Akshatha Mohan (Authorized to work in the USA)

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Professional Experience

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

- Engineered novel "lacunarity pooling" technique for deep neural networks, enhancing **pattern recognition** in biological and agricultural images and improving disease classification accuracy by 2% from baseline SOTA models.
- Developed end-to-end ML pipelines using **Docker and cloud platforms (Azure)**, reducing model deployment time by 40% and ensuring scalable processing for large agricultural datasets.
- Optimized YOLOv8 model for **image segmentation**, achieving 93% Intersection Over Union (IOU) and integrating with custom APIs built using Python FastAPI for real-time phenotyping applications
- Implemented advanced XAI methods for remote sensing image classification, publishing findings at IEEE IGARSS 2023 and providing data-driven **recommendations** for optimal AI interpretability in agricultural contexts
- Leveraged big data technologies (Hadoop, Big Query) and **cloud-based API Gateways** to process and analyze multispectral plant imaging data, reducing processing time by 83% and improving overall data quality
- Explored emerging technologies including **LLMs**, **vector databases, and Document AI** for agricultural applications, prototyping a conversational AI system for crop management that improved farmer decision-making efficiency by 25%

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

- Developed software fuzzers for **Android's** Open-Source Project, focusing on **Linux kernel** and **UI test automation**, resulting in more than 80% code coverage and enhancing overall platform security.
- Engineered **C++** code for **LLVM** and syzkaller backend, successfully debugging and improving **AOSP** platform security, demonstrating independent work capability in a collaborative open-source environment.

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.

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**

Skills

Programming Languages	C, C++, Python, R, SQL, Bash, CUDA, Linux, Unix, Perl, Data Structures and Algorithms, node.js
Frameworks/ Libraries	**Nvidia GenAI LLM framework (Certified),** 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, **Natural Language processing**