Anming Gu

CONTACT INFORMATION
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RESEARCH INTERESTS

Foundations of Machine Learning, High-Dimensional Statistics, Stochastic Calculus, Optimal Transport

I'm interested in applying tools in theoretical computer science (e.g. Boolean Fourier analysis and spectral graph theory) and mathematics (e.g. stochastic calculus, optimal transport, and functional analysis) to prove theoretical results on machine learning algorithms and architectures.

EDUCATION

Boston University — Boston, MA
B.A. in Computer Science, Minor in Mathematics — Expected May 2024
GPA: 3.96/4.00

HONORS AND AWARDS

Putnam Math Competition Top 35%	2022
3x AIME Qualifier	2017, 2019, 2020
USA Biology Olympiad Top 30	2020
University of Toronto Biology Competition International 18th Place	2019

RESEARCH EXPERIENCE

Chien Lab, Boston University — Boston, MA
Research Assistant, supervised by Prof. Edward Chien — Sept 2020 – Present

- Undergraduate Research Opportunity Program (Spring 2021, Fall 2021), Honors Thesis I & II (Expected Fall 2023, Spring 2024).
- Optimal transport for k-mixup regularization in deep learning.
- Optimal transport, stochastic calculus, calculus of variations, and mean-field Langevin dynamics for trajectory inference of probability distributions in a partial observation setting.

PUBLICATIONS

Journals

K. Greenewald, A. Gu, M. Yurochkin, J. Solomon, E. Chien. **k-Mixup Regularization for Deep Learning via Optimal Transport**. *Transactions on Machine Learning Research*, 2023. arXiv: 2106.02933.

PRESENTATIONS

k-Mixup Regularization for Deep Learning via Optimal Transport
Boston University SIAM, March 2023

TEACHING EXPERIENCE

Boston University — Boston, MA

- Programming Language Theory, Profs. Marco Gaboardi and Hongwei Xi — Fall 2023
- Analysis of Algorithms, Prof. Dora Erdos — Spring 2022

INDUSTRY EXPERIENCE

Amazon — Sunnyvale, CA
Software Engineer Intern — Summer 2023

Capital One — McLean, VA
Software Engineer Intern — Summer 2022

SKILLS

- **Languages**: Python, C/C++, OCaml, Java, Bash, MATLAB
- **Technologies**: PyTorch, TensorFlow, Pandas, Jupyter Notebook
- **Other**: Linux, Git/Github, LaTeX, Make

ACADEMIC PROJECTS

American Option Pricing via Particle Filters
Implemented American option pricing algorithms in Python under stochastic volatility and jump-diffusion models using Monte Carlo simulation and particle filters, (Financial Econometrics, Spring 2023).

λ-Calculus Compiler
Wrote a type-checker and compiler for a λ-calculus language to the C language, (Functional Compilers, Fall 2022).

Hypergraph Expanders from Cayley Graphs
Explored spectral graph theory and expander graphs in the context of hypergraphs. Wrote an exposition on the paper [Hypergraph expanders of all uniformities from Cayley graphs], (Math for Thereotical CS, Spring 2022).

Monte Carlo Geometry Processing
Implemented Monte Carlo algorithms in C++ to solve linear elliptic PDEs on triangle meshes following the paper [Monte Carlo Geometry Processing: A Grid-Free Approach to PDE-Based Methods on Volumetric Domains], (Geometry Processing, Spring 2022).

GRADUATE COURSEWORK

- **Theory**: Math for Theoretical CS, Complexity Theory*, *Statistical Learning Theory*, *Advanced Optimization Theory*
- **ML/AI**: Machine Learning, Artificial Intelligence, Deep Learning, *Mathematics of Deep Learning*
- **Mathematics/Statistics**: Functional Analysis, Stochastic Calculus*, *Partial Differential Equations*
- **Other Quantitative**: Functional Compilers, Geometry Processing, Financial Econometrics

[Current*, *Expected Spring 2024*]