Shubham Gupta

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Education

New York University — New York City, US
Master of Science in Computer Engineering — GPA: 3.75/4.0 — *May 2024*

PES University — Bangalore, India
Bachelor of Technology in Computer Science and Engineering — GPA: 8.39/10.0 — *May 2022*

Publications

- Lee, K., **Gupta, S.**, Kim, S., Makwana, B., Chen, C., & Feng, C. (2023). SO-NeRF: Active View Planning for NeRF using Surrogate Objectives. arXiv preprint arXiv:2312.03266. **[preprint]** **[code]**
- **Gupta, S.**, Uma, D., Hebbar, R. (2023). Analysis and Application of Multispectral Data for Water Segmentation Using Machine Learning. In: Tistarelli, M., Dubey, S.R., Singh, S.K., Jiang, X. (eds) Computer Vision and Machine Intelligence. Lecture Notes in Networks and Systems, vol 586. Springer, Singapore. https://doi.org/10.1007/978-981-19-7867-8_56 **[preprint]** **[code]** **[publication]** **[slides]**
- **Gupta, S.**, Ravishankar, R. K., Gangaraju, M., Dwarkanath, P., & Subramanyam, N. (2022). WSSL: Weighted Self-supervised Learning Framework For Image-inpainting. arXiv preprint arXiv:2211.13856. **[preprint]** **[code]** **[publication]** **[poster]**

Scholarships and Awards

- Granted Merit scholarship of $16000 at New York University (2022-24).
- Granted Distinction Award Certificate in Semesters I, II, IV, V, VI, VII, and VIII at PES University.
- Granted the MRD scholarship(top 20% of the department) in Semesters V and VI at PES University.
- Secured 1^{st} place at MIT Covid19 Challenge India: Track I as Team Collective (2020).
- Secured 3^{rd} place at Prakalpa science exhibition at PES University for demonstration of Chladni patterns (2019).

Experience

AI4CE Lab — May 2023 – Present
Student Researcher— Advisor: ***Dr. Chen Feng*** — *New York City, USA*

- Worked on optimizing camera trajectory by applying Active perception for Neural Radiance Fields. **[ArXiv]**.
- Carried out large scale experiments on NYU HPC cluster for verifying hypothesis.

NYU Courant Institute — February 2023 – Present
Climate Modeling Research Assistant — Advisor: ***Dr. Laure Zanna*** — *New York City, USA*

- Co-wrote and reformatted content in *Machine Learning with Lorenz-96* to make climate modeling using machine learning more beginner friendly. **[L96_demo]**
- Maintaining and updating user experience for the *M²LInES* website. **[M²LInES]**

NYU Marron Institute — January 2023 – August 2023
Urban Transit Research Assistant — Advisor: ***Dr. Elif Ensari*** — *New York City, USA*

- Achieved an accuracy of **85%** in classifying boundaries from Google Street View data for the **IBX project**.
- Experimented with **Open Vocabulary Semantic Segmentation** models: **X-Decoder** and **Grounded-SAM**, and **ViT-Adapter** to self annotate man-made boundaries from data.

NYU Robomaster — September 2022 – Present
Computer Vision Lead - Mentor: ***Chris DiMauro*** — *New York City, USA*

- **Leading** an interdisciplinary team of fifteen to train, optimize and deliver a detection and tracking solution.
- Secured 5^{th} place in RoboMasters University League 2023, against twenty teams from USA, Singapore, and Japan.
- Cut YOLOv5 inference latency by 40% using **TensorRT** on Jetson and x86, deploying in Docker NGC containers.

Aruba, a Hewlett Packard Enterprise company January 2022 – July 2022
Software Development Intern - Manager: ***Sachin Sanap*** *Bangalore, India*

- Developed **SQL** queries and **SpringBoot** APIs for customer device and app usage insights in production.
- Created a tool for developers to visualize customer statistics using **Grafana**, SQL, **Elasticsearch**, and **Python3**.

