Licong Lin

liconglin@berkeley.edu | licong-lin.github.io

Education

University of California at Berkeley *Berkeley, CA*

PhD student in Statistics *Aug 2021 - Current*

- Advised by Song Mei and Peter Bartlett.
- Worked as a GSI (teaching assistant) for STAT 153, STAT 210B, STAT 135; as a GSR (research assistant).
- **Graduate Courses:** STAT 205B (Probability theory, A), STAT 210A,B (Theoretical Statistics, A+), STAT 215A (Applied Statistics, A+), STAT 241 (Reinforcement learning, A+), STAT 256 (Causal inference, A+), EE 227C (Convex optimization, A).

Peking University *Beijing, China*

B.S. in Statistics *Sep 2017 - July 2021*

- Overall GPA: **3.82**/4 (rank: **2**/45)

Research Interests

Statistical learning theory, LLM alignment, high-dimensional statistics, statistical inference

Preprints (∗ for a co-first author or alphabetical order)

Choose Your Anchor Wisely: Effective Unlearning Diffusion Models via Concept Reconditioning
Jingyu Zhu, Ruiqi Zhang, Licong Lin, Song Mei
Neurips Safe Generative AI Workshop 2024

A Statistical Theory of Contrastive Learning via Approximate Sufficient Statistics
Licong Lin, Song Mei
arXiv preprint arXiv:2503.17538 (2025). 2025

A Statistical Theory of Contrastive Pre-training and Multimodal Generative AI
Kazusato Oko, Licong Lin, Yuhang Cai, Song Mei
arXiv preprint arXiv:2501.04641 (2025). 2025

Minimax Optimal Convergence of Gradient Descent in Logistic Regression via Large and Adaptive Stepsizes
Ruiqi Zhang, Jingfeng Wu, Licong Lin, Peter L Bartlett
arXiv preprint arXiv:2504.04105 (2025). 2025

Simplicity Prevails: Rethinking Negative Preference Optimization for LLM Unlearning
Chongyu Fan, Jiancheng Liu, Licong Lin*, Jinghan Jia, Ruiqi Zhang, Song Mei, Sijia Liu
arXiv preprint arXiv:2410.07163 (2024). 2024

When is it worthwhile to jackknife? Breaking the quadratic barrier for Z-estimators
Licong Lin, Fangzhou Su, Wenlong Mou, Peng Ding, Martin Wainwright
arXiv preprint arXiv:2411.02909 (2024). 2024

Mean-field variational inference with the TAP free energy: Geometric and statistical properties in linear models
Michael Celentano, Zhou Fan, Licong Lin*, Song Mei
arXiv preprint arXiv:2311.08442 (2023). 2023

Near-optimal multiple testing in Bayesian linear models with finite-sample FDR control
Taejoo Ahn, Licong Lin*, Song Mei
arXiv preprint arXiv:2211.02778 (2022). 2022

Publications

Transformers as Decision Makers: Provable In-Context Reinforcement Learning via Supervised Pretraining
Licong Lin, Yu Bai, Song Mei
International Conference on Learning Representations (ICLR) (2024). 2024

Scaling Laws in Linear Regression: Compute, Parameters, and Data
Licong Lin, Jingfeng Wu, Sham M Kakade, Peter L Bartlett, Jason D Lee
NeurIPS (2024). 2024

Plug-in Performative Optimization
Licong Lin, Tijana Zrnic
International Conference on Machine Learning (ICML) (2024). 2024

Negative Preference Optimization: From Catastrophic Collapse to Effective Unlearning
Ruiqi Zhang, Licong Lin*, Yu Bai, Song Mei
Conference on Language Modeling (COLM) (2024). 2024

Semi-parametric inference based on adaptively collected data
Licong Lin, Koulik Khamaru, Martin J Wainwright

arXiv preprint arXiv:2303.02534, to appear in Annals of Statistics (2023). 2023

Statistical Limits of Adaptive Linear Models: Low-Dimensional Estimation and Inference
Licong Lin, Mufang Ying, Suvrojit Ghosh, Koulik Khamaru, Cun-Hui Zhang
Advances in Neural Information Processing Systems 36 (2023). 2023

What causes the test error? going beyond bias-variance via anova
Licong Lin, Edgar Dobriban
The Journal of Machine Learning Research 22.1 (2021) pp. 6925–7006. JMLRORG, 2021

Experiences

Summer intern at Amazon AWS *Santa Clara, CA*

worked as an applied scientist intern *May 2024 - August 2024*

- Worked on accelerate decoding of LLMs via speculative decoding.
- Investigate the trade-offs between sampling quality and speed of LLM inference.
- Proposed approximated speculative decoding algorithms that optimally trade off sampling accuracy for speed, and empirically evaluated these tradeoffs.

Remote intern at Google Research *New York City, NY*

working as a student researcher *Jan 2025 - May 2025*

- Working on generative retrieval.

Selected Research Projects

Theoretical understanding of scaling law in LLMs *Berkeley, CA*

Joint work with Jingfeng Wu, advised by Peter Bartlett, Jason Lee (UCB & Princeton) *Jan 2024 - May 2024*

- Aim to provide a theoretical interpretation of the scaling laws of LLMs.
- Analyze the simple linear model with one-pass SGD training. We theoretically established that the risk of the model satisfies a power-law formula, which is consistent with the empirical observations in LLMs.

LLM unlearning *Berkeley, CA*

Joint work with Ruiqi Zhang, advised by Song Mei (UCB) *Jan 2024 - Mar 2024*

- Develop a new algorithm for LLMs to unlearn private data seen during pretraining.
- We propose Negative Preference Optimization (NPO), which is motivated by DPO but targeting unlearning tasks.
- NPO achieves state-of-the-art unlearning performance on the benchmark TOFU dataset.

Transformers as Decision Makers: Provable In-Context Reinforcement Learning *Berkeley, CA*

Advised by Prof. Song Mei (UCB) *May 2023 - Oct 2023*

- Proposed a theoretical framework for in-context reinforcement learning via supervised pretraining using transformers.
- Theoretically showed that transformers have the ability to in-context approximate near-optimal RL algorithms, e.g., LinUCB, Thompson sampling for stochastic linear bandits, and UCB-VI for tabular MDPs.
- Performed preliminary experiments on in-context RL using GPT-2 to verify our theoretical findings.

Semi-parametric inference with adaptively collected data *Berkeley, CA*

Advised by Prof. Martin Wainwright (UCB & MIT) *Dec 2021 - Feb 2023*

- Statistical inference of the target parameter in a generalized linear model at the presence of potentially high-dimensional nuisance parameter.
- Assumed the data points are sequentially collected instead of i.i.d. Obtained asymptotic normal estimators via solving a weighted estimating equation.
- Our proposed algorithm works for offline data collected from bandit algorithms or sequential experiments.

Honors & Awards

2023	**Outstanding Graduate Student Instructor**, UC Berkeley	*Berkeley, CA*
2021	**Huaixin Bachelor**, Peking University	*China*
2021	**Honor graduate of Applied Mathematics and Statistics Program**, Peking University	*China*
2018,19,20	**Academic Excellence Award**, Peking University	*China*
2019,20	**Peking University Scholarship**, Peking University	*China*
2020	**Gold Medal in Probability & Statistics**, *S.-T. Yau College Student Mathematics Contest, placed 1st nationally*	*China*
2018	**1st Prize**, Beijing College Student Mathematics Competition	*China*
2016	**2nd Prize**, China National Mathematical Olympiad	*China*

Skills

Programming and software Python (proficient), R (proficient), Matlab, Git, LaTeX.