pp. 1-4, DOI: 10.1109/IATMSI60426.2024.10502458.

67. Nageshwar Nath Pandey, Avadh Pati & Ritesh Maurya, “DriSm_YNet: a breakthrough in real-time recognition of driver smoking behavior using YOLO-NAS” Neural Computing and Applications, DOI: doi.org/10.1007/s00521-024-10162-w, 2024, SCI indexed Impact Factor : 6.0

Area: Deep Learning & Computer Vision.

68. Ritesh Maurya; M.K.Dutta Dutta; Mohan Karnati, Dr Nageshwar Nath Pandey, “FCCS-Net: Breast Cancer Classification Using Multi-Level Fully Convolutional-Channel and Spatial Attention-based Transfer Learning Approach” Biomedical Signal Processing and Control, Elsevier Publishers, 2024, DOI: doi.org/10.1016/j.bspc.2024.106258, SCI indexed Impact Factor - 5.1.

Area: Deep Learning & Computer Vision.

Industry Interface @ ACAI

Industry Projects with Samsung Prism

1. Industry Name: Samsung PRISM

Project Title: Detect Samsung Products in an Image

Name of the Industry Mentor:
Mentor-1: Vamsi Krishna Agasthyaraju,
Mentor-2: Sreenivasa Dhamaragunta Reddy

Name of the Faculty/Professor from Amity:
1. Dr. Partha S Mangipudi, 2. Dr. Ritesh Maurya, 3. Prof. M.K. Dutta.

Name of the Amity Student Involved: Harsh Raj, Achal Shankar Gupta, Harsh Verma, Nandini Biswas, Lucky Rajput.

2. Industry Name: Samsung PRISM

Project Title: AI/ML: Overlapping Sound event detection and classification

Name of the Industry Mentor:
Mentor-1: Rashmi T Shankarappa
Mentor-2: Sourabh Tiwari
Mentor-3: Gaurav

Name of the Faculty/Professor from Amity:
1. Dr. Rinki Gupta, 2. Dr. Neetu Mittal,
3. Prof. M.K. Dutta.

Name of the Amity Student Involved: Farhan, Ranesh Krishna, Akshay Tyagi, Saumya Gaikwad

3. Industry Name: Samsung PRISM

Project Title: Music classifier to predict the genre of the background music

Name of the Industry Mentor:
Mentor-1: Shaik Jani Basha
Mentor-2: Lokesh Kumar Thandaga Nagaraju

Name of the Faculty/Professor from Amity:
1. Mr. Karnati Mohan, 2. Dr. Vijay Kumar Tayal, 3. Prof. M.K. Dutta

Name of the Amity Student Involved: Utkarsh Chauhan, Sakshi Neeraj, Sunetra Bakshi, Sushma Singh

SAMSUNG

Amity Centre for Artificial Intelligence

AMITY UNIVERSITY

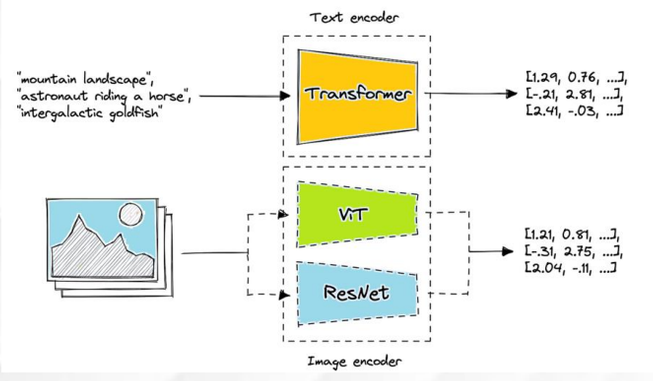
Industry Projects with Thales

Offensive Content Detection in Doodles & Sketches Using AI Models

Methodology Description

Offensive Content Detection in Doodles & Sketches Using AI Models: This project focuses on developing AI models to detect offensive or harmful content in doodles and sketches using advanced computer vision and machine learning techniques.

Student Involved: Nitya Pillai and Akshara Sharma



Status and Expected Outcomes:

- **Offensive Content Detection:** The project is in its advanced testing phase, with early results showing promising accuracy in detecting offensive content. The goal is to deploy a reliable system for real-time content monitoring on digital platforms.

Both projects are set to provide valuable technological advancements for AI applications, with practical implications for both research and industry.

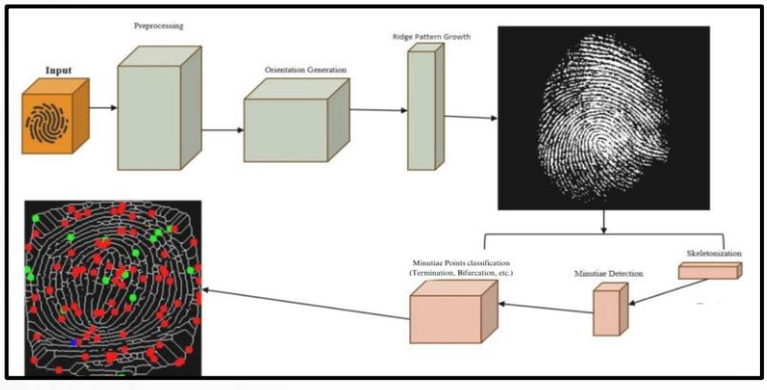
Synthetic/Artificial Data Generation for Machine Learning Models

Methodology Description

Synthetic/Artificial Data Generation for Machine Learning Models: The aim is to generate high-quality synthetic data to train machine learning models, particularly in scenarios where real-world data is scarce or hard to obtain.

Additionally, ACAI students have demonstrated user-friendly graphical interfaces (GUIs) developed as part of their research, receiving positive feedback from Thales India and researchers from France and Singapore.

