Lichen Zhang

+1-412-463-5490 | lichenz@mit.edu | lczh.github.io
Cambridge, Massachusetts - 02139, U.S.A.

Education

- **Massachusetts Institute of Technology** — *Sep 2022 - Present*
  Ph.D in Applied Mathematics — Cambridge, MA
  ◦ Advisor: Jonathan Kelner
- **Carnegie Mellon University** — *June 2021 - May 2022*
  M.S. in Computer Science — Pittsburgh, PA
  ◦ Advisor: Gary Miller
  ◦ Thesis: **Speeding Up Optimizations via Data Structures: Faster Search, Sample and Maintenance**
- **Carnegie Mellon University** — *Aug 2017 - May 2021*
  B.S. in Computer Science — Pittsburgh, PA

Research Interests

Machine learning, optimization, numerical linear algebra, sketching and streaming, differential privacy.

Experience

- **Amazon Web Services (AWS)** — *May 2024 - Aug 2024*
  Applied Scientist Intern — East Palo Alto, CA
  ◦ Mentors: Nina Mishra, Yonatan Naamad, Tal Wagner
- **Simons Institute for the Theory of Computing** — *Aug 2023 - Dec 2023*
  Visiting Student — Berkeley, CA
  ◦ Data Structures and Optimization for Fast Algorithms program
- **Adobe Research** — *May 2023 - Aug 2023*
  Research Scientist Intern — San Jose, CA
  ◦ Mentors: Zhao Song, Ritwik Sinha, Raghavendra Addanki
- **University of Washington** — *June 2022 - Aug 2022*
  Research Assistant — Seattle, WA
  ◦ Advisor: Yin Tat Lee
- **Carnegie Mellon University** — *May 2020 - Aug 2020*
  Undergraduate Research Assistant — Pittsburgh, PA
  ◦ Advisor: Gary Miller
  ◦ Supported by CMU Summer Undergraduate Research Fellowship (SURF)

Teaching

- **An Algorithmist's Toolkit (18.408)** — *Fall 2024*
  Teaching Assistant — MIT
  ◦ Instructor: Jonathan Kelner
- **Intro to Numerical Methods (18.335)** — *Spring 2024*
  Teaching Assistant — MIT
  ◦ Instructor: John Urschel
- **The Computational Lens (15-155)** — *Spring 2022*
  Teaching Assistant — CMU
  ◦ Instructors: Pravesh Kothari and Anil Ada
- **Undergraduate Complexity Theory (15-455)** — *Spring 2021*
  Teaching Assistant — CMU
  ◦ Instructor: Pravesh Kothari

Awards and Scholarships

- **Finalist of the Jane Street Graduate Research Fellowship** — *2024*
  Jane Street
- **Reitano Fellowship** — *Sep 2022 - Aug 2023*
  MIT
- **Summer Undergraduate Research Fellowship** — *May 2020 - Aug 2020*
  CMU

TALKS

- **Alternating Minimization for Matrix Completion and Beyond**
  - MIT SPAMS Seminar *April 2024*
- **Training Multi-Layer Over-Parametrized Neural Network in Subquadratic Time**
  - ITCS 2024 *Jan 2024*
- **Convex Minimization with Integer Minima in $\widetilde{O}(n^4)$ Time**
  - SODA 2024 *Jan 2024*
- **Sketching as a Tool for Fast Optimization**
  - Google Research (Mountain View) Algorithms Seminar *Nov 2023*
  - MIT SPAMS Seminar *Oct 2022*
- **Sketching Meets Differential Privacy: Fast Algorithm for Dynamic Kronecker Projection Maintenance**
  - ICML 2023 *July 2023*
- **Sketching for First Order Method: Efficient Algorithm for Low-Bandwidth Channel and Vulnerability**
  - ICML 2023 *July 2023*
- **A Nearly-Optimal Bound for Fast Regression with ℓ_∞ Guarantee**
  - ICML 2023 *July 2023*
- **Space-Efficient IPM, with applications to LP and Maximum Weight Bipartite Matching**
  - ICALP 2023 *June 2023*
- **Dynamic Tensor Product Regression**
  - NeurIPS 2022 *Dec 2022*
- **Fast Sketching of Polynomial Kernels of Polynomial Degree**
  - Workshop on Algorithms for Large Data (Online) *Aug 2021*
  - ICML 2021 *July 2021*

