Aryan Mishra

College Park, Maryland
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Education

University of Maryland **Expected: May 2025**
Masters of Engineering in Robotics *College Park, Maryland, USA*

Vellore Institute of Technology **June 2023**
Bachelors of Technology in Electronics and Communication Engineering *Vellore, India*

Research and Work Experience

National Institute of Standards and Technology, US Dept. of Commerce **November 2024 - Present**
Software Developer - Generative A.I. *Gaithersburg, Maryland*

- Part of NIST's Gen AI program, developing robust pipelines for the detection of authentic and fabricated multi-modal inputs. Using statistical methods deriving metrics and evaluation terms for evaluating the same.

Department of Statistics **August 2024 – Present**
Machine Learning Researcher *College Park, Maryland*

- Generated high dimensional data using intrinsic Gaussian processes and heat kernel map. Tested data for classification and regression tasks using a manifold regularization term.
- Testing different objective functions for the generator network of conditional GAN's. These include theoretically developed penalty terms to make the generator network produces more realistic images.

Tubaldi Lab, Dept. of Mechanical Engineering **January 2024 – December 2024**
Machine Learning Researcher *College Park, Maryland*

- Deployed VNET with Attention Mechanism on the Stanford Type B Aorta Dissection dataset, achieving a Dice Coefficient of 0.80, Jaccard Mean of 76.3, AsD Mean of 0.98, and Dice Overlap of 92.3%. Developed a transformer-based encoder for the VNET architecture.
- Developed soft robotic grippers, 3D-printed bases, and machine learning models to predict object size, shape, and material from Pressure-Volume curves and tactile data.

Projects

Vision Language Model **August 2024 - December 2024**

- Combining 400M SigLIP and 2B Gemma Models into a sub-3B VLM works for VQA, QA tasks and referring segmentation.

Multimodel Trajectory Prediction **July 2024 - August 2024**

- Addressing the uncertainties faced by self-driving vehicles with a Multiple Trajectory Prediction (MTP) model by predicting multiple possible paths and the likelihood of each using probability adhering to geometric and angular meaning using the NuScenes Dataset.

Retrieval Augmented Generation - RAG **June 2024 - July 2024**

- Implemented a Retrieval Augmented Generation (RAG) pipeline using the Gemma-2-9b-it LLM modeL.Achieved high efficiency for real-time query answering, optimizing for scalable performance and reduced latency.

Generative Adversarial Networks - GAN **June 2024**

- Successfully deployed multiple GAN models, including Deep Convolution GAN, Cycle GAN, and Progressive GAN, on diverse datasets such as MNIST, CelebA, and the Summer to Winter Yosemite dataset.

Skills

Programming: Python, C++, Rust, SQL, CUDA
Libraries: TensorFlow, PyTorch,JAX, NumPy, Pandas, Matplotlib, Seaborn, Pillow, Scikit-Learn, OpenCV, LangChain, Hugging Face
Robotics Architecture and Tools : Robot Operating System, Gazebo, RVIZ, Moveit
Deep Learning and A.I. Architectures: Semi-Supervised Learning, CNN, RNN, LSTM, GAN, StyleGAN, Transformers, Vision Transformers, Large Language Models, Large Multimodal Models, Flow Matching , Diffusion Models, RLHF
Cloud Development: AWS,Sagemaker,S3, MLOps
Computer Architecture Tools: Linux, Git/GitHub, Docker
Domain Skills: Robot Perception, Localization, Deep Learning, Computer Vision,Artificial Intelligence, Microsoft Suite, Content Writing