Student Involved: Amisha Krishna Gupta, Anoushka Ishi Gupta



Status and Expected Outcomes:

- **Synthetic Data Generation:** This project is progressing with successful generation of synthetic datasets. The expected outcome is a toolkit that can create synthetic data to enhance machine learning model training, especially where real data is limited.

Team Members

Faculty Mentors

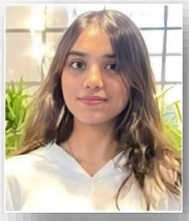
Prof. M. K. Dutta
Amity Centre for Artificial Intelligence

Dr. Rakesh C Joshi
Amity Centre for Artificial Intelligence

Student Involved

Nitya Pillai
B.Tech Student, (2022-26)
Amity University

Akshara Sharma
B.Tech Student, (2022-26)
Amity University



Amisha Krishna Gupta
B.Tech Student, (2022-26)
Amity University

Anoushka Ishi Gupta
B.Tech Student, (2022-26)
Amity University

Ongoing Projects @ ACAI

Personalized Recommender System for Virus Research and Diagnosis Laboratory Network: Advancing Diagnostic Decision-Making through Artificial Intelligence

Objective:

1.Develop a Smart System to Identify Possible Infections

- Create a machine learning model that analyses patient details and symptoms to provide personalized recommendation for names of probable infections.

2. Optimize Different Methods

- Evaluate the performance of various machine learning algorithms to determine which one most accurately recommends lab tests for diagnosing infections.
- Test and refine multiple models to ensure the highest accuracy and reliability in recommendations.

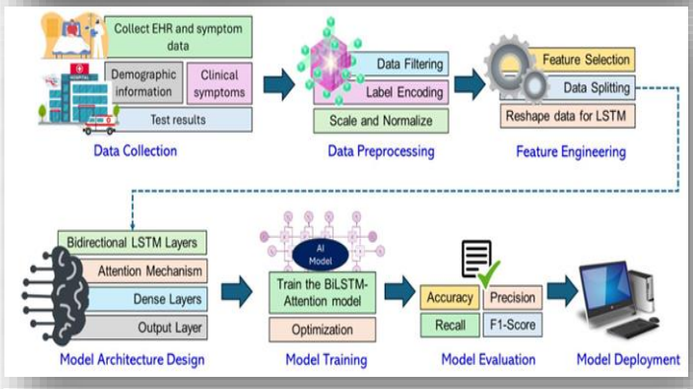
3. Predict Future Outbreaks

- Utilized approx. 30 lakhs patients data from ICMR to forecast potential viral disease outbreaks in specific geographic locations.
- Incorporate patient residence information and historical disease data to develop predictive models.

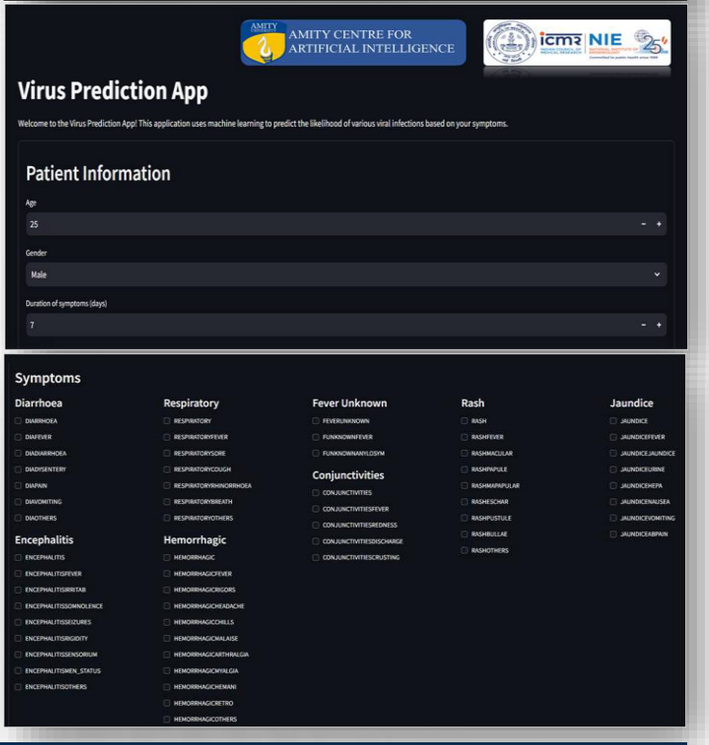
Description:

The implementation plan of this project is Data Collection: Gather historical data from ICMR, Model Development: Develop and train AI models using collected data, Testing to validate model performance and accuracy, Deployment: Deploying AI system in the ICMR network for real-time use, Monitoring: Continuously monitor and refine the system based on feedback and performance with the help of AI-powered Enhanced Diagnostic Decision-Making: AI-enhanced system will analyze data for precise diagnoses, improving patient care outcomes. Optimized Test Selection: The proposed system aids in selecting necessary tests, reducing costs, patient anxiety, and legal liabilities, Efficiency and Resource Allocation: It will streamline processes, ensuring effective resource utilization for patient needs, Utilization of Historical Data: It will utilization accumulated data for evidence-based decisions, enhancing diagnostic capabilities.

