Akshatha Mohan

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Education

Texas A&M University *College Station, TX*
Master of Science in Computer Engineering, GPA: 3.8/4 August 2022 - May 2024
Coursework: Machine Learning, Parallel Programming, Analysis of Algorithms, Computer Vision, Computer Architecture, Computer Science

Bangalore Institute of Technology *Bangalore*
Bachelor of Engineering in Electronics and Communication, GPA: 9.15/10 August 2017 - May 2021
Coursework: Deep Learning, Data Science, Probability, Statistics, Operating System, Cloud Computing, Software Engineering

Professional Experience

Machine Learning Research Assistant Texas A&M University Advanced Vision and Learning Lab, College Station January 2023 - Present

- Project 1: Generated actionable insights and data-driven recommendations for selecting optimal Explainable AI (XAI) methods, enhancing the interpretability and decision-making of complex ML models in remote sensing applications by up to 66%.
- Streamlined data preprocessing for TorchGeo satellite datasets in **PyTorch**, enhancing model training efficiency by applying efficient **data transformations** such as Min-Max normalization techniques, resulting in a 95% model accuracy.
- Evaluated and validated an ML pipeline using state-of-the-art models (ConvNeXt, Vision Transformers, FocalNets) for remote sensing image classification, achieving an average accuracy metric of 92%. Integrated **MLOps CI/CD** pipelines for automated model deployment and monitoring.
- Project 2: Applied statistical analysis and classical image processing techniques like Canny edge detection, morphological operations (erosion, closing) and image denoising to improve plant phenotype measurements and aid in curation of greenhouse images.
- Implemented best practice machine learning algorithms for **automated image normalization** in multispectral plant imaging, reducing processing time by 83% and improving data quality.
- Streamlined a data collection ML pipeline using the ORB algorithm for **image stitching** multiple viewpoints of an image captured at varying heights, optimizing image alignment, synthesis, and accelerating processing speed by 50%
- Optimized a YOLOv8 deep learning model for precise **image segmentation**, achieving an Intersection Over Union (IOU) of 93%, utilizing OpenCV with **CUDA** for high-performance imaging systems. Performed detailed **exploratory data analysis** by correlating segmented images with dataframe information.

Android Security Software Engineer Ittiam Systems Private Limited, Bangalore August 2021 - July 2022

- Contributed to the software development of fuzzers for Android's Open-Source Project, working on both Linux kernel **hardware compiler and software** user interface for test automation detection, which increased code coverage beyond 80%.
- Developed C++ code in a collaborative environment on the backend of the LLVM infrastructure and syzkaller, to debug code and enhance the security of the Android Open-Source Project (AOSP) platform to demonstrate ability to work independently.

Computer Vision Intern EngineCAL, Bangalore June 2020 - September 2020

- Developed a real-time **Machine Vision** driver assistance leveraging AI for monitoring lanes and vehicles on road including automotive object detection in autonomous vehicles. Implemented real-time alerts via a Telegram bot in a robotic system.
- Configured and optimized Raspberry Pi and **NVIDIA Jetson Nano GPU** camera modules for efficient object recognition tasks and data processing.
- Executed the training and deployment of the MobileNet-SSD v2 algorithm on edge devices, achieving an a 72.7% mean average precision (MAP).

Publications

- A. Mohan and J. Peeples, "Lacunarity Pooling Layers for Plant Image Classification using Texture Analysis", accepted at 2024 IEEE/CVF Computer Vision and Pattern Recognition (CVPR) Vision for Agriculture Workshop [Link]
- A. Mohan and J. Peeples, "Quantitative Analysis of Primary Attribution Explainable Artificial Intelligence Methods for Remote Sensing Image Classification," IGARSS 2023 - 2023 IEEE International Geoscience and Remote Sensing Symposium [Link]
- A. Mohan, et al., "Generation of Netlist from a Hand drawn Circuit through Image Processing and Machine Learning," IEEE 2022 2nd International Conference on Artificial Intelligence and Signal Processing (AISP) [Link]

Research and Projects

Medical Chatbot: LLM and Vector Embedding-Based Medical QA System [Link]

- Engineered a FastAPI application leveraging transformer-based foundation models i.e., LLMs and Retrieval-Augmented Generation (RAG) with SentenceTransformer embeddings and Qdrant vector database, enabling precise medical question-answering and optimized user experience.

Intelligent PDF Query System Using AWS Bedrock and LangChain [Link]

- Developed an interactive tool for chatting with PDF documents using AWS Bedrock, LangChain, Amazon Titan for embedding generation and similarity search, AWS S3 for storage, AWS EC2 for deployment, and Streamlit for the front-end interface.

Master's thesis: Lacunarity Pooling Layer for Plant Image Texture Analysis [Link]

- Conducted research and development on the integration of a textural feature as a novel pooling layer in Convolutional Neural Networks (CNNs) for plant image analysis, enhancing model accuracy to 87% through improved feature engineering and dimensionality reduction techniques.

Facial Recognition using the Viola-Jones Algorithm [Link] Model Training and Evaluation

- Engineered training of a face classifier using the AdaBoost algorithm on a diverse dataset of 2000 face and 1470 non-face images, employing effective preprocessing techniques toenhance model performance.

Technical Skills

Programming Languages	C, C++, Python, R, SQL, Bash, CUDA, Linux, Unix, Perl, Data Structures and Algorithms, node.js
Frameworks/ Libraries	Tensorflow, Pytorch, Pytorch Lightning, Keras, Numpy, Matplotlib, Pandas, Seaborn, SciPy, XGBoost, Scikit-learn, BeautifulSoup, PowerBI, Tableau, LangChain
Cloud Technologies	AWS Sagemaker, AWS Bedrock, AWS S3, AWS EC2, AWS Athena, Azure Data Factory, Azure AI Fundamentals (Certified), Azure Databricks, Snowflake, Hadoop, Apache Spark,
Professional Software/Technology	OpenCV, MATLAB, Git (Version Control System), Data Visualization, NLP, Natural Language Processing