SERVICES

- **Conference Reviewer**
  - NeurIPS: 2023, 2024
  - ICML: 2024
  - ICLR: 2024, 2025
  - AISTATS: 2023, 2024, 2025
  - AAAI: 2025
  - SODA: 2023
- **Journal Reviewer**
  - ACM Transactions on Quantum Computing

PUBLICATIONS (AUTHOR NAMES IN ALPHABETICAL ORDER)

[1] Yuzhou Gu, Nikki Lijing Kuang, Yi-An Ma, Zhao Song and **Lichen Zhang**. **Log-concave Sampling from a Convex Body with a Barrier: a Robust and Unified Dikin Walk**. In *Proceedings of the 38th Conference on Neural Information Processing Systems (NeurIPS)*, 2024.

[2] Zhao Song, Junze Yin and **Lichen Zhang**. **Solving Attention Kernel Regression Problem via Pre-conditioner**. In *Proceedings of the 27th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024.

[3] Zhao Song, Junze Yin, **Lichen Zhang** and Ruizhe Zhang. **Fast Dynamic Sampling for Determinantal Point Processes**. In *Proceedings of the 27th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024.

[4] Yuzhou Gu, Zhao Song, Junze Yin and **Lichen Zhang**. **Low Rank Matrix Completion via Robust Alternating Minimization in Nearly Linear Time**. In *Proceedings of the 12th International Conference on Learning Representations (ICLR)*, 2024.

[5] Zhao Song, **Lichen Zhang** and Ruizhe Zhang. **Training Multi-Layer Over-Parametrized Neural Network in Subquadratic Time**. In *Proceedings of the 15th Innovations in Theoretical Computer Science (ITCS)*, 2024.

[6] Haotian Jiang, Yin Tat Lee, Zhao Song and **Lichen Zhang**. **Convex Minimization with Integer Minima in $\widetilde{O}(n^4)$ Time**. In *Proceedings of the 35th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2024.

[7] Zhao Song, Xin Yang, Yuanyuan Yang and **Lichen Zhang**. **Sketching Meets Differential Privacy: Fast Algorithm for Dynamic Kronecker Projection Maintenance**. In *Proceedings of the 40th International Conference on Machine Learning (ICML)*, 2023.

[8] Zhao Song, Yitan Wang, Zheng Yu and **Lichen Zhang**. **Sketching for First Order Method: Efficient Algorithm for Low-Bandwidth Channel and Vulnerability**. In *Proceedings of the 40th International Conference on Machine Learning (ICML)*, 2023.

[9] Zhao Song, Mingquan Ye, Junze Yin and **Lichen Zhang**. **A Nearly-Optimal Bound for Fast Regression with ℓ_∞ Guarantee**. In *Proceedings of the 40th International Conference on Machine Learning (ICML)*, 2023.

[10] S. Cliff Liu, Zhao Song, Hengjie Zhang, **Lichen Zhang** and Tianyi Zhou. **Space-Efficient Interior Point Method, with applications to Linear Programming and Maximum Weight Bipartite Matching**. In *Proceedings of the 50th International Colloquium on Automata, Languages and Programming (ICALP)*, 2023.

[11] Lianke Qin, Zhao Song, **Lichen Zhang** and Danyang Zhuo. **An Online and Unified Algorithm for Projection Matrix Vector Multiplication with Application to Empirical Risk Minimization**. In *Proceedings of the 26th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023.

[12] Aravind Reddy, Zhao Song and **Lichen Zhang**. **Dynamic Tensor Product Regression**. In *Proceedings of the 36th Conference on Neural Information Processing Systems (NeurIPS)*, 2022.

[13] Zhao Song, David Woodruff, Zheng Yu and **Lichen Zhang**. **Fast Sketching of Polynomial Kernels of Polynomial Degree**. In *Proceedings of the 38th International Conference on Machine Learning (ICML)*, 2021.