Harsh Patel

(+1) 858-247-9926 | h1patel@ucsd.edu | harshp1802.github.io | harshp1802 | harshp1802 | Harsh Patel

Education

University of California San Diego — *California, USA*

M.S. Computer Science and Engineering (GPA: 4/4) [***Transcript***] — *2022 - Mar 2024*

Relevant Coursework: Search & Optimization, Math for Robotics, Algorithm Design, Unsupervised Learning

Indian Institute of Technology Gandhinagar — *Gandhinagar, India*

B.Tech. with Honours in Computer Science and Engineering (CPI: 9.01/10) [***Transcript***] — *2018 - 2022*

Technical Knowledge

Programming Languages: Python, C, C++, Go, MATLAB, SQL, Verilog, JavaScript, HTML, CSS, SLURM Scripting

Tools: Git, Airflow, PyTorch, Tensorflow, Docker, Kubernetes (Beginner), ROS, OpenCV, GCP, LaTeX, Huggingface, Databricks

Relevant Experiences

Lucid Motors — *Newark, California*

Sr. Data Scientist | Manager: Dr. Anuradha Kodali — *April 2024 - Present*

- Joined the team and quickly made remarkable contributions by *leading the adoption of Generative AI* for automating customer care data analysis. This initiative reduced manual workforce effort by **90%**, streamlined operations, and provided valuable insights from customer feedback, resulting in potential significant process improvements.
- Enabled the transition from rule-based to *ML-driven anomaly detection* for vehicle fleet security. This enhancement significantly reduced false positives by **50%**, simplifying the validation of cybersecurity threats. Proposed and implemented feature importance techniques, which enhanced the explainability and reliability of vehicle security operations.

Nokia Bell Labs — *Murray Hill, New Jersey*

Autonomous Systems Research Intern | Mentor: Mrs. Buvaneswari Ramanan — *June 2023 - August 2023*

- Leveraged large language models (LLMs) to enhance Nokia's patent-pending, proprietary MLOps platform for the end-to-end operations of ML-based use cases. [*Manuscript under review at IEEE Transactions on Artificial Intelligence*]
- Developed innovative task-specific knowledge enrichment strategies, involving automatic retrieval using Langchain and vectorstores, to improve the performance of LLMs in complicated code generation tasks.

Nanyang Technological University — *Singapore*

Research Intern | Mentor: Prof. Erik Cambria — *May. 2021 - Jul. 2021*

- Developed a *deep multitask learning* framework that enhances the performance of Negation Scope Detection using POS tagging as an auxiliary task. Used *transformers* and *neural tensor fusions* to leverage the inter-task correlations. Achieved **5%** improvement over the baseline models.

Mysuru Consulting Group (MCG AI) — *Mysuru, India*

Machine Learning Intern | Mentor: Mr. Gautam Ramachandra (CTO) — *Apr. 2020 - June. 2020*

- Conducted advanced data processing and analysis to extract valuable insights from financial datasets. Used LSTMs for stock market excess return forecasting.

Publications

Harsh Patel, Buvaneswari A. Ramanan, Manzoor A. Khan, Thomas Williams, Brian Friedman, Lawrence Drabeck, **Automating Code Adaptation for MLOps – A Benchmarking Study on LLMs** [***arxiv***]

Zeel Patel, **Harsh Patel***, Palak Purohit*, Shivam Sahni*, Nipun Batra, **Accurate and Scalable Gaussian Processes for Fine-grained Air Quality Inference**, Thirty-Sixth AAAI Conference on Artificial Intelligence (**AAAI (2022)**) [***doi***]

Harsh Patel, Xulang Zhang, Qian Liu **Enhancing Negation Scope Detection using Multitask Learning**, 2021 International Conference on Data Mining Workshops, (**ICDMW (2021)**) [***doi***]

Harsh Patel*, Praveen Venkatesh*, Shivam Sahni*, Varun Jain*, Mrinal Anand, Mayank Singh, **Program Synthesis: Does Feedback Help?**, ACM India 5th Joint International Conference on Data Science and Management of Data (**CoDS-COMAD (2022)**) [***doi***][***poster***]

Rohan Patil*, Raviraj Dave*, **Harsh Patel**, Viraj Shah, Deepayan Chakrabarti and Udit Bhatia, **Assessing the interplay between travel patterns and SARS-CoV-2 outbreak in realistic urban setting**, (***Applied Network Science* 6, 4, SpringerOpen(2021)**) [***doi***]

Projects

Advancing Model-Agnostic Text Dataset Distillation **GitHub Repo** **Arxiv** — *UC San Diego*

Mentor: Prof. Jingbo Shang ▷ NLP | Deep Learning | Efficient Learning — *Apr. 2023 - June 2023*

- Developed novel text-dataset distillation techniques that demonstrate strong cross-architecture generalization capability, enhancing efficiency and performance in natural language processing tasks. Achieved a remarkable 95% distillation ratio with just 30 samples.

