

Nicholas Sullivan

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EDUCATION

Washington University in St. Louis, McKelvey School of Engineering, St. Louis, MO

Master of Science in Computer Science

Bachelor of Science in Computer Science and Economics, minor in Mathematics (3.8 GPA)

Aug 2024 – Dec 2024

Aug 2020 – May 2024

EXPERIENCE

Federal Reserve Bank of St. Louis | St. Louis, MO *Research Associate*

July 2025 - Present

- Perform statistical analyses on topics such as bond yields and option volatility and create data-intensive and sophisticated, visually-compelling presentations for economists preparing for Federal Open Market Committee (FOMC) meetings.
- Conduct in-depth and timely research support on topics such as labor pressure for projects intended for St. Louis Fed publications as well as outside journals. See website for list of publications.
- Developing an unemployment forecasting model using machine learning methods like LSTMs to deliver earlier, more accurate unemployment forecasts.

Comcast | remote - *Graduate Intern in AI Technologies*

June – Aug 2024

- Developed AI-based products to lower customer service costs by improving the accuracy of chatbot responses in online customer interactions despite lack of real customer data.
- Created novel synthetic data generation methods using LLMs for chatbot testing by mimicking a broad range of real customer linguistic patterns via fine-tuning and controlling the path of conversation via chain-of-thought prompting.
- Invented metrics to evaluate the level of similarity between real and synthetic customer data.

Spectrum/Charter Communications | St. Louis, MO *Product Management & Development Intern*

June – Aug 2023

- Enhanced the controlled testing environment for software upgrades.
- Conducted competitive analysis of cellular networks, reviewed existing product portfolio, and made product recommendations for key product refreshes.

TEACHING & RESEARCH POSITIONS

Washington University in St. Louis

Research Assistant in the NLP group with Professor C. Wang

Jan 2024 – present

- Created innovative methods to prevent catastrophic failure in MLLMs, including using teacher-student architecture along with stable diffusion to generate pseudo datasets that improve MLLM's performance on NLU tasks.

Lead teaching assistant for graduate level NLP and undergrad intro computer science courses

Jan 2024 – May 2024

- Wrote and graded assignments and assessments and managed team of 3 other TAs.

Research Assistant in the Applied Game Theory group with Professor Y. Vorobeychik

June 2023 – Dec 2023

- Implemented novel neural network architecture derived from stochastic game theory to find optimal pitch sequence for an inning of baseball.

Economic Research Assistant with Professor G. Aryal

Feb 2023 – May 2023

- Collaborated with faculty on a project analyzing inefficiencies in the oil industry; collected, tested, maintained, and documented original research datasets.
- Analyzed OPEC data to summarize how the bloc and its individual members influence the global oil market.

PROJECTS

Sep 2020 – present

- Submitting paper titled “Reducing Space Complexity with Precision Optimized Floats” to *Current Research in Statistics & Mathematics* based on development of a custom 32-bit float representation optimized for machine learning models by increasing the exponent bias, demonstrating a performance gain on MNIST and on function minimization tasks.
- Invented an advanced algorithm that finds shortened Hamiltonian cycles in polynomial time to solve the game of snake perfectly. Trained dueling Q networks to play the game well.
- Performed a sentimental analysis of social media posts about homelessness by modifying TF-IDF while serving as digital chair of Heart for the Unhoused, a non-profit.
- Utilized waveform collapse to generate two-dimensional terrain.

OTHER

- **SKILLS:** Python (advanced) (PyTorch, TensorFlow, NumPy, Economicspandas, selenium, sklearn, etc.), Economics, C++ (intermediate), C (intermediate), Java (intermediate), Git, GitHub, UNIX, Machine Learning, NLP, Time Series Analysis, Statistical Modeling, Game Theory, Computer Vision, Reinforcement Learning, SQL (beginner),
- **CITIZENSHIP:** United States and Ireland/EU
- **INTERESTS:** Running, wood carving, and camping with friends