Pavan Kumar Sathya Venkatesh
CGPA: 8.88/10
B.Tech Computer Science and Engineering
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Research Experience

- **Improved tomato leaf disease classification through adaptive ensemble models with exponential moving average fusion and enhanced weighted gradient optimization**
  - Developed an Adaptive Ensemble Classifier using VGG-16 and NASNet models to reduce error rate and classified tomato leaf disease dataset comprising of 10,000 images
  - Integrated Exponential Moving Average (EMA) Fusion and Enhanced Weighted Gradient (EWG) Optimization achieving classification accuracy of 98.7% on the test data.
  - Accepted and Published by "Frontiers in Plant Science". Published article: https://doi.org/10.3389/fpls.2024.1382416

- **An Integrated Deep Learning Framework for Effective Brain Tumor Localization, Segmentation, and Classification from Magnetic Resonance Images**
  - Utilized a multi-modal Fourier Transform fusion technique for processing and integrating T1ce, T2 and FLAIR 3D-MRI modal images and reduced computational constraints for tumor localization and classification
  - Pioneered a Spatial-Graph Attention model for precise tumor localization, attaining 98.5% accuracy.
  - Implemented a novel LinkNet framework incorporating a SeResNet101 backbone for high-precision tumor segmentation, surpassing 97% in IoU score.
  - Submitted to Artificial Intelligence in Medicine, Preprint: https://doi.org/10.48550/arXiv.2409.17273

- **Leveraging Bi-Focal Perspectives and Granular Feature Integration for Accurate Reliable Early Alzheimer's Detection**
  - Captured multi-scale features using parallel convolutions into a deep CNN framework and highlighted amyloid plaques and neurofibrillary tangles.
  - Incorporated spatial and self attention mechanisms into the proposed framework, improving feature extraction and facilitating identification of disease-specific biomarkers from MRI scans.
  - Demonstrated exceptional performance by achieving an outstanding F1-score of 99.31%.
  - Submitted to IEEE Access, Preprint: https://doi.org/10.48550/arXiv.2407.10921

- **Exploiting Precision Mapping and Component-Specific Feature Enhancement for Breast Cancer Segmentation and Identification**
  - Introduced precision mapping into a LinkNet framework enhanced, leveraging the powerful feature extraction capabilities of InceptionResNet for accurate breast cancer segmentation.
  - Pioneered a CNN framework and heightened its ability to distinguish tissue types using a component-specific feature extraction method, surpassing over 99% accuracy in breast cancer classification
  - Submitted to Computer Methods and Programs in Biomedicine, Preprint: https://doi.org/10.48550/arXiv.2407.02844

- **High-Performance Intrusion Detection System Using Neural Network Ensembles**
  - Developed a Deep Learning Based Intrusion Detection Framework for classifying the input data among the normal class and four different attack classes.
  - By leveraging a stacking ensemble of three classifiers, the IDS demonstrated superior performance, achieving a remarkable accuracy of 98.22% on the evaluation dataset.
  - Accepted into IEEE International CONference on Electronics, Computing and Communication Technologies (CONECCT), Published article: https://doi.org/10.1109/CONECCT62155.2024.10677096

- **A Channel Attention-Driven Hybrid CNN Framework for Paddy Leaf Disease Detection**
  - Modeled a SwiSeNet classifier based on SENet framework by integrating channel attention mechanism across the network.
  - Solved Leaky-ReLU problem by using Swish-ReLU activation and Set a new performance benchmark with a classification accuracy of 98.8%, eclipsing previous state-of-the-art results.
  - Preprint: https://doi.org/10.48550/arXiv.2407.11753

- **A Deep CNN-Augmented Vision Transformer Framework for Clinical Diagnosis of X-Ray Bone Fractures**
  - Built a Vision Transformer to accurately localize fractured regions in X-Ray images, enhancing diagnostic precision and support advanced medical imaging workflows
  - Currently addressing scalability challenges by incorporating MobileNet to maintain efficiency while not compromising performance at the same time.

