

LIMING LIU

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EDUCATION

Georgia Tech

Ph.D. in Machine Learning

Focus: Large Language Models, Computational Efficiency in Training and Inference

Aug. 2024 - Present

Advisor: Prof. Tuo Zhao

Peking University

Dual Bachelor's Degree

B.Sc. in Mathematics and Applied Mathematics

B.Sc. in Economics

Sep. 2020 - June 2024

Cumulative GPA: 3.75/4.0 (Top 25th percentile)

RESEARCH INTERESTS

- Design and analysis of efficient optimizers for LLM pretraining.
- Synthetic data generation for LLM finetuning and Agent training.
- Development of advanced SFT and RL algorithms for LLM post-training.
- Improving the performance and speed of inference in Diffusion Language Models.
- Optimization theory for high-dimensional, non-convex deep learning problems.

PREPRINTS AND PUBLICATIONS

COSMOS: A Hybrid Adaptive Optimizer for Memory-Efficient Training of Large Language Models

Liming Liu, Zhenghao Xu, Zixuan Zhang, Hao Kang, Zichong Li, Chen Liang, Weizhu Chen, Tuo Zhao

Under review at ICLR 2026

NorMuon: Making Muon more efficient and scalable

Zichong Li*, Liming Liu*, Chen Liang, Weizhu Chen, Tuo Zhao

Under review at ICLR 2026

A Minimalist Example for Understanding Edge-of-Stability and Progressive Sharpening

Liming Liu, Zixuan Zhang, Simon Du, Tuo Zhao

Accepted by the 39th Conference on Neural Information Processing Systems (NeurIPS 2025)

WORKING EXPERIENCE

Applied Scientist Intern, Diffusion Language Models

Amazon, Rufus AI

June 2025 - Present

Manager: Binxuan Huang

- Build a complete framework for diffusion language models (DLLM), covering pretraining, supervised fine-tuning (SFT), inference, and evaluation.
- Propose a novel SFT method for DLLM that trains the model to self-correct, and leverage this ability for test-time compute and speculative decoding tailored specifically for DLLMs.

RESEARCH EXPERIENCE

Graduate Researcher, Synthetic Data Generation

Georgia Tech, Amazon Rufus

Sep. 2025 - Present

Advisor: Prof. Tuo Zhao

- Develop a method for synthesizing multi-turn instruction-following (IF) data, achieving greater SFT performance improvements than training on existing datasets; Expand existing collection of IF tasks and validators.
- Collaboration with Amazon Rufus post-training team.

Graduate Researcher, Efficient Training of LLMs

Georgia Tech, Microsoft GenAI

Oct. 2024 - May 2025

Advisor: Prof. Tuo Zhao

- Developed a novel memory-efficient adaptive optimization algorithm for LLM pre-training, which outperforms SOTA algorithms including SOAP, MUON and Adam.
- Collaboration with Microsoft GenAI team.

Research Assistant, Theory of Large Learning Rates

University of Washington, Georgia Tech

June 2023 - Jan. 2025

Advisors: Prof. Tuo Zhao; Prof. Simon Du

- Developed a new theory on understanding the progressive sharpening and edge of stability phenomena when using gradient descent to train neural networks.

Research Assistant, Instability in Pretraining of LLMs

Carnegie Mellon University, Microsoft

Apr. 2023 - Oct. 2023

Advisor: Prof. Yuanzhi Li

- Proposed a new Hessian-based metric for measuring the impact of loss spikes in pretraining of LLMs and a novel layer-wise regularization approach to mitigate loss spikes.

HONORS AND AWARDS

• Stewart President’s Fellowship, Georgia Tech	2024
• Guoqin Scholarship for Outstanding Academic Achievement, Peking University	2022
• Yizheng Scholarship for Academic Excellence, Peking University	2021
• National Second Prize, Chinese Mathematical Olympiad (Top 150 nationwide)	2019

TECHNICAL PROFICIENCIES

Programming Languages: Python, PyTorch, C++