Methodology



Prototype Application



Team Members

Principle Investigators

Dr. Rizwan S A
ICMR, NIE

Prof. M. K. Dutta
Amity Centre for Artificial Intelligence

Co-Principle Investigators

R. Janani Surya
ICMR, NIE

Dr. Rakesh C Joshi
Amity Centre for Artificial Intelligence

Project Scientist

Dr. Abhishek Kaushal
Amity Centre for Artificial Intelligence

Project Staff

Manish Chauhan
Amity Centre for Artificial Intelligence

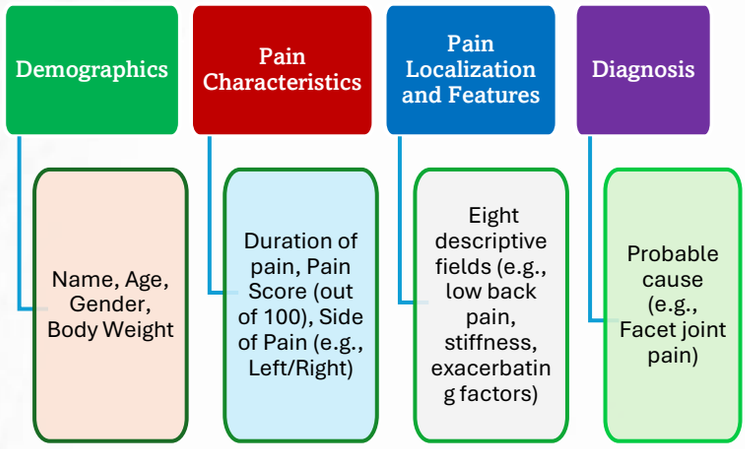
Artificial Intelligence-Driven Chronic Pain Management with Mobile App Integration for Empowering Primary Healthcare Physicians

Objective:

1. Develop an user-friendly AI-based mobile app capable of diagnosing and managing chronic pain diseases.
   - The app will utilize advanced algorithms trained on a comprehensive database of clinical features and patient demographics, enabling it to provide accurate assessments and personalized treatment recommendations.
2. Evaluate the feasibility of chronic pain management by primary care physicians using the AI-based app.
   - By conducting pilot studies, qualitative and quantitative feedback will be gathered on the app's functionality, user experience, and its influence on clinical decision-making in chronic pain management.
3. Establish a clinical feature databank of prevalent chronic pain conditions in India to support the app's algorithm.
   - The data will be gathered through patient evaluations and input from pain specialists, ensuring a robust foundation for AI-driven insights.

Dataset Description

This dataset consists of detailed records of patients with pain-related symptoms. The features captured aim to aid in diagnosing the probable cause of pain. Each record includes:



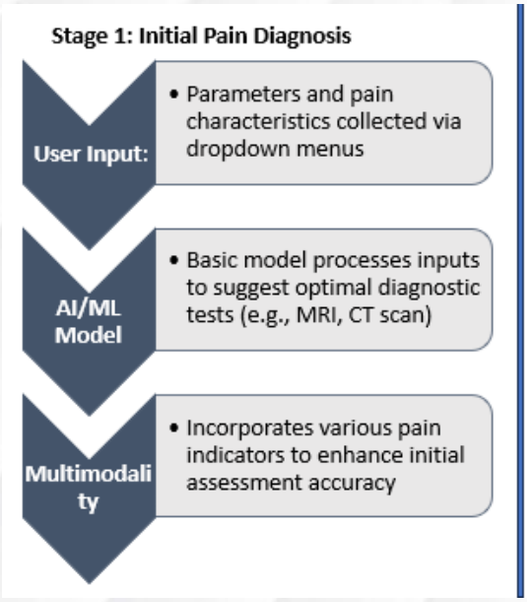
Methodology Description

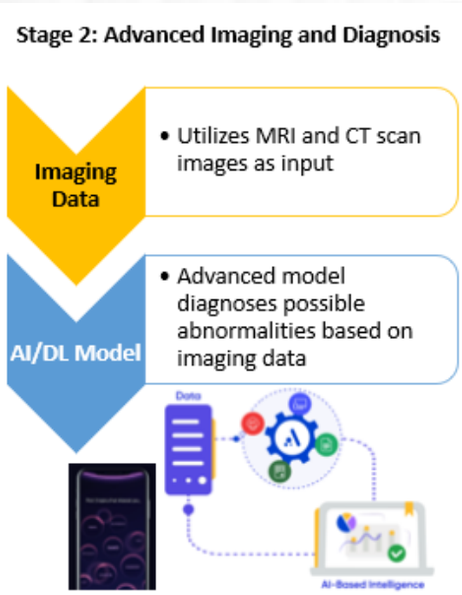
A multidisciplinary team will develop an AI-based mobile app for chronic pain management using Large Language Model and Retrieval-Augmented Generation (RAG) techniques. Initially, the team will compile a clinical feature databank specific to prevalent chronic pain conditions in India, utilizing input from pain specialists to enrich the data pool. RAG will be employed to enhance the app's diagnostic capabilities by integrating a large language model trained on pain-related literature with user-provided information, enabling it to provide evidence-based diagnostic suggestions and management recommendations. The app's algorithms, developed using advanced deep learning techniques, will be continuously refined through iterative testing with real patient data, ensuring accurate and context-specific outputs. Primary care physicians will then be trained to use the app, evaluating its effectiveness by comparing their clinical assessments against the app's suggestions. Statistical analyses, including diagnostic performance metrics, will be executed to validate the app's contribution to improved chronic pain management among primary healthcare providers, ultimately aiming to enhance treatment outcomes for patients.

Retrieval Augmented Generation
Integrates LLM model trained on pain-related literature

Interactive Interface
Users can chat/talk to the app for diagnostic suggestions and recommendations

Enhanced Accuracy
Combines user inputs, imaging techniques, and LLM models for comprehensive pain diagnosis





Investigators

Dr. Sujeet K. Gautam
Dep. of Anesthesiology
SGPGIMS

Prof. M. K. Dutta
Amity Centre for
Artificial Intelligence

Development of an Artificial Intelligence driven Pharmacokinetics based algorithm as an aid to better management of drug resistance in tuberculosis.

Primary Objectives:

1. To generate and supplement the plasma concentration data of all first line ATDs from the Indian population with detailed PK approach
2. Development of AI incorporated LSS from the collected data to predict detailed PK parameters of first line ATD.
3. To detect association of salivary concentration of the drugs to the changes in plasma concentration.

