Daogao Liu

Google Research
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RESEARCH INTEREST

Machine Learning, Theoretical Computer Science
Current Focus: Differential Privacy, Stochastic Optimization, and Algorithm Design
Exploring: Large Language Models and Deep Learning

EDUCATION

University of Washington, Seattle, US *2020 - 2024*
Ph.D. in Computer Science Advised by *Yin Tat Lee*
Thesis: "Advancing Differentially Private Optimization: Efficiency, Utility, and Applications"

Tsinghua University, Beijing, China *2016 - 2020*
B.S. in Physics and Mathematics Advised by *Jian Li*
Thesis: "Stochastic Optimization: Approximation Algorithms on Metric Spaces"

PROFESSIONAL EXPERIENCE

Google Research, Mountain View, US *2024 - present*
Visiting Postdoc Researcher, Working with the Algorithms team

Apple MLR, Cupertino, US *Summer, 2023/2024*
Research Intern, Working with *Hilal Asi*, *Kunal Talwar* and *Vitaly Feldman*

Google Brain, Remote *Spring 2023*
Research Intern, Working with *Abhradeep Thakurta*

SELECTED LARGE-SCALE PROJECTS

- **Gemini — IMO Gold Medal (2025)** *Data Contributor*
  Official blog
- **VaultGemma — Pretraining with Differential Privacy Guarantees** *Core Contributor*
  Technical report, Official blog

PUBLICATIONS

* denotes equal contribution; most theoretical works are in (reverse) alphabetical ordering.

[1] Syamantak Kumar, **Daogao Liu**, Kevin Tian, and Chutong Yang. Private Geometric Median in Nearly-Linear Time. *Accepted to NeurIPS 2025. Arxiv link*

[2] Andrew Lowy*, **Daogao Liu***. Differentially Private Bilevel Optimization: Efficient Algorithms with Near-Optimal Rates. *Accepted to NeurIPS 2025. Arxiv link*

[3] Da Yu, Edith Cohen, Badih Ghazi, Yangsibo Huang, Pritish Kamath, Ravi Kumar, **Daogao Liu**, and Chiyuan Zhang. Scaling Embedding Layers in Language Models. *Accepted to NeurIPS 2025. Arxiv link*

[4] Weijia Shi, Akshita Bhagia, Kevin Farhat, Niklas Muennighoff, Jacob Morrison, Evan Pete Walsh, Dustin Schwenk, Shayne Longpre, Jake Poznanski, Allyson Ettinger, **Daogao Liu**, Margaret Li, Mike Lewis, Wen-tau Yih, Dirk Groeneveld + 8 more authors. FlexOLMo: Open Language Models for Flexible Data Use. *Accepted to NeurIPS 2025. Draft link*

[5] **Daogao Liu**, Edith Cohen, Badih Ghazi, Peter Kairouz, Pritish Kamath, Alexander Knop, Ravi Kumar, Pasin Manurangsi, Adam Sealfon, Da Yu, and Chiyuan Zhang. Urania: Differentially Private Insights into AI Use. *Accepted to COLM 2025. Arxiv link*

[6] Guy Kornowski, **Daogao Liu**, and Kunal Talwar. Improved Sample Complexity for Private Nonsmooth Nonconvex Optimization. *Accepted to ICML 2025. Arxiv link*

[7] **Daogao Liu**, and Kunal Talwar. Adaptive Batch Size for Privately Finding Second-Order Stationary Points. *Accepted to ICLR 2025, Spotlight. Arxiv link*

[8] Yangsibo Huang*, **Daogao Liu***, Lynn Chua, Badih Ghazi, Pritish Kamath, Ravi Kumar, Pasin Manurangsi, Milad Nasr, Amer Sinha, and Chiyuan Zhang. Unlearn and Burn: Adversarial Machine Unlearning Requests Destroy Model Accuracy. *Accepted to ICLR 2025. Arxiv link*

[9] Weijia Shi, Jaechan Lee, Yangsibo Huang, Sadhika Malladi, Jieyu Zhao, Ari Holtzman, **Daogao Liu**, Luke Zettlemoyer, Noah A Smith, and Chiyuan Zhang. Muse: Machine unlearning six-way evaluation for language models. *Accepted to ICLR 2025. Arxiv link*

[10] Hilal Asi, **Daogao Liu**, and Kevin Tian. Private Stochastic Convex Optimization with Heavy Tails: Near-Optimality from Simple Reductions. *Accepted to NeurIPS 2024. Arxiv link*

[11] Hilal Asi, Tomer Koren, **Daogao Liu**, and Kunal Talwar. Private Online Learning via Lazy Algorithms. *Accepted to NeurIPS 2024. Arxiv link*

[12] Andrew Lowy, **Daogao Liu**, and Hilal Asi. Faster Algorithms for User-Level Private Stochastic Convex Optimization. *Accepted to NeurIPS 2024. Arixv link*

[13] Lynn Chua, Badih Ghazi, Yangsibo Huang, Pritish Kamath, **Daogao Liu**, Pasin Manurangsi, Amer Sinha, and Chiyuan Zhang. Mind the Privacy Unit! User-Level Differential Privacy for Language Model Fine-Tuning. *Accepted to COLM 2024. Arxiv link*

[14] Weijia Shi, Anirudh Ajith, Menthou Xia, Yangsibo Huang, **Daogao Liu**, Terra Blevin, Danqi Chen, and Luke Zettlemoyer. Detecting Pretraining Data from Large Language Models. *Accepted to ICLR 2024. Arxiv link*

