Ackshay Nagamallu Rajasekar

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Education

Northeastern University Sep 2024 – Present
Master of Science in Artificial Intelligence; GPA:3.75/4.0 *Boston, MA*

National Institute of Technology, Tiruchirappalli Nov 2020 - May 2024
Bachelor of Technology in Electronics and Communication;GPA: 8.42/10.0 *Trichy, India*

Experience

Computer Vision Research Intern Aug 2023 – Nov 2023
Xu Lab, Carnegie Mellon University, Pittsburgh *Remote*

- Experimented with neural style transfer models to blend domain-relevant and natural images, improving stylization quality with an **SSIM of 0.3199** using VGG-based pipelines.
- Employed **PCA-based feature extraction** and fine-tuned **VGG19** for style contrastive learning across **15+** image domain pairs to improve stylization consistency.

AI Research Assistant May 2022 – Jul 2022
Artificial Intelligence Lab, NIT Trichy *Trichy, India*

- Engineered a **TensorFlow-based PSRN** for image super-resolution, achieving **2x–6x upscaling** and a PSNR of **35.428** on benchmark fruit classification data.
- Evaluated PSRN-integrated pipeline on a mango variety dataset, reaching a classification **accuracy of 99.45%** by combining resolution enhancement with **CNN-based** inference.

Projects

CarbonCast | *Streamlit, PyTorch, ARIMA, OpenAI, Plotly* Mar 2025 – Apr 2025

- Built and deployed a carbon emission forecasting dashboard in streamlit cloud using **LSTM, GRU, ARIMA**, and **hybrid models** with a **100-year** forecast horizon across 2 geographic regions.
- Conducted **grid search** across multiple forecasting models, optimizing **LSTM hidden layers, sequence lengths, and learning rates** to minimize error; achieved robust generalization with an average **MSE of 0.03**.

SciChat | *Python, LangChain, OpenAI, Pinecone, FastAPI, ReactJs* Jan 2025 – Feb 2025

- Constructed a scalable **Retrieval-Augmented Generation (RAG)** based chatbot to answer scientific queries, using **GPT-3.5**, dense embeddings (MiniLM), and metadata-filtered vector search.
- Leveraged **FastAPI** to implement REST API endpoints with asynchronous background tasks, reducing latency by **40%** and scaling to **10K+** embedded chunks via **Pinecone**.

AI-Driven Hashtag Recommender System | *NumPy, Scikit-Learn, Flask, TweePy* Sep 2024 – Dec 2024

- Designed a hybrid hashtag recommendation model using a custom **LDA with variational inference** and vector-based similarity search, achieving a **coherence score of 0.645** on **50K+ tweets**.
- Led a team of 5 to build and deploy **Flask app** serving top-5 most relevant hashtag suggestions with **<200ms latency**, supporting real-time recommendations for tweet-like inputs.

Automated Weld Defect Detection | *Pytorch, OpenCV, Scikit-Learn, Numpy* Nov 2023 – Mar 2024

- Architected a **2-stage** end-to-end Weld Inspection and Classification pipeline using **Pytorch** to accurately segment and identify weld defects, achieving a **Jaccard score of 98.12.**
- Developed an **Attention-based U-net model** for high-precision weld defect detection and improved model precision by **15%** for precise weld porosity detection using **OpenCV**.

Publications

Pilot Super-Resolution Network (PSRN)-Based Mango Fruit Classification May 2023
ICMLBDA Conference, Advances in Machine Learning and Big Data Analytics, Springer Nature

Technical Skills

Languages: Python, Java, C++, SQL, HTML/CSS
Frameworks: React, Nextjs, Flask, JUnit, FastAPI, Material-UI, Firebase, Pinecone
Developer Tools: Docker, Git, VSCode, Jupyter Notebook, AWS (EC2, Lambda, SageMaker, Bedrock)
Libraries: PyTorch, TensorFlow, LangChain, OpenCV, Numpy, Pandas, Scikit-Learn, Matplotlib, Streamlit
Research areas: Computer Vision, Natural Language processing, Optimization, Representation Learning