Secondary Objectives:

1. To develop an AI based tool to estimate drug concentration from photographic images obtained from blood samples and other parameters
2. To compare the early PK prediction with the microbiological outcome after two months of treatment in pulmonary TB.

Investigators

Dr. Sujeet K. Gautam
Dep. of Anesthesiology
SGPGIMS

Prof. M. K. Dutta
Amity Centre for
Artificial Intelligence

Rationale:

Conventional therapeutic drug monitoring (TDM) often failed to predict microbiological outcome to first line anti-TB drugs (ATD). Detailed pharmacokinetic information may be more valuable but needs user friendly ways for wider implementation at the field level. Artificial intelligence may be utilized to develop such strategy.

Novelty of the work :

Artificial intelligence incorporated 'limited sampling strategy (LSS)' to derive predictions like 'intensive plasma sampling' for ATDs were never attempted. Saliva is non-invasive but needs validation. Prediction of plasma concentration of AT drugs from image of blood sample is innovative and may have application at the field level.

Collaborators

NIRBI KOLKATA

AMITY UNIVERSITY

ALL INDIA INSTITUTE OF MEDICAL SCIENCES BHUBANESWAR

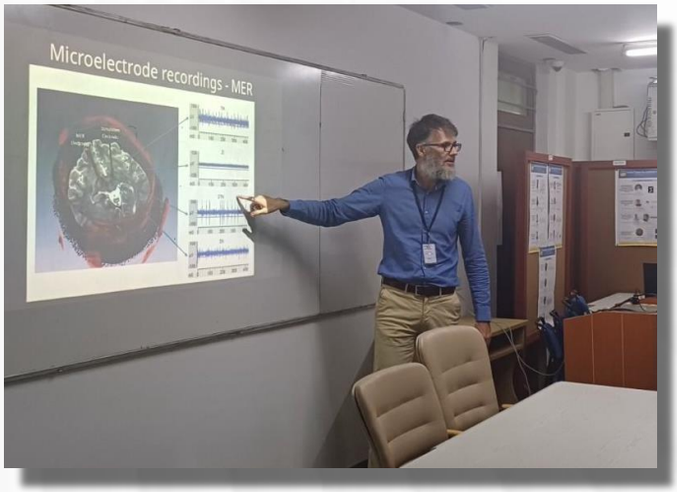
NICED KOLKATA

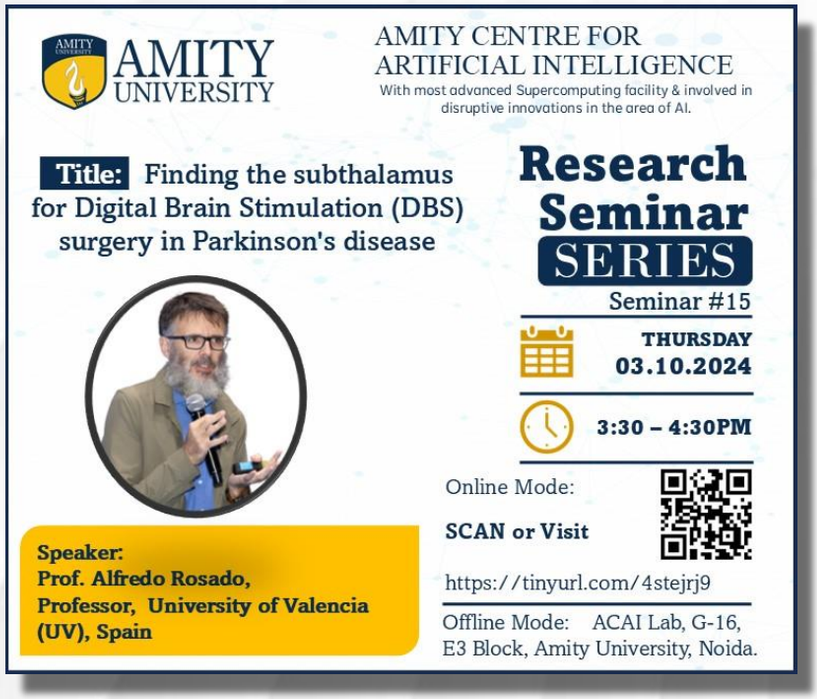
Visit of Prof. Alfredo Rosado Munoz

Visiting Professor Alfredo Rosado Munoz, Professor, Department of Electronic Engineering University of Valencia (UV), Spain had visited the Amity Centre for Artificial Intelligence from Sept 2024 to Nov 2024.

During his Visit Prof Rosado had collaborated with faculty and students in many research topics like Deep Brain Stem simulation, transport management using AI, Skin Disease identification using AI and some more research problems.

He had delivered a Research Seminar on the Topic - "Finding the subthalamus for Digital Brain Stimulation (DBS) surgery in Parkinson's disease" on 3rd October 2024. Many enthusiastic students joining from various Institutes of Amity University attended his talk.





Events @ ACAI

Amity Centre for Artificial Intelligence, Noida, and NVIDIA Deep Learning Institute (DLI) jointly organized a hands-on workshop on Deep Learning on 30 August 2024 exclusively for verifiable academic students, staff, and researchers at ACAI Lab.

Course Instructor:
Dr. Rakesh Chandra Joshi, Associate Professor, ACAI & NVIDIA Certified Deep Learning Instructor and University Ambassador.

This exclusive workshop brought together academic participants from various universities and states, all eager to deepen their knowledge and practical skills in deep learning. Under the mentorship of Prof. M.K. Dutta and the guidance of Dr. Rakesh Chandra Joshi (Nvidia Certified Instructor and University Ambassador), participants engaged in immersive, skills-based coding exercises, utilizing GPU-accelerated computing to solve complex challenges in deep learning. Enthusiastic participation and dedication were shown by all attendees. Acknowledgement to NVIDIA DLI for their invaluable partnership and to all the participants for making this workshop a resounding success.

