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   **Aug 2024 – Dec 2024**
Bachelor of Science in Computer Science and Economics, minor in Mathematics (3.8 GPA)   **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.
- 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