Bill Zhu

(803) 639-8650 | youranzhu123@gmail.com | linkedin.com/in/bill-y-zhu/ | github.com/billz0824

Education

Northwestern University **Evanston, IL**

B.A. in Mathematics & MMSS | M.S. in Computer Science *Expected Jun. 2026*

- **Cumulative GPA:** 3.98/4.00 | **Major GPA:** 4.00/4.00 | **Dean's List:** All Quarters
- **Relevant Coursework:** Machine Learning, Statistical Learning, Reinforcement Learning, Probability & Stochastic Analysis, Data Structures & Algorithms, Generative AI, Real Analysis, Linear Algebra, Game Theory

Experience

SCALE Lab **Evanston, IL**

Machine Learning Research Intern *Nov. 2024 – Present*

- Conducted theoretical research on convergence rate guarantees in policy iteration for stochastic control problems, focusing on Linear Quadratic Regulation (LQR) and Deterministic Markov Decision Processes (DMDP)

Northwestern University Mathematics Department **Evanston, IL**

Undergraduate Researcher, Teaching Assistant *Sep. 2024 – Present*

- Collaborating with a postdoctoral scholar through weekly meetings to investigate a conjecture on the frequency of irreducible representations of group symmetries in Laplacian eigenspace decompositions
- Solved partial differential equations and implemented character-theoretic numerical algorithms in MATLAB to compute irreducible representation counting functions, verifying results numerically across multiple examples
- Led weekly discussion sections, including mini-lectures and problem set explanations, for 40+ students

Beijing Sylincom Technology - Telecommunications Company **Beijing, China**

Machine Learning Research Intern *Jul. 2024 – Sep. 2024*

- Presented machine learning-based channel estimation methods to the product team, comparing metrics such as efficiency, accuracy, cost, and scalability against traditional algorithms to assess implementation feasibility
- Utilized Python and Fourier Transforms to simulate and visualize transmitted signals with additive Gaussian noise, analyzing the Bit Error Rate (BER) across different modulation schemes using Monte Carlo methods
- Authored documentation for product calibration, streamlining adoption processes for clients like Samsung

Northwestern Financial Technologies Club **Evanston, IL**

Quantitative Researcher *Oct. 2023 – Present*

- Developed a trading strategy testing platform with benchmarked baselines, including tree-based models, LASSO regression, buy-and-hold, and momentum-based strategies, incorporating proper normalization techniques
- Fine-tuned the 'facebook/opt-350m' model for sentiment analysis using Low-Rank Adaptation (LoRA) and Direct Preference Optimization (DPO), incorporating LLM-assisted data augmentation through prompt engineering

Projects

Transform-ED | *Independent Study* *Jun. 2024 – Sep. 2024*

- Instruction-tuned a GPT-2 model from scratch to enable context-aware responses to text prompts
- Performed supervised fine-tuning on a custom dataset to train the model for answering IB English-specific questions, leveraging Direct Preference Optimization (DPO) to promote positive, encouraging responses

Honors and Awards

2024 Northwestern University Trading Competition | *Team Lead, 1st Place HFT, 4th Place Cryptocurrency*

IMC Prosperity 2 Trading Competition | *Team Lead, Top 100 Globally*

2024 Undergraduate Mathematics Award | *Awarded to 15 Top Performing Northwestern University Math Students*

Other: 2x AIME Qualifier (2022, 2023); ICTM State Champion (2023); President's Gold Volunteer Service Award (2021)

Technical Skills

Programming & Data Processing: Python, C++, SQL, R, MATLAB, Pandas, NumPy, Polars, SciPy, Matplotlib
Machine Learning: PyTorch, TensorFlow, scikit-learn, Hugging Face, LLM fine-tuning, RAG, XGBoost, LightGBM
Software & Infrastructure: Git, GitHub Actions, Flask, Django, Swagger.io, AWS, Valgrind, PyTest