WORKSHOP ON PYTORCH: AN OPEN-SOURCE DEEP LEARNING FRAMEWORK

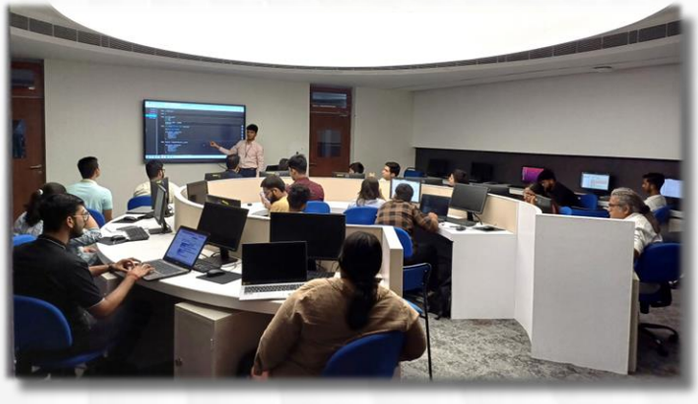
Amity Centre for Artificial Intelligence, Noida, organized a PyTorch Deep Learning Framework workshop on 26th September 2024. Great to see so many enthusiastic students joining from various Institutes of Amity University.

Workshop Speaker:
Dr. Ritesh Maurya,
Associate Professor, ACAI.

PyTorch has gained popularity as a deep learning framework known for its rapid prototyping, vast research community and built-in tools for implementing state-of-the-art deep learning models. A short workshop was organized to train how to build, train, and optimize neural networks for real-world applications.

Workshop Highlights:

- Introduction to Deep Learning with PyTorch.
- Building Advanced Neural Networks.
- Advanced Optimization.
- Real-World Application.



RESEARCH SEMINARS

AMITY UNIVERSITY

AMITY CENTRE FOR ARTIFICIAL INTELLIGENCE
With most advanced Supercomputing facility & involved in disruptive innovations in the area of AI.

Title: Finding the subthalamus for Digital Brain Stimulation (DBS) surgery in Parkinson's disease

Speaker:
Prof. Alfredo Rosado,
Professor, University of Valencia (UV), Spain

Research Seminar SERIES

Seminar #15

THURSDAY
03.10.2024

3:30 – 4:30PM

Online Mode:
SCAN or Visit
https://tinyurl.com/4stejrj9

Offline Mode: ACAI Lab, G-16, E3 Block, Amity University, Noida.

AMITY UNIVERSITY

AMITY CENTRE FOR ARTIFICIAL INTELLIGENCE
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Title: Data-Driven Smart Healthcare: The Role of RAG and LLMs in Transforming Health Data Retrieval and Analysis.

Speaker:
Shivam Bhardwaj
USRF 2024 Fellow
(Undergraduate Summer Research Fellowship – A Unique Amity initiative).

Research Seminar SERIES

Seminar #16

THURSDAY
10.10.2024

3:30 – 4:30PM

Online Mode:
SCAN or Visit
https://tinyurl.com/k9n3jhsw

Offline Mode: ACAI Lab, G-16, E3 Block, Amity University, Noida.

AMITY UNIVERSITY

AMITY CENTRE FOR ARTIFICIAL INTELLIGENCE
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Title: Enhanced Stock Index Prediction Using Multivariate Empirical Mode Decomposition and Temporal Convolutional Networks

Speaker:
Arkajit Banerjee
USRF 2024 Fellow
(Undergraduate Summer Research Fellowship – A Unique Amity initiative).

Research Seminar SERIES

Seminar #17

WEDNESDAY
16.10.2024

3:30 – 4:30PM

Online Mode:
SCAN or Visit
https://tinyurl.com/38ffjrb2

Offline Mode: ACAI Lab, G-16, E3 Block, Amity University, Noida.

AMITY UNIVERSITY

AMITY CENTRE FOR ARTIFICIAL INTELLIGENCE
With most advanced Supercomputing facility & involved in disruptive innovations in the area of AI.

Title: An Artificial Intelligence framework for affective state recognition

Speaker:
Ritu Tanwar
Amity Centre for Artificial Intelligence.

Research Seminar SERIES

Seminar #18

THURSDAY
28.11.2024

3:30 – 4:30PM

Online Mode:
SCAN or Visit
https://tinyurl.com/mr3zv4su

Offline Mode: ACAI Lab, G-16, E3 Block, Amity University, Noida.

AMITY UNIVERSITY

AMITY CENTRE FOR ARTIFICIAL INTELLIGENCE
With most advanced Supercomputing facility & involved in disruptive innovations in the area of AI.

Title: Control with Style:- Variational Autoencoder-based Stylized Image Captioning Framework

Speaker:
Dr. Dhruv Sharma
Amity Centre for Artificial Intelligence.

Research Seminar SERIES

Seminar #19

THURSDAY
16.01.2025

3:30 – 4:30PM

Online Mode:
SCAN or Visit
https://tinyurl.com/ypyxj5dn

Offline Mode: ACAI Lab, G-16, E3 Block, Amity University, Noida.

AMITY UNIVERSITY

AMITY CENTRE FOR ARTIFICIAL INTELLIGENCE
With most advanced Supercomputing facility & involved in disruptive innovations in the area of AI.

Title: NLP for Social Goods

Speaker:
Dr. Gopendra Vikram Singh
Amity Centre for Artificial Intelligence.

