Raavi Gupta

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Columbia University *New York, NY*
Master of Science in Computer Science (Machine Learning Specialization) *2024 – (expected) 2025*

Indian Institute of Technology (IIT) Bombay *Mumbai, India*
*B.Tech. (with Honors) in Electrical Engineering with Minor in AI (GPA : **9.22/10.0**; top 10% in class of 200+) 2020 – 2024*
Achievements: KVPY Fellowship (Rank: 385/0.1M), JEE Advanced (Rank: 817/0.15M) ['20]; INMO Awardee ['19]

Internships

Piramal Capital and Housing Finance Limited | Machine Learning Intern *May' 23 - July' 23*

- Achieved **20.4%** improvement in transaction categorization accuracy using a 3-stage pipeline equipped with **LLaMA-7B**
- Institutionalized **2500$** in annual cost savings by using fuzzy matching on webscraped domain information of **0.8M+** companies | Additionally, saved computational resources by using 7B model instead of 13B for categorization

FinIQ Consulting | Quantitative Analyst Intern *November' 22 - December' 22*

- Formulated a pricing model for low-volatility **Target Redemption Forward** structured products
- Implemented the **Black-Scholes method** for option pricing using **geometric Monte Carlo** simulations
- Designed a **neural network** based **BackSolve** of derivative pricing to maximize payoff in Fixed Coupon Notes products

Research and Technical Projects

Hallucination Detection of Large Language Models (in collaboration with Adobe India) *August' 23 - Present*
Advisor: Prof. Ganesh Ramakrishnan | Bachelor Thesis *Computer Science and Engineering, IIT Bombay*

- **Designed** a **novel** method for detecting factual inaccuracies in LLM responses without using external databases
- Surpassed the SOTA AUC-ROC by **12%** (among other results) for Mistral-7B answers evaluated on the NQ Open dataset
- Submitted a **research paper** summarizing results to the ACL rolling review process – June ARR 2024

Algorithmic Construction of Lyapunov Functions *June' 22 - August' 23*
Advisor: Prof. Debasish Chatterjee | Research Project *Systems & Control Engineering, IIT Bombay*

- Devised a novel method to algorithmically construct Lyapunov functions for nonlinear vector fields
- **Outperformed** the **SOTA** `SOSTOOLS` library in handling non-polynomial continuous black-box vector fields
- Conferred with the **undergraduate research award** (URA 01) | Awarded to **5/200+** students in class of 2024

Unsupervised Segmentation of Agricultural Crop Fields *January' 24 - May' 24*
Advisor: Prof. Rajbabu Velmurugan | Bachelor Thesis - II *Electrical Engineering, IIT Bombay*

- **Automated** normalized difference vegetation index **calculation** of crop patches | Achieved **0.02 MSE** on custom dataset
- Aligned six-channel multispectral images using MicaSense and segmented the images using the Segment-Anything model

InterIIT Tech Meet 12.0: Tooling up for Success *December' 23*
Problem Statment Lead | DevRev *IIT Bombay*

- **Spearheaded** a team of **12 members** for creating an LLM-planner customized for DevRev use-case
- Implemented multiple research papers for fine-tuning, prompt-engineering, automated data generation among others
- Secured **third position** overall in the competition among **21 IITs** across India with **1000+ participants**

Autonomous Underwater Vehicle (AUV-IITB) *January' 21 - July' 22*
Advisor: Prof. Leena Vachhani | Student Technical Project *Systems & Control Engineering, IIT Bombay*
A student team which develops underwater vehicles capable of performing naval tasks, competing annually at RoboSub, San Diego

- Implemented Simultaneous Localization & Mapping Algorithm to map vehicle's path using data from localization sensors
- Achieved 7th place out of 39 teams [Robosub' 22] | Ranked 2nd out of 54 teams in Propulsion Design [Robosub' 21]

Publications

S. Chattopadhyay, **R. Gupta**, P. Paruchuri and D. Chatterjee,"An algorithmic recipe to construct Lyapunov functions for continuous vector fields," 2024 Australian & New Zealand Control Conference, doi: link

Technical Skills

Programming Languages Python, C/C++, MATLAB, Bash, SQL, HTML, CSS, JavaScript, VHDL, ARM
Technologies/Frameworks PyTorch, TensorFlow, Keras, Transformers, Docker, Git
Courses Optimization in ML, Markov Chains and Queuing System, Game Theory, Organization of Web Information, Blockchain and Cryptocurrencies, Reinforcement Learning