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

- Project 1: Developed and implemented Explainable AI (XAI) methods for imaging analysis, enhancing **interpretability** of complex ML models by up to 66%, crucial for reliable **diagnostics** and treatment planning in healthcare.
- Optimized data preprocessing for large-scale datasets using PyTorch, applying efficient **data transformations and normalization** techniques, resulting in a 95% model accuracy for **disease detection** and classification.
- Engineered an ML pipeline utilizing state-of-the-art models (ConvNeXt, Vision Transformers, FocalNets) for multi-modal medical image analysis, achieving 92% average accuracy. Integrated **MLOps CI/CD pipelines** for seamless deployment in clinical settings.
- Project 2: Applied advanced image processing techniques including **edge detection and morphological** operations to enhance cellular structure visibility in microscopy images, improving accuracy in cell phenotype measurements for drug discovery applications.
- Developed machine learning algorithms for automated normalization of multispectral biomedical imaging data, reducing processing time by 83% and **enhancing data quality** for more efficient drug screening processes.
- Created an ML pipeline for 3D reconstruction of biological specimens using ORB algorithm for image stitching, optimizing alignment of multi-view microscopy images and accelerating processing speed by 50% for improved **structural analysis**.
- Fine-tuned a **YOLOv8** model for precise **segmentation** of cellular structures in high-resolution microscopy images, achieving 93% Intersection Over Union (IOU). Utilized OpenCV with **CUDA** for high-performance analysis of large-scale biomedical datasets.

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 - December 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, DVCS**
Professional Software/Technology	OpenCV, MATLAB, **Git (Version Control System),** Data Visualization, **Natural Language processing**