Omkar Nayak

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Education

University of Michigan **Ann Arbor, MI**

Honors B.S in Computer Science and Mathematics *Expected Graduation - May 2026*

- **Awards:** LSA Honors Award @ The University of Michigan
- **Courses:** Graduate Machine Learning, Graduate ML in Biomedical Sciences, Graduate Probability Theory, Advanced Data Science, Computer Vision, Web Systems, Data Structures and Algorithms, Real Analysis
- **Activities:** Ukrainian Club (President), MSAIL (Educaion Lead), Cantor Trading Club (Software Developer)

Experience

Zhou Lab @ University of Michigan **MI, Ann Arbor**

Research Associate II *Sep 2024 – Present*

- Enhanced **Genome Wide Association Studies (GWAS)** at the UM School of Public Health by authoring a paper on a novel phenotype recognition method, the bespoke **Large Language Models (LLMs)** successfully tested on 12 distinct phenotypes from over **+50,000** Genetic Sequencing and Electronic Health Records.
- Advanced **Deep Learning** diagnostic accuracy by about **38%** by collaborating on a paper within a cross-functional team of doctors at Michigan Medicine to integrate expert reasoning into **LLMs**. This work analyzed **+80,000 precision health** records from **+24,000** patients, using NeMo **Guardrails** to ensure data security and topic relevance.
- Accelerated AI-driven research cycles by **15x** on a HIPAA-regulated **HPC cluster** by implementing a parallelized software architecture with **vLLM** within an **Agile** development framework while utilizing **Site Reliability Engineering** techniques to employ **information security** methods to protect sensitive data.

Synafox AI **MI, Detroit**

Machine Learning and Systems Engineer *May 2025 – Present*

- Designed and developed autonomous agentic workflows using **CrewAI** for the continuous monitoring and optimization of digital twin **simulations** improving the management of predictive models for system analysis and resource allocation.
- Integrated of multiple **Agentic Frameworks** into the **CI/CD pipeline**, automating the software development cycle by using **MLOps principles** to minimize manual intervention and accelerate the **Agile** iteration frequency.
- Deployed scalable, production-grade **RAG pipelines** using **LangChain** and **vector databases** to serve domain-specific **LLMs**. This architecture ensured low-latency, context-aware inference for specialized enterprise applications.

Suuchi Inc **NJ, Jersey City**

Machine Learning Engineer Intern *May 2024 – Nov 2024*

- Deployed **Predictive Modeling** using **Lightwood** and **Hugging face** models on **docker** to develop 5+ proprietary Machine Learning Models for product and sales **forecasting**, resulting in a 95% average AUROC score.
- Utilized **PostgreSQL**, **MindsDB**, and **Apache Superset** to analyze information using the internal database and integrated ML models into the company's SAAS **platform services** "Suuchi GRID", resulting in 27% increase in orders.

Research and Projects

Cell Foundation Model Benchmarking

Python, SQl, PyTorch, Git, Github

- Collaborated with team of Masters and Phd students, engineered a **benchmarking** framework for scRNA-seq **foundational models** and devised methodologies to enhance model performance across relevant evaluation metrics
- Developed and executed comprehensive evaluation pipelines using **PyTorch** and **TensorFlow** to assess foundational model performance on scRNA-seq tasks; employed **Github** to containerize workflows, ensuring full code compatibility

Graphical Neural Networks for Epidemic Simulations

Python, PyTorch Geometric, SciPy

- Designed algorithms leveraging **Graph Neural Networks** in **mathematical modeling** for **epidemiology** and presenting findings on Covid-19 spread in various cities at the Math Department Symposium with 50+ attendees
- Developed a novel method to simulate Covid-19 virus transmission dynamics using **PyTorch Geometric** and extended **PyTorch** libraries along with **SIRD Delayed Differential Equations.**

Skills

Languages: Python, C++, MATLAB,SQL,HTML,CSS, Javascript
Frameworks and Libraries: PyTorch, Pytorch Geometric, SciPy, MLflow, React, Apache, SQLite, PostgreSQL
Developer Tools: Github, AWS, Azure, Docker, PubMed API, WSL, Prompt/System Prompt Engineering

Additional

- Peer Facilitator for engineering students at the UROP department at the University of Michigan
- Passionate about learning to make (and eat) desserts