[15] Gavin Brown, Krishnamurthy Dvijotham, Georgina Evans, **Daogao Liu**, Adam Smith, and Abhradeep Thakurta, Private gradient descent for linear regression: Tighter error bounds and instance-specific uncertainty estimation. *Accepted to ICML 2024. Arxiv link*

[16] Hilal Asi, **Daogao Liu**, User-level Differentially Private Stochastic Convex Optimization: Efficient Algorithms with Optimal Rates. *Accepted to AISTATS 2024. Arxiv link*

[17] Weijia Shi, Anirudh Ajith, Mengzhou Xia, Yangsibo Huang, **Daogao Liu**, Terra Blevins, Danqi Chen, Luke Zettlemoyer, Detecting pretraining data from large language models. *Accepted to ICLR 2024. Arxiv link*

[18] Arun Ganesh, **Daogao Liu**, Sewoong Oh, Abhradeep Thakurta. Private (Stochastic) Non-Convex Optimization Revisited: Second-Order Stationary Points and Excess Risks. *Accepted to NeurIPS 2023, Spotlight. Arxiv link*

[19] Yair Carmon, Arun Jambulapati, Yujia Jin, Yin Tat Lee, **Daogao Liu**, Aaron Sidford, Kevin Tian. ReSQueing Parallel and Private Stochastic Convex Optimization. *Accepted to FOCS 2023. Arxiv link*

[20] Sivakanth Gopi, Yin Tat Lee, **Daogao Liu**, Ruoqi Shen, Kevin tian. Algorithmic Aspects of the Log-Laplace Transform and a Non-Euclidean Proximal Sampler. *Accepted to COLT 2023. Arxiv link*

[21] Hu Fu, Jiawei Li, **Daogao Liu**. Pandora Box Problem with Nonobligatory Inspection: Hardness and Improved Approximation Algorithms. *Accepted to STOC 2023. Arxiv link*

[22] Sivakanth Gopi, Yin Tat Lee, **Daogao Liu**, Ruoqi Shen, Kevin Tian. Private Convex Optimization in General Norms. *Accepted to SODA 2023. Arxiv link*

[23] Yaonan Jin, **Daogao Liu**, Zhao Song. Super-resolution in High Dimension: (Nearly) Linear Running Time and Sample Complexity. *Accepted to SODA2023. Arxiv link*

[24] Ziqi Wang, Yuexin Wu, Frederick Liu, **Daogao Liu**, Le Hou, Hongkun Yu, Jing Li, Heng Ji. Augmentation with Projection: Towards an Effective and Efficient Data Augmentation Paradigm for Distillation. *Accepted to ICLR 2023. Arxiv link*

[25] Xuechen Li*, **Daogao Liu***, Tatsunori Hashimoto, Huseyin A Inan, Janardhan Kulkarni, Yin Tat Lee, Abhradeep Guha Thakurta. When Does Differentially Private Learning Not Suffer in High Dimensions? *Accepted to NeurIPS 2022. Arxiv link*

[26] Sivakanth Gopi, Yin Tat Lee, **Daogao Liu**. Private convex optimization via exponential mechanism. *Accepted to COLT 2022. Arxiv link*

[27] **Daogao Liu**. Better Private Algorithms for Correlation Clustering. *Accepted to COLT 2022. Arxiv link*

[28] Jian Li, **Daogao Liu**. Multi-token Markov Game with Switching Costs. *Accepted to SODA 2022. Arxiv link*

[29] Janardhan Kulkarni, Yin Tat Lee, **Daogao Liu**. Private Non-smooth ERM and SCO in Subquadratic Steps. *Accpeted by NeurIPS 2021, Spotlight. Arxiv link*

[30] Haotian Jiang, Jian Li, **Daogao Liu**, Sahil Singla. Algorithms and Adaptivity Gaps for Stochastic k-TSP. *Accepted to ITCS 2020. Arxiv link*

[31] **Daogao Liu**. More efficient Algorithms for Stochastic Diameter and Some Unapproximated Problems in Metric Space. *Accepted to COCOON 2019.*

MANUSCRIPTS

[1] Badih Ghazi, Ravi Kumar, **Daogao Liu**, and Pasin Manurangsi. Linear-Time User-Level DP-SCO via Robust Statistics. *Under submission. Arxiv link*

[2] YinTat Lee, **Daogao Liu**, Zhou Lu. The Power of Sampling: Dimension-free Risk Bounds in Private ERM. *Arxiv link*

SELECTED AWARDS

- Apple Scholars in AI/ML, Ph.D fellowship. 2024
- Paul G. Allen School First-Year Ph.D Fellowship 2020
- Ye Qisun Nomination Award (The highest honor of Physics undergraduate), Tsinghua 2020
- Scholarship for Comprehensive Excellence, Tsinghua University 2019

PROGRAM COMMITTEES SERVICE AND REVIEWING

- Conferences: SODA 2026/2025/2023, COLT 2025, ICML 2025, COLM 2025, ICLR 2025, AISTATS 2025, NeurIPS 2025/2024/2023, TPDP 2025/2024/2023, STOC 2024, ALT 2024, FOCS 2022/2021, RANDOM 2020
- Journals: Operations Research, Theoretical Computer Science, Information and Computation

TEACHING EXPERIENCES

- CSE521 - Design and Analysis of Algorithms Fall 2024
  - Instructor: Thomas Rothvoss
- CSE 521: Design and Analysis of Algorithms Fall 2023
  – Instructor: Shayan Oveis Gharan