Sam Mitchell

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Education

Massachusetts Institute of Technology Cambridge, MA

Master of Engineering in Electrical Engineering and Computer Science, GPA: 5.0/5.0 *Expected May 2025*

Bachelor of Science in Computer Science, GPA: 4.6/5.0 *Expected Dec. 2024*

Experience

AI Research Intern *MIT-IBM Watson AI Lab* Feb. – Aug. 2024

- Improved large-scale anomaly detection to spot illegal banking activity 10x faster, protecting customer accounts.
- Optimized GPU throughput to process datasets 3x larger than possible in the prior published research.
- Authored and submitted two fraud detection papers to the International Conference on AI in Finance (ICAIF).

Founder *Nya Labs* Dec. 2021 – Jan. 2023

- Founded a blockchain startup to align incentives and foster collaboration between creators and their supporters.
- Raised $1M+ in venture capital within one month of fundraising and led an eight-person startup team.
- Accepted into the Y Combinator S22 batch, earning a spot in the world's most renowned startup accelerator.

Machine Learning Intern *Mekorot* June – Aug. 2021

- Increased predictive accuracy from 70% to 88% for the water quality indicator at Israel's national water company.
- Tested K-Nearest Neighbors, Logistic Regression, and Random Forest models using NumPy and Pandas.
- Reduced the cost of redundant water quality checks while ensuring clean water is available for over 7M civilians.

Current Projects & Research

Cross-Platform Content Arbitrage | *Amazon AWS, Facebook API, Matplotlib, Pandas, Python, Requests*

- Initiated a three-month unmonetized experiment to see if viral TikTok content could find success on Instagram.
- Developed an automated system to detect high-quality TikToks and post them on Instagram.
- Achieved 100,000 daily views and over 4 million views in aggregate by the time of the project's completion.

Finding Sparse Linear Connections between Features in LLMs | *Git, Huggingface, Python, Pytorch*

- Successfully modeled interpretable features in LLMs as compositions of a few other interpretable features.
- Identified the specific sets of model weights responsible for OR/AND/NOT computations in different layers.
- Published a popular blog post on LessWrong detailing our findings.

Model Weight Security with Gauge Transformations | *Overleaf, Python, Pytorch*

- Challenged the idea that Gauge Transformations with low-bandwidth pipes secure model weights from hackers.
- Uncovered a novel attack rooted in complex linear algebra that exposes yet-undiscovered vulnerabilities.
- Polishing a research paper which was described as "super useful to know" by AI policy experts in Washington.

Awards & Competitions

Math Olympiad Program (MOP) 2019 – 2020

- Qualified for the 2020 USA TST Group, ranking among the top 10 Math Olympiad students nationwide.
- Qualified for MOP (Summer 2019), USAMO (2019 and 2020), USAJMO (2018), AIME (2016 - 2020).

NPR Podcasts 2017 – 2019

- Selected as the math expert for three NPR podcasts, simplifying complex math concepts for a general audience.
- Explained problems like calculating travel speed to always see the sunset in relatable ways for everyday listeners.

Technical Skills

Languages: Python, Java, Javascript, Typescript, C, C++, CSS, HTML, R, SQL.
Frameworks & Libraries: Pytorch, Tensorflow, Jax, Distill, FastAPI, Flask, Node.js, React, WordPress.
Developer Tools: Amazon AWS, Cursor IDE, Docker, Git, Google Cloud, Microsoft Azure, Nvidia GPUs.