Archit Rathod

Chicago, IL, USA arath21@uic.edu +1 331-270-7909 Portfolio LinkedIn GitHub

Education

University of Illinois Chicago **Aug 2024 – May 2026**
Master of Science in Computer Science ***Relevant Coursework**: Applied Machine Learning, Natural Language Processing, Big Data Analytics*

University of Mumbai **Aug 2020 – May 2024**
Bachelor of Engineering in Information Technology *CGPA 9.35 / 10*

Technical Skills

Languages: Python, JavaScript, TypeScript, C++, Shell, HTML, CSS
Frameworks & Libraries: React.js, Next.js, Node.js, FastAPI, Flask, PyTorch, TensorFlow, CUDA
Databases: MySQL, MongoDB, BigQuery, Neo4j
Cloud & DevOps: Google Cloud Platform (Cloud Run, Vertex AI, VMs), AWS (EC2, Amplify, Lambda), Docker, Kubernetes
Tools & Other: Git, GitHub Actions, WebRTC, Tailwind CSS, jQuery, Looker Studio
Tools & Techniques: Statistical Methods (Regression, Clustering), Machine Learning (SVM, LSTM), PEFT (LoRA), Transformers, Vision Transformers, Anomaly Detection, Foundation Models, Natural Language Processing (TF-IDF), Mathematical Modeling

Professional Experience

Research Assistant **Feb 2025 – May 2025**
University of Illinois Chicago *Chicago, USA*

- Developing a **geospatial analysis pipeline** using **OSMnx, NetworkX, and Python** to construct a **road network graph** of Chicago, optimizing node reduction by filtering **primary and secondary roads** for computational efficiency including **40-45 intersections**.
- Engineering a **graph-based cycle detection model** to identify **traffic congestion zones**, implementing **bounded cycle search algorithms** to determine optimal camera placements, improving city planning insights around **3-5 miles** of the city centroid.
- Developed **Python-based models** for identifying urban congestion zones using **graph analytics** and **cycle detection**, contributing to **predictive modeling** for smart city planning

Research and Web Engineer **Mar 2023 – Jul 2024**
SimPPL *New York, USA (Remote)*

- Developed a full-stack **Next.js** web application for ethical AI research by integrating a **FastAPI** backend and **GCP Compute** for deploying LLMs. Applied NLP techniques for real-time text data analysis and summarization to detect toxic responses, aligning with ethical AI goals.
- Built an interactive **network graph visualizer** in **React.js, Node.js, and Neo4j**, overcoming visualization limitations of **Gephi** to analyze large-scale social media data with **20000+ nodes** and **100K+ edges**. **Link**
- Engineered an **automated GCP pipeline** to scrape and store **2,300+ Stormfront threads** into **BigQuery**, enabling real-time data collection and analytics for research on extremist content under **Prof. Deb Donig** at UC Berkeley.
- Led data engineering efforts in a **large-scale YouTube project**, collecting and processing **80M+ comments across 440K videos**. Created **Looker Studio** dashboards and **optimized BigQuery SQL queries**, increasing analysis efficiency and securing a **5x API limit increase from YouTube**. **Link**

Software Developer and AI Engineer **Dec 2023 – Jun 2024**
Digital Information Research Lab, Boston University *Boston, USA (Remote)*

- Led a team of **14 engineers** to develop a **gamified virtual marketplace** in **React.js and Empirica.ly**, simulating economic decision-making with **2000+ human participants** and **agentic AI sellers**.
- Built **mathematical models** using **LLM-driven** agents for simulating decision-making behavior, enabling large-scale behavioral data analysis, **AWS and Prolific** following an **Agile** development methodology.
- Researched **transformer fine-tuning** methods for improving model efficiency and adaptability.
- Designed and implemented **multi-stage game logic** in **JavaScript** with **8 consumer-producer strategies**, ensuring a seamless **Figma-to-code** conversion using **Tailwind CSS and React.js** for enhanced UX. **Link**

Teaching Assistant - Python Lab (ITL404) **Aug 2022 – Nov 2022**
University of Mumbai, Department of Information Technology *Mumbai, India*

- Conducted lab sessions for **25 students**, defined lab objectives, and helped in the practical implementation of **Python** concepts like advanced data types, OOPs, file handling, and web programming with **RESTful APIs** guided by **Dr. Arun Kulkarni**.
- Developed and evaluated lab assignments covering Python, providing one-on-one assistance and enhancing student comprehension and performance, resulting in an average score improvement of **20%**.