CBeyond Technologies LLP November 2021 – June 2022
Founder and CTO *Bangalore, India*

- **Founded** a company to make Computer Vision based SaaS solutions available to the general public.
- FacePass: We aim to provide a face authentication system as an alternative to fingerprint system. Our solution will focus on having **zero contact points** to comply with covid restrictions.

Regional Remote Sensing Center - South, ISRO August 2019 – April 2020
Research Intern — Advisor: ***Dr. Hebbar R*** *Bangalore, India*

- **Published work** at the international conference of Computer Vision and Machine Intelligence (CVMI 2022).
- Demonstrated a Sentinel-2 data pipeline with **SnaPy** and **GDAL** for water body detection, **eliminating** manual annotation. Tested on DeeplabV3+ and a custom architecture for near real time water segmentation.

Center for Data Science and Applied Machine Learning, PES University June 2019 – August 2019
Research Intern — Advisor: ***Dr. Uma D*** *Bangalore, India*

- Developed a model to monitor open water bodies from aerial drone images using **DeepLabv3+**.
- Won 1^{st} place in one of the three internal hackathons and won 'L2' position for the final project demonstration.
- **Recommended** to work with scientists at RRSC-S, ISRO.

Projects

SO-NeRF | **[Website]** | *PyTorch, Python3, HPC, Blender, NerfStudio* | *Open-Source* 2023

- Developed an active perception pipeline for Neural Radiance Fields that provides us with an optimal view trajectory prior to NeRF training.
- Our method shows a $\sim$ 80x speedup over the present day baseline in Active Perception for Neural Radiance Fields.

Cavemen: A prehistoric approach for Mapless Navigation | **[Website]** | *Python3, Github, FAISS, Redis* 2023

- End of Semester project for Robot Perception course where we demonstrate Dead Reckoning, Visual Bag of Words (VBoW), A* algorithm, and system design concepts.
- We achieve the fastest possible time to navigate to a target view in a maze without having prior knowledge of the map. Our solution visualizes the robot's location in **real-time**.
- Our solution is able to scale to maps of large size and generate VBoW of 18000 images under 3 minutes.

Compressed Sensing | **[Website]** | *Python3, Numpy, Github, JupyterBook* 2023

- End of Semester project for Image and Video Processing course where we demonstrate Compressed Sensing for MRI data using primal dual splitting algorithm to reduce scan lengths.
- We compare the performance and convergence on random and equidistant masks.

Leave Your Clothes Behind | **[Website]** | *Python3, HPC, PyTorch, Blender, Pytorch3D* 2023

- End of Semester project for the Deep Learning course where we demonstrate virtual try-ons for online shopping.
- We present a pipeline thay uses **SAM** to extract the clothes from a monocular handheld video and **COLMAP** to generate camera parameters. We then feed it to **NeRF2Mesh** to create a exportable mesh.

Talks

- Demonstrated how to use Singularity and Anaconda on NYU HPC clusters for machine learning and software development as the Computer Vision Lead at NYU Robomaster (2023).
- Hosted Android Study Jams as the Head of Android Development at Google Developer Student Club, PES University Chapter. The workshops introduced Android development using Kotlin and attracted over a 1000 unique views (2021).

Technical Skills

Languages: Python3, C++, Java, SQL, Javascript, Shell, Lucene, LaTeX
Libraries: PyTorch, Pytorch3D, Onnx, TensorRT, OpenCV, Scikit-learn, Numpy, Pandas, Numba, PyRealSense2
Frameworks: ROS2, SpringBoot, Flutter, Hadoop, Elasticsearch, Jekyll, Hugo, Jenkins, Kubernetes, CUDA
Applications: HPC, AWS, GCP, Docker, Grafana, QGIS, Github, Jira, Confluence, Firebase Postman, Blender
Certifications: Associate Cloud Engineer, Architecting with Google Compute Engine, 30 Days of Google Cloud