

Anming Gu

CONTACT INFORMATION	gu.anming106@gmail.com anminggu.github.io
RESEARCH INTERESTS	<p>Foundations of Machine Learning, Algorithms and Theory of Computation, Optimization, Stochastic Calculus, Optimal Transport</p> <p>I enjoy applying tools in theoretical computer science (e.g. Boolean Fourier analysis, pseudo-randomness, and complexity theory) and mathematics (optimization, stochastic calculus, and analysis) to prove theoretical results on machine learning algorithms and architectures.</p>
EDUCATION	<p>Boston University Boston, MA B.A. in Computer Science, Minor in Mathematics Expected May 2024 GPA: 3.96/4.00</p>
HONORS AND AWARDS	<p>Putnam Math Competition Top 35% 2022 3x AIME Qualifier 2017, 2019, 2020 USA Biology Olympiad Top 30 2020 4x USA Biology Olympiad Semifinalist 2017 – 2020 British Biology Olympiad Gold Medal 2019, 2020 University of Toronto Biology Competition International 18th Place 2019</p>
RESEARCH EXPERIENCE	<p>Chien Lab, Boston University Boston, MA <i>Research Assistant, supervised by Prof. Edward Chien</i> Sept 2020 – Present</p> <ul style="list-style-type: none">• Undergraduate Research Opportunity Program (Spring 2021, Fall 2021), Honors Thesis I & II (Expected Fall 2023, Spring 2024).• Optimal transport and spectral graph theory for k-mixup regularization in deep learning.• Optimal transport, stochastic calculus, and mean-field Langevin dynamics for trajectory inference of probability distributions and particle filters. <p>Independent Research Boston, MA <i>Primary Researcher</i> March 2023 – Present</p> <ul style="list-style-type: none">• Bernstein polynomial approximation, real analysis, and topology for Fourier analysis of Boolean functions.
PUBLICATIONS	<p>Manuscripts K. Greenewald, A. Gu, M. Yurochkin, J. Solomon, E. Chien. k-Mixup Regularization for Deep Learning via Optimal Transport. arXiv preprint: arXiv:2106.02933.</p>
PRESENTATIONS	<p>k-Mixup Regularization for Deep Learning via Optimal Transport Boston University SIAM, March 2023</p>
ACADEMIC PROJECTS	<p>American Option Pricing via Particle Filters Created American option pricing algorithms in Python under stochastic volatility and jump-diffusion models using Monte Carlo simulation and particle filters, (Financial Econometrics, Spring 2023).</p> <p>λ-Calculus Compiler Wrote a type-checker and compiler for a λ-calculus language to the C language, (Functional</p>

Compilers, Fall 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).

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](#)], (Mathematical Methods for Theoretical Computer Science, Spring 2022).

TEACHING EXPERIENCE

Boston University

Boston, MA

- Teaching Assistant: Analysis of Algorithms (Spring 2022)
- Grader: Analysis of Algorithms, Linear Algebra, Honors Differential Equations, Calculus II (Fall 2021)

SKILLS

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

GRADUATE COURSEWORK

- **Upcoming:** Complexity Theory, Stochastic Calculus, Game Theory
- **Theory:** Mathematical Methods for Theoretical Computer Science
- **ML/AI:** Machine Learning, Artificial Intelligence, Deep Learning
- **Software:** Functional Compilers
- **Applications:** Geometry Processing
- **Pure Mathematics:** Functional Analysis
- **Economics & Finance:** Financial Econometrics