Research Seminar SERIES

Seminar #20

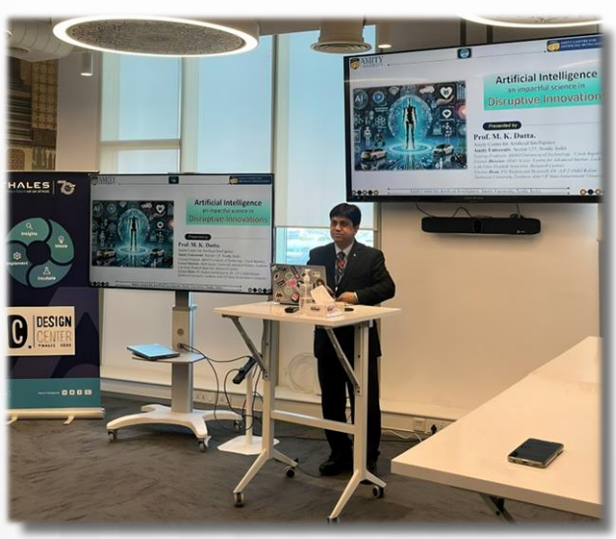
THURSDAY
23.01.2025

3:30 – 4:30PM

Online Mode:
SCAN or Visit
https://tinyurl.com/57er37dt

Offline Mode: ACAI Lab, G-16, E3 Block, Amity University, Noida.

The Director of the Amity Centre of Artificial Intelligence (ACAI) Delivered a Talk on AI applications in Healthcare at All India Institute Of Ayurveda under the Ministry of Ayush on 21st November 2024.



Faculty from Amity Centre of Artificial Intelligence along with other officials visited the Thales office in Noida on 11th December 2024..

Amity Centre for Artificial Intelligence (ACAI) had the pleasure of hosting a group of enthusiastic school students at our AI Centre on 23rd December 2024.

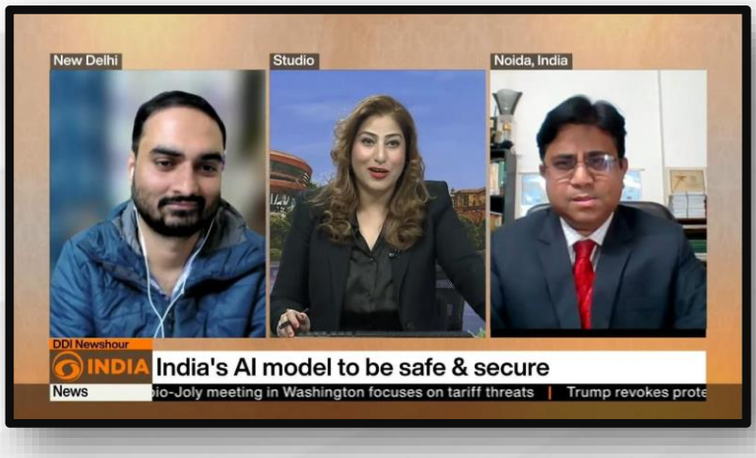
Mr. Gilles Durbec , CTO , Thales had distributed Certificates to BTech Students from Amity University for completion of AI based Industry Project in collaboration/ Mentored by Thales and Amity University

On December 12, 2023, Prof. M.K. Dutta, the Director of the Amity Centre for Artificial Intelligence, spoke on National Television on the Global Partnership on Artificial Intelligence (GPAI), which the Honorable PM had inaugurated in Pragati Maidan.

On December 29, 2023, Prof. M.K. Dutta, the Director of the Amity Centre for Artificial Intelligence, spoke on National Television in a Discussion on the Issue of Data infringements in the context of the incident of New York Times legal suit against Microsoft and OpenAI

Prof. M.K.Dutta Director of Amity Centre for Artificial Intelligence in a Discussion on AI telecasted by National TV on 9th June 2023

Prof. M.K.Dutta, Director of Amity Centre for Artificial Intelligence in a Discussion on Artificial intelligence based deepfake threats in National Television on 24 Nov 2023.



On January 30, 2025, Prof. M.K. Dutta, the Director of the Amity Centre for Artificial Intelligence, spoke on National Television regarding India's National AI mission and the great initiatives taken by the Government is a significant step in the AI landscape to develop its own foundational Large Language Model (LLM).

Prof. M.K. Dutta, the Director of the Amity Centre for Artificial Intelligence, Delivered a Talk on "Artificial Intelligence as an Impactful Science in Disruptive Innovations" in the Series of "Pathbreaking Scientific Achievements Deliberation 2024: Session II". Organized by Amity Science, Technology and Innovation Foundation (ASTIF) and Chaired by Dr. W. Selvamurthy Sir.

Call for Research Participants

Call for Research @ ACAI

AMITY UNIVERSITY

AMITY CENTRE FOR ARTIFICIAL INTELLIGENCE

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Research Problem SERIES

Call #109

Join the AI revolution: Work in the most powerful Supercomputers

Call for Amity Students to join Research Project!

Title: RAGNet: Advancing Conversational AI with RAG-based Question Answering

This project is to develop a task solving conversational AI systems using RAG-based (Retrieval-Augmented Generation) Large language models LLMs. Initially, focus will be on domain of healthcare / legal-financial services.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as an independent research.
Potential for a Research Paper and Significant for Job Opportunities in AI.
Mentoring by expert Faculty from Amity Centre for AI and International Collaboration

Interested in this Research Project?
Email: ai@amity.edu or visit E3,G-12B.

For more info / to join,
Visit our website
amity.edu/acai
or
scan the QR code.

E3G-12B, Amity University, Sector 125, Noida, UP. Email: ai@amity.edu Web: amity.edu/acai

AMITY UNIVERSITY

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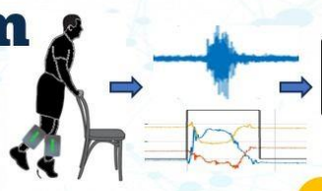
Research Problem SERIES

Call #110



Join the AI revolution: Work in the most powerful Supercomputers

Call for Amity Students to join Research Project!

