Ethan Chen

machine learning, optimization, and geometry | 470-494-1588 | chenethan323@gmail.com | echen347.github.io

Education

Georgia Institute of Technology Atlanta, GA

Bachelor of Science in Mathematics, Bachelor of Science in Computer Science *Aug 2023 - May 2027*

- President and co-founder of GT Competitive Math, Co-President of GT Undergrad Math Advisory Committee
- **Undergraduate:** Natural Language Processing, Graph Theory, Algorithms, Statistical Theory
- **Graduate:** Convex Optimization, Measure Theory, Differential Geometry, Graphical Models in ML, Statistical Machine Learning, High Dimensional Statistics, Geometric and Generative Deep Learning, Optimal Transport, Probability

Experience

Georgia Institute of Technology *Atlanta, GA*

Machine Learning Researcher *Feb 2025 – Present*

- Investigating algorithmic and theoretical foundations of diffusion models on general Riemannian manifolds, with an emphasis on applications to Lie groups, by employing advanced techniques from optimal transport and differential geometry.
- Developing and implementing discrete diffusion models for structured data, including sequences and natural language, with applications to protein modeling
- Engineered novel predictor-corrector sampling strategies, inspired by k-Gillespie methods, to enhance convergence and generation quality.

Mathematics Researcher *May 2024 – Present*

- Advancing research on the Cartan–Hadamard conjecture in CAT(0) spaces by developing novel differential geometry techniques to analyze curvature bounds in non-smooth metric spaces, addressing fundamental challenges in geometric analysis.

NLP Researcher *Feb 2024 – Dec 2024*

- Engineered robust data pipelines for large-scale T5 model training, efficiently processing over 500,000 text pairs and incorporating custom semantic similarity metrics for enhanced model performance.
- Co-authored research submitted to EMNLP on optimizing transformer fine-tuning, achieving a 12% BLEU score improvement through novel attention mechanism modifications.

HyTech Racing (Formula SAE) Atlanta, GA

Optimization Lead *Jan 2025 – Present*

- Migrated MATLAB data pipeline to Python, implementing real-time telemetry validation, reducing processing errors by 18%
- Developed ML models for power distribution optimization, achieving 15% performance gain through ensemble gradient boosting techniques

Williams College Williamstown, MA

REU Participant *June 2025 – Aug 2025*

- Conducted research on Riemannian geometry and optimal control.

Scale AI Remote

Artificial Intelligence Researcher *Feb 2024 – Present*

- Designed olympiad-level math problems focusing on combinatorial optimization and stochastic processes for LLM training.

Projects

Quantitative Portfolio Analytics Platform Dec 2024 – Present

Django, AWS, MySQL, Python

- Designed and developed a full-stack quantitative analytics platform leveraging Django (Python) and AWS (EC2, S3, RDS for MySQL), architected for robust, scalable ingestion and near real-time processing of over 1M daily financial data points.
- Engineered comprehensive backend systems featuring RESTful APIs for data retrieval and analytical functions, and optimized MySQL database schemas for efficient data warehousing, significantly improving query performance (35% reduction in analysis time).

Awards and Honors

AIME Qualifier (3x) (2021, 2022, 2023) — Putnam (2023, 2024) (27, 21) — 5th Place GT Trading Competition (2025)

Technical Skills and Interests

Programming Languages: Python, Java, SQL

Technologies: AWS (EC2, RDS, S3), Django, MySQL, MySQL Workbench, TensorFlow, PyTorch, NumPy, Scipy, Bitbucket, Git