Siddharth Satyam

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Education

University of California, San Diego **Sept 2022 - May 2024, GPA - 3.8/4**
MS in Machine Learning and Data Science (ECE) *La Jolla, California*

- Coursework: Statistical Learning (Bayesian Estimation, Gaussian mixture models), Linear Algebra, Probability and Statistics, Operating Systems, Statistical Natural Language Processing, Deep Generative Models

Indian Institute of Technology, Kanpur **July 2018 - May 2022, CPI - 9.4/10**
Bachelor of Technology in Mechanical Engineering *Kanpur, India*

- Coursework: Numerical Methods, Deep Learning in Mechanical Sciences, Data Structures and Algorithms, Cryptology
- Part of vehicle dynamics subteam at the university SAE team, participated in Virtual BAJA SAEINDIA 2019.

Work Experience

Valeo **June'23 – Sep'23**
Machine Learning Software Engineer Intern - Autonomous driving *San Mateo, CA*

Project 1: Pothole Detection using LiDAR Point Cloud data

- Worked on point cloud labeling methods - modified an OpenGL-based open source tool for combining point clouds through point cloud registration using KISS-ICP for pose generation, and created a button for fixing point cloud view.
- Achieved 60% mIoU on semantic segmentation task on Scala3 LiDAR data for ground classes using SalsaNext model.

Project 2: Lost Cargo object detection and LiDAR Point Cloud Density Optimization

- Performed bounding box annotation on Scala3 LiDAR data and trained on PointPillars model for lost cargo detection.
- Optimized the LiDAR point cloud density using MCMC iterations and Deterministic-grid based resampling to increase the object detection performance on PointPillars by 2%.
- Implemented state-of-the-art data augmentation techniques to prevent imbalance in the data by inserting objects at apt positions in the LiDAR range projection.

Lenek Technologies **May'22 – Aug'22**
Data Science Intern *Remote*

- Performed the semantic segmentation of Left Ventricle in cardiac ultrasound images with fIoU of 95%.
- Created an Ejection Fraction prediction model with 5.91 test MAE using a R2+1D pytorch architecture.
- Applied Swin Transformers, a Vision Transformer architecture, to effectively denoise cardiac ultrasound images.

CSE Department **Jan'24 – Mar'24**
Teaching Assistant - Computer Vision 2 (CSE 252B) *UC San Diego*

- Devised assignments aimed at extracting and matching image features, estimating Essential and Fundamental matrices utilizing stereo image geometry from scratch in Python. This facilitated 3D scene reconstruction through optimal triangulation and involved optimization using the Levenberg-Marquardt technique.

Projects

Object Material Estimation with Multimodal LLM | Course project | *CSE 252D* **April'24 - June'24**

- Developed a multi-modal model for object material estimation from audio-visual cues, leveraging transformer-based approaches and pre-trained language models.
- Performed PEFT using QLoRA on Macaw-LLM (CLIP + Whisper + Llama) on datasets of impact sounds and images.

Deep Diffusion Models for Image Generation | Course project | *ECE 285* **Feb' 23**

- Developed a Deep Diffusion Probabilistic Model (DDPM) as a core component of the Deep Generative Models course.
- Employed Denoising Diffusion Implicit Models (DDIM) technique to enhance the sampling process, resulting in accelerated generation of MNIST images with superior quality and computational efficiency.

Publications

Long Short-Term Memory Implementation Exploiting Passive RRAM Crossbar Array **IIT Kanpur**
IEEE Transactions on Electron Devices, doi: 10.1109/TED.2021.3133197 ***[arXiv]*** *Prof. Shubham Sahay*

Energy-Efficient Implementation of GANs on Passive RRAM Crossbar Arrays **IIT Kanpur**
Accepted at IEEE Design Automation Conference 2024, San Francisco ***[arXiv]*** *Prof. Shubham Sahay*

Technical Skills

Languages: Python, C, C++, MATLAB, FORTRAN, SQL, Java
Libraries: NumPy, Pandas, Matplotlib, Keras, Tensorflow, Pytorch, Hugging Face, OpenCV, PCL, Open3D, ROS
Cloud Technologies: Docker, Kubernetes, SAP Cloud Platform (SAP BTP)
Development: Qt, Cmake, C++ Eigen