Title: AIPMS: Design and Development of an AI-enabled Physiotherapy Monitoring System

Collect data from wearable sensors and video camera related to physiotherapy exercises. Design multi-head deep convolutional neural networks, with attention for identification of type of exercise, and comparing the extend of limb motion as compared to previously performed exercise.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as an independent research. **Potential for a Research Paper.**
Mentoring by expert Faculty from Amity Centre for AI.

Interested in this Research Project?
Email: ai@amity.edu or visit E3,G-12B.

For more info / to join,
Visit our website
amity.edu/acai
or
scan the QR code.

E3G-12B, Amity University, Sector 125, Noida, UP. Email: ai@amity.edu Web: amity.edu/acai

Call for Research @ ACAI

AMITY UNIVERSITY

AMITY CENTRE FOR ARTIFICIAL INTELLIGENCE

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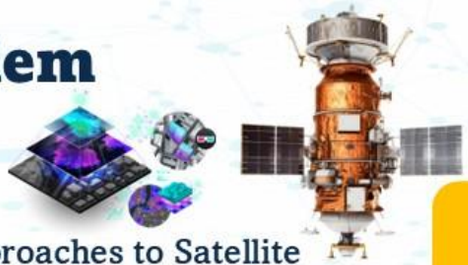
Research Problem SERIES

Call #111



Join the AI revolution: Work in the most powerful Supercomputers

Call for Amity Students to join Research Project!

Title: GeoAI: AI-Powered Approaches to Satellite Image Analysis and Environmental Monitoring

The project aims on developing cutting-edge AI models to enhance satellite image analysis, enabling precise environmental monitoring and informed decision-making.

Research Focus:

- Develop AI models to classify land cover, track changes and image captioning.
- Employ AI for wildfire detection, deforestation monitoring, climate impact assessment, etc.
- Integration of AI with diverse data sources, including optical and SAR imagery, to provide comprehensive environmental insights.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

Call #112

Call for Amity Students to join Research Project!

Title: Optimizing Performance in Competitive Cycling using AI

Description:

A competitive cyclist uses an onboard computer for their ride. By the previous data recorded from riding activities, the goal is to create AI Algorithm also to optimize the best riding performance for a race. BTech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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The Project will be Mentored by Prof. Alfredo Rosado, Professor, University of Valencia (UV), Spain. Currently in Amity University, Noida as a Visiting Professor. (Room No. G-17, E3- Block)

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Research Problem SERIES

Call #113

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Title: AI and Wearable-Based Stress Recognition

This project will utilize an advanced deep-learning approach for stress recognition. By incorporating data from wearable devices, the goal is to develop an automated system for stress recognition.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.
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Research Problem SERIES

Call #114

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Title: Explainable Affective State Recognition with AI

This project proposes to develop an AI-driven system for recognizing affective states (e.g., stress, amusement) with a significant emphasis on explainability. By using explainable AI techniques, trust in AI decisions can be augmented.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.
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Research Problem SERIES

Call #139

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Title: Brain-Computer Interface (BCI) for Motor Imagery Tasks Using Deep Learning

This project seeks to advance Brain-Computer Interface (BCI) technology using deep learning to classify motor imagery patterns from EEG data. By training neural networks on EEG features linked to imagined movements, it enables accurate, real-time classification crucial for BCI systems. This AI-driven approach improves accuracy, reduces calibration time, and holds promise for assistive technologies that empower motor-impaired individuals.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

Call #140

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Title: AI-Enhanced Epileptic Seizure Prediction Using Sequential Deep Learning Models

This project aims to develop an AI framework for real-time seizure prediction using EEG data and deep learning models like Long Short-Term Memory (LSTM) networks. The goal is to detect subtle pre-seizure patterns by identifying complex temporal dependencies, offering more accurate and timely warnings. This approach seeks to surpass traditional methods, providing epileptic patients with critical alerts and improving their safety and independence

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Call #141

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Title: Cross-Modal AI for Enhanced Stress Detection Using EEG and Physiological Data

This project proposes an AI-driven stress detection framework that combines EEG with other physiological signals (e.g., heart rate, skin conductance). Using neural networks for feature fusion, the system aims to improve classification accuracy and enable real-time stress monitoring. The approach has potential applications in wearable tech for workplace well-being, mental health assessment, and biofeedback-based stress management.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

Call #142

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Title: Empowering Women and Children: AI Solutions for Combating Harassment and Supporting Mental Health

This project will leverage advanced deep-learning techniques to combat harassment and promote mental health among women and children. By utilizing data from wearable devices, it aims to develop an automated system for stress detection and emotional well-being support.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

Call #143

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Title: Decoding Cognitive Distortions: Advancing Mental Health Assessment

"Decoding Cognitive Distortions: Advancing Mental Health Assessment" explores innovative approaches to identify and analyze cognitive distortions using advanced artificial intelligence techniques. This work aims to enhance the accuracy and efficiency of mental health diagnostics for better therapeutic outcomes.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Title: Underwater Object Detection Using Deep Learning Techniques

The project focuses on developing a deep learning-based underwater object detection system to address challenges like poor visibility, light distortion, and noise in underwater environments. It aims to develop state-of-the-art deep learning models like YOLO or Faster R-CNN to detect and classify underwater objects accurately in real-time. The system will be designed for applications in marine research, submarine navigation, underwater exploration, and security

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

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Title: 3D Object Detection Using Deep Learning Techniques For Self-Driving Cars

This project aims to develop a 3D object detection system using deep learning techniques to enhance the perception capabilities of self-driving cars. By leveraging advanced models like PointNet++, PV RCNN, or 3D SSD, the system will accurately identify and localize objects such as vehicles, pedestrians, and obstacles in 3D space. It will process data from LiDAR, cameras, and radar sensors, combining them to create a comprehensive environmental map. The project focuses on optimizing detection for real-time performance, ensuring safety and efficiency in autonomous driving

