Anming Gu

CONTACT INFORMATION
gu.anming106@gmail.com
anminggu.github.io

RESEARCH INTERESTS

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

I'm interested in applying tools in theoretical computer science, high-dimensional statistics, and mathematics to prove theoretical results on machine learning algorithms and architectures. Currently, I'm especially passionate about optimal transport, mathematical analysis, and stochastic calculus.

EDUCATION

Boston University — Boston, MA
B.A. in Computer Science, Minor in Mathematics — Expected May 2024
Honors in Major (Thesis)
GPA: 3.96/4.0

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 (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 latent trajectory inference of probability distributions.

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

• CS332: Theory of Computation	Spring 2024
• CS320: Concepts of Programming Languages	Fall 2023
• CS330: Analysis of Algorithms	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

Smoothed Complexity of Nash Equilibria
Explored algorithmic game theory and smoothed complexity. Wrote an exposition on the paper [Smoothed Complexity of 2-player Nash Equilibria], Complexity Theory, Fall 2023.

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 based language to the C language via A-normal form and closure conversion, Functional Compilers, Fall 2022.

Hypergraph Expanders from Cayley Graphs
Explored spectral graph theory and expander graphs for hypergraphs. Wrote an exposition on the paper [Hypergraph Expanders of All Uniformities from Cayley Graphs], Mathematical Methods for Theoretical 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**: Complexity Theory, Mathematical Methods for Theoretical Computer Science, *Statistical Learning Theory*, *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

[*Expected Spring 2024*]