Robust, Scalable, & Fault-Tolerant Networked File Storage Service — *UC San Diego*

Mentor: Prof. George Porter ▷ Networked Systems Design | Distributed Cloud Computing — *Jan. 2023 - Mar. 2023*

- Developed a cloud-based file storage system, leveraging **gRPC** for streamlined communication, **Consistent Hashing** for efficient load balancing, and the **RAFT** consensus algorithm to ensure fault-tolerance and consistency.

Exploring Options Trading Strategies for GLD Stock | **Portfolio Summary** — *UC San Diego*

Mentor: Prof. David Sworder ▷ Portfolio Management | Mathematical Finance — *Jan. 2023 - Mar. 2023*

- Managed a hypothetical GLD stock portfolio as a part of a course project. Devised strategies using OptionStrat platform, which uses mathematical models (Eg. Black-Scholes), along with adaptations in response to pertinent global economic events. Achieved a 301.21% return, turning $10,000 into $40,121.20 within a 10 week period.

Motion Planning, Localization and Mapping using Qualcomm Robotics RB5 platform | **Demo** — *UC San Diego*

Mentor: Prof. Henrik Christensen ▷ Robotics | Simultaneous Localization and Mapping — *Sept. 2022 - Dec. 2022*

- Implemented fundamentals of robotics on MegaBot mBots with on-board *Qualcomm RB5 platform*. Covered several aspects including kinematics, vision & perception, localization, control and motion planning for the robot.

Accurate and Scalable Gaussian Processes for Fine-grained Air Quality Inference | **Repo** | **GP-Viz** — *IIT Gandhinagar*

Mentor: Prof. Nipun Batra ▷ Applied & Data-Driven Machine Learning | Bayesian Modeling — *Aug. 2021 - May 2022*

- Implemented stationary & non-stationary probabilistic **Gaussian Process** models for urban air quality estimation - as spatio-temporal regression. Our **uncertainty-aware** approach outperformed conventional baselines on standard air quality datasets.

Explainability Methods for Graph Neural Networks - Super-pixel Image classification | **Arxiv** — *IIT Gandhinagar*

Mentor: Prof. Anirban Dasgupta ▷ Computer Vision | Explainable AI — *Jan. 2022 - May. 2022*

- Demonstrated the performance of explainability methods on Graph Attention Networks for super-pixel image classification task.

Exploring Constrained Reinforcement Learning for Autonomous Driving | **GitHub Repo** — *IIT Gandhinagar*

Mentor: Prof. Nipun Batra ▷ Reinforcement Learning | Policy Optimization & Evaluation — *Jan. 2021 - May. 2021*

- Investigated the adaptability of safe reinforcement learning by training agents with algorithms such as Constrained Policy Optimization for custom environments.

Image Inpainting using Partial Convolutions | **GitHub Repo** — *IIT Gandhinagar*

Mentor: Prof. Shanmuganathan Raman ▷ Computer Vision | Deep Learning — *Feb. 2021 - May. 2021*

- Implemented [Image Inpainting for Irregular Holes Using Partial Convolutions] a U-Net based deep neural network architecture with Partial Convolution Layers to regenerate missing pixel values in images.
- Applied feature representation based perceptual and style loss functions to enhance the performance of image restoration.

Mini-Face: Miniature protoype of Facebook | **GitHub Repo** — *IIT Gandhinagar*

Mentor: Prof. Sameer Kulkarni ▷ Networking Fundamentals | Concurrent System Design — *Oct. 2020 - Dec. 2020*

- Designed and implemented a networks tool that mimics the functionalities and features of Facebook using various networking paradigms such as Client-Server TCP (Transmission Control Protocol), Concurrency and Data Transfer.

Assessing the role of transportation networks in disease outbreak — *IIT Gandhinagar*

Mentor: Prof. Udit Bhatia ▷ Urban Planning | Network Science | Data Analysis — *Jan. 2020 - Dec. 2020*

- Developed a **Decision Support System** that simulates COVID-19 spread in various urban zones under different lockdown strategies.

Honors and Community Engagement

2024 **Teaching Assistant - Unsupervised Learning**, UC San Diego

2022 **Cash Award for Journal Publication**, IITGN ($140)

2022 **Awarded Shri Onkarprasad Tandon Scholarship**, for academic performance at IITGN ($1250)

2021 **Teaching Assistant - Machine Learning and Natural Language Processing courses**, IITGN

2021 **Pull Request (PR) accepted for PyMC**, Open source GitHub package for Bayesian statistical modeling

2019 **Leadership - Core Committee Member**, Amalthea - Tech Summit, Jashn - Cultural Fest at IITGN

2018 **Joint Entrance Exam (JEE)**, All-India-Rank 143 out of 1.13 million candidates