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

Call #146

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Title: Camouflage Object Detection Using Deep Learning Techniques For UAV data

This project focuses on developing a camouflage object detection system using deep learning techniques for UAV (Unmanned Aerial Vehicle) data. Camouflaged objects, such as wildlife, military equipment, or concealed threats, are difficult to detect due to their ability to blend into surroundings. The proposed system will use advanced deep learning models, like Mask R-CNN or Transformer-based architectures, combined with image enhancement techniques to improve detection accuracy in complex backgrounds

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

Call #147

Title: Designing a graph-based neural network to automate road extraction and maintain connectivity

This project will leverage a graph-based neural network (GNN) to automate road extraction tasks from geospatial imagery. The pipeline includes constructing a network where nodes represent key features such as road intersections or segments, and edges capturing the spatial and topological relationships. Additionally, incorporating attention mechanisms to handle noise, and occlusions effectively. The expected output will ensure precise road vector footprints, crucial for applications like urban planning, navigation systems, and disaster response.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

Call #148

Title: Development of unsupervised domain adaptive deep learning models for aerial and satellite imagery

The project focuses on exploring different techniques of adversarial learning and self-supervised learning, that can generalize across diverse domains of aerial and satellite imagery without requiring labeled data from the target domain. The framework also explores extracting invariant features from source and target domains, ensuring high-performance tasks. This project will particularly aid in scenarios where labeled data for target domains is scarce, therefore enhancing model scalability and usability across varied geographic regions.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Call #149

Title: Sentimental Analysis in Social Media Visual Question Answering (VQA)

Sentimental Visual Question Answering (VQA) combines sentiment analysis and visual understanding, aiming to answer questions about images while considering emotional and affective cues. The project focuses on developing an advanced deep learning-based model to analyse sentiment in social media posts by generating emotion-driven answers to questions about images. This further enables nuanced emotion recognition in images and text, leading to more accurate and empathetic answers

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Call #150

Title: Dense Radiology Report Generation Framework for Medical Images

Medical image captioning is a challenging yet impactful task in healthcare and artificial intelligence. The generation of long and coherent reports highlighting correct abnormalities is a challenging task, in this direction this project focusses on developing a deep-learning-based radiology report generation framework. The proposed framework extracts intricate features from medical images, enabling precise and detailed reports that support accurate diagnoses

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Title: Mental Health Analysis

This project focusses on developing systems to detect signs of mental health conditions (e.g., depression, anxiety) from textual inputs, such as social media posts or chat transcripts. By employing a range of classification algorithms and text vectorization techniques, this project aims to develop advanced deep-learning models that effectively identify addiction, alcoholism, anxiety, depression, and suicidal thoughts within text-based discussions

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

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Title: Advanced driver-assistance systems

Advanced driver-assistance systems (ADAS) can monitor various factors such as speed, acceleration, braking, lane keeping, and proximity to other vehicles. By analyzing this data, AI can identify risky behaviors like harsh braking, aggressive acceleration, and distracted driving. This information can be used to provide personalized feedback to drivers, encourage safer habits, and even predict potential accidents before they occur. Ultimately, AI-powered solutions aim to improve road safety, reduce accidents, and promote fuel efficiency by fostering optimal driving behavior

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

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Call #153

Title: **Wearable sensor based multimodal system for detection and feedback generation of physiotherapy exercises**

This study presents a wearable sensor-based multimodal system designed to enhance the accuracy and efficiency of physiotherapy exercises. The proposed system integrates multiple sensors, including accelerometers, gyroscopes, and electromyography (EMG) devices, to capture detailed motion and muscle activity data during exercises. Advanced signal processing and machine learning algorithms are employed to analyze the data, ensuring precise detection of exercise patterns and deviations. Additionally, real-time feedback generation provides users with corrective guidance, enabling proper execution of exercises and reducing the risk of injury.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

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Call #154

Title: **Fine-tuning Language Models for Chatbot Development for Engineering Colleges Across India**

This proposal outlines the development of a chatbot tailored for engineering colleges across India by fine-tuning a pre-existing language model using a domain-specific dataset. By leveraging several gigabytes of text data sourced from educational and technical domains, this intelligent conversational agent aims to assist students, faculty, and staff in addressing academic queries and navigating resources. The project focuses on optimizing the chatbot's relevance and responsiveness to enhance the support systems available within the academic environment.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Research Problem SERIES

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Title: **Development of a State-of-the-Art Automatic Fact-Checking System for India**

This proposal outlines the development of a state-of-the-art automatic fact-checking system tailored for the Indian context. By scraping and compiling data from diverse credible sources, we aim to train and evaluate a fact-checking model that leverages advanced machine learning techniques. This system will analyze claims and verify their accuracy against a curated dataset, addressing the critical challenge of misinformation and disinformation in India.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

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Faculty Mentor, E3 Block, Room No. G-17. Amity University, Noida.

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Title: **Development of Mini Language Models for Low-Resource Languages: Focus on Nepali**

This proposal outlines the development of mini language models (LLMs) tailored for the Nepali language, a low-resource language. By leveraging transfer learning, multilingual embeddings, and curated datasets, we aim to design, train, and deploy efficient LLMs that address the unique challenges of Nepali morphology and syntax. This initiative will empower NLP applications such as translation, summarization, and sentiment analysis, advancing linguistic inclusivity and technology accessibility for Nepali speakers.

Desired outcomes of the project: B.Tech/M.Tech Students of CSE/AI/IT/DS or relevant branch can take this as Minor / Major Project/Dissertation/ NTCC or as independent research.

Potential for a Research Paper and Significant for Job Opportunities in AI.

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