Research Intern **May 2021 – July 2021**
Kaizen Future Tech *Mumbai, Maharashtra*

- Built and trained image classification models for detecting natural disasters using **Convolutional Neural Networks (CNNs)** and **ResNet**, achieving up to **95% accuracy**.
- Developed a **stacked ensemble** model combining CNN and ResNet predictions, using **XGBoost** as a meta-classifier to improve generalization and precision in disaster type detection.
- Cleaned and curated a large-scale disaster image dataset (30K+ images) from **Incidents1M**, applying data augmentation and duplicate removal techniques to ensure model robustness.
- Conducted experiments with **hyperparameter tuning, batch sizes, and epochs**, optimizing training using **EarlyStopping**, model checkpoints, and **TensorFlow GPU acceleration**.

Projects

RealEstateAI | *Conversational AI for Real Estate* **GitHub**

- **Tech**: Next.js, Tailwind CSS, React Context, LLMs, Google Maps API, Zillow API, Framer Motion
- Developed a full-stack real estate discovery platform with a **conversational UI**, enabling users to query properties via natural language, achieving **85%+** intent classification accuracy using custom **NLU** pipelines.
- Engineered **12+** dynamic, modular components including property cards, agent chat simulation, and transit/restaurant visualizations; improved user engagement via **session-persistent bookmarks** and **stateful UI** routing.
- Integrated APIs for real-time property data, local amenities, and transit options; implemented reverse **geocoding** and **geospatial filtering** to support location-based insights across **1000+** ZIP codes.
- Deployed a scalable full-stack system on Vercel, enhancing user interaction through multilingual support and modular architecture, collaborating with professional mentors at **G19 Studios**.

Attire.AI | *AI-Powered Fashion Assistant* **GitHub**

- **Tech**: Stable Diffusion, LoRA, LLama, FastAPI, MongoDB, Next.js, Terraform, Docker, AWS Lambda
- Built an **AI-driven fashion recommendation system** with real-time **image augmentation**, upscaling images from **512p to 2048p** and a **conversational chatbot** powered by **Stable Diffusion** and **LoRA fine-tuning**.
- Built a **full-stack application** with **WebRTC** for seamless user interactions and **MongoDB** for scalable fashion data storage.
- Deployed an end-to-end **CI/CD** pipeline with **GitHub Actions and Docker**, automating deployments to **Vercel** and **AWS Amplify** with **FastAPI**, reducing infrastructure costs by **30%**.

Social Vision | *Detecting Coordinated Inauthentic Behavior on Twitter* **GitHub**

- **Tech**: Next.js, FastAPI, MongoDB, TF-IDF, LSTM, Support Vector Machines
- Developed a **graph-based model** for detecting **coordinated disinformation networks**, achieving **94.6% accuracy** in **14 class** agenda and propaganda detection.
- Built an **interactive React.js dashboard** with a **FastAPI backend** for real-time visualization and analysis of inauthentic Twitter activities.
- Worked on a **Python** pipeline for summarizing and analyzing large-scale social media threads using **rule-based** and **ML-based** techniques

Research and Publications

Ascend.ai - Building Confidence Through Technology: A Technical Exploration of Facial Expression, Tone and Pitch Analysis with Chatbot Guidance. – Springer Scopus Series, ICDSA 2024

Leveraging CNNs and Ensemble Learning for Automated Disaster Image Classification – Springer Book Series 'Algorithms for Intelligent Systems', ICSISCET, 2023 **ArXiv**

Multi-Agent Simulators for Social Networks – Multi-Agent Security (MASEC AI) Workshop, NeurIPS 2023 **ArXiv**

Extracurricular Activities

Contributed to 'Sakhi', a WhatsApp chatbot using LLMs to improve menstrual health literacy in rural Bangladesh. **Details**
Participated in 10+ hackathons and won 6 of them. **Certificates**
Conducted a React.js Crash Course named 'React Zero-to-Hero' under the HoD of IT department. **Details**
Gave an invited talk at a Fellowship backed by Google Research and Mozilla on the YouTube Data Project. **Details**