Work Experience

- **Zestral** *Chennai, India*
  Co-founder and CTO Oct 2024 - Present
  – **AI-COP**
    * Built a Speech-to-Text transcription application which records voice notes from physicians and transcribes it to text using LLMs appropriately .
    * Improved workflow efficiency by 60% in Kauvery Group of Hospitals, allowing medical professionals to dictate report findings directly, bypassing manual transcription and accelerating the creation of comprehensive medical records.
- **MedxAI Innovations Pvt Ltd.** *Chennai, India*
  AI/ML and Software Developer Intern May 2024 - Jul 2024
  – **EndoBuddy**
    * Improved accuracy of landmark identification in Upper-GI Endoscopy by 30% by introducing EndoVision, a model quantization based algorithm along with attention mechanisms.
    * Developed an automated feedback system to assist gastroenterologists by analyzing time spent on each landmark during endoscopy, ensuring accurate and error-free procedures.
  – **Mediscan**
    * Built an automated report generating application which could be used for different clinical procedures
    * Enhanced workflow efficiency by 60% and reduced data entry efforts by 70% in Anderson Diagnostics and Labs, streamlining processes and optimizing productivity.
  – **CerviLens**
    * Leveraged Graph Neural Networks to develop a system based on Jetson Nano for improving cervical cancer-grade classification during colposcopy procedures.
    * Improved early-stage cancer lesion detection by integrating the system with multiscale lenses enhancing image resolution by 30%
- **Prodapt Solutions Pvt Ltd.** *Chennai, India*
  Backend Developer Intern at NextGen Labs, Department of Delivery Sep 2023– Oct 2023
  – Conducted Time Series Analysis on the datasets provided by the company by utilizing machine learning techniques to identify trends, seasonality and anomalies.
  – Utilized Flask API framework to develop application which involved authentication, session creation and database migration
  – Developed an application for Optical Character Recognition (OCR) to extract specific text from documents and images.

Projects

- **ItinerEase (Smart India Hackathon 2024)** *Aug 2024 - Sep 2024*
  Python, Django, HTML, CSS, JavaScript, AJAX, Gen-AI
  – Developed a personalized itinerary generator application for tourists powered by AI
  – Elevated user satisfaction by improving trip recommendations utilizing RAG and increased personalization by applying continual learning
- **Augmented Autonomous Vision using GANs** *Mar 2024 - Jul 2024*
  Generative Adversarial Networks
  – Performed realistic day-to-night image translation and vice-versa by utilizing a deep convolutional CycleGAN-based solution for enhancing the adaptability and safety of autonomous vehicles in varying lighting conditions
  – Boosted visual data robustness by optimizing image quality and environmental representation and improved AV's perception for safer navigation
  – Earned access to AMD Radeon Instinct Cloud Accelerator with ROCm 6.1.2, worth $24,000.

Technical Skills

Languages: Python, C, C++, Java, SQL, HTML5, CSS3, JavaScript, R, Electron and PHP
Frameworks, Cloud and Databases: PyTorch, TensorFlow, Keras, Scikit-Learn, Hugging Face, streamlit, OpenCV, NLTK, Django, Postman, Flask, AMD Accelerator, PostgreSQL and MongoDB
Coursework: Machine Learning, Artificial Intelligence, Computer Networks, Cryptography and Network Security, Operating Systems, Theory of Computation

Achievements & Extracurricular

- Presented a research paper at a conference hosted by Indian Institute of Science, Bangalore
- Presented a research paper at a conference hosted by Manipal Institute of Technology, Bangalore
- Attended a conference as an author conducted by Hindustan Institute of Science and Technology, Chennai
- Part of the operations department of the University's Game Development Club and extended support in terms of marketing and event management
- Obtained opportunity to be a Teaching Assistant at Machine Learning Lab in VIT Chennai
- Served as a part of the organizing team for a university-wide gaming tournament with over 300 participants.