Tao Lin

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Education

- **Harvard University**, Ph.D. in Computer Science 09/2020 – 05/2025 (expected)
  Advisor: Yiling Chen
  Areas of Research: Machine Learning, Mechanism Design, Information Design
- **Peking University**, B.S. in Computer Science and Technology, *summa cum laude* 09/2016 – 05/2020
  Advisor: Xiaotie Deng
  Thesis: Private Information Protection Game in Auctions

Research Interests

My research lies in the intersection between Machine Learning and Economics. I study mechanism design and information design problems from machine learning perspectives, along two directions:

- **Learning Agents:** I investigate how the learning behavior of boundedly rational agents (modeled by, e.g., reinforcement learning) can affect the outcome of games, compared to the equilibrium outcome predicted by the traditional economic theory based on rational-agent assumptions.
- **Learning principals:** I also study how the principals (designers of mechanisms or information structures) can learn the preferences of agents or the environment where agents interact, through repeated interactions with the agents. Involving dynamic and strategic data sources, this learning problem departs from the canonical machine learning paradigm that assumes an exogenous and stationary data distribution, requiring new methodologies that I aim to develop.

I am also fascinated by the interplay between economic incentives and machine learning algorithms in real-world AI systems (e.g., *ad auction platforms* and *recommender systems*). My ultimate research goal is to contribute to the community's endeavor of building socially responsible AI systems.

Publications

- **Generalized Principal-Agent Problem with a Learning Agent** [ICLR 2025] (spotlight)
  Tao Lin, Yiling Chen
  - Under submission to journal [Quantitative Economics]
- **Information Design with Unknown Prior** [ITCS 2025]
  Tao Lin, Ce Li
- **User-Creator Feature Polarization in Recommender Systems with Dual Influence** [NeurIPS 2024]
  Tao Lin, Kun Jin, Andrew Estornell, Xiaoying Zhang, Yiling Chen, Yang Liu
- **Bias Detection via Signaling** [NeurIPS 2024]
  (alphabetical) Yiling Chen, *Tao Lin*, Ariel D. Procaccia, Aaditya Ramdas, Itai Shapira
- **Multi-Sender Persuasion: A Computational Perspective** [ICML 2024]
  Safwan Hossain*, Tonghan Wang*, *Tao Lin**, Yiling Chen, David C. Parkes, Haifeng Xu
  (*: equal contribution)
- **Learning Thresholds with Latent Values and Censored Feedback** [ICLR 2024]
  Jiahao Zhang, *Tao Lin*, Weiqiang Zheng, Zhe Feng, Yifeng Teng, Xiaotie Deng
- **Sample Complexity of Forecast Aggregation** [NeurIPS 2023] (spotlight)
  Tao Lin, Yiling Chen
- **From Monopoly to Competition: Optimal Contests Prevail** [AAAI 2023]
  (alphabetical) Xiaotie Deng, Yotam Gafni, Ron Lavi, *Tao Lin*, Hongyi Ling

  - Under *revise-and-resubmit* to journal [Games and Economic Behavior]

- **Nash Convergence of Mean-Based Learning Algorithms in First Price Auctions** [WWW 2022]
  (alphabetical) Xiaotie Deng, Xinyan Hu, *Tao Lin*, Weiqiang Zheng
- **How Many Representatives Do We Need? The Optimal Size of a Congress Voting on Binary Issues** [AAAI 2022]
  Manon Revel, *Tao Lin*, Daniel Halpern
- **Learning Utilities and Equilibria in Non-Truthful Auctions** [NeurIPS 2020]
  (alphabetical) Hu Fu, *Tao Lin*
- **A Game-Theoretic Analysis of the Empirical Revenue Maximization Algorithm with Endogenous Sampling** [NeurIPS 2020]
  (alphabetical) Xiaotie Deng, Ron Lavi, *Tao Lin*, Qi Qi, Wenwei Wang, Xiang Yan
- **Private Data Manipulation in Optimal Sponsored Search Auction** [WWW 2020]
  (alphabetical) Xiaotie Deng, *Tao Lin*, Tao Xiao

Notes Not Planned to Publish

- **How Does Independence Help Generalization? Sample Complexity of ERM on Product Distributions** [2022]
- **On Clearing Prices in Matching Markets: A Simple Characterization without Duality** [2019]

Research Experiences Outside Harvard

- **Google**, "Market Algorithms" group 06 – 09, 2024
  Student Researcher
  Host: Christopher Liaw
- **ByteDance**, "Responsible AI" group 05 – 09, 2023
  Research Intern
  Host: Yang Liu
  - Led five people to work on a project on "polarization in recommender systems".
    - Proposed research problem, proved theoretical results, ran initial experiments, drafted the paper.
    - Paper published at [NeurIPS 2024].
- **Peking University**, Center on Frontiers of Computing Studies 09/2018 – 09/2021
  Research Assistant
  Advisor: Xiaotie Deng
  - Led six people to work on a project on "incentive-compatible learning in auctions".
    - Dispatched tasks, reviewed literature, did simulations, and proved main theorems.
    - Paper published at [NeurIPS 2020].
  - *Advised two undergraduate students* to write a paper on "no-regret learning in first-price auctions".
    - Proposed research problems, suggested solutions, surveyed literature, revised paper.
    - Paper published at [WWW 2022] and *invited* to present at [AAMAS 2022 workshop on Learning with Strategic Agents].
- *Summer research visit* to **University of British Columbia** 07 – 09, 2019
  Host: Hu Fu
  - Drove a project on "sample complexity of learning equilibria in non-truthful auctions" from formulation to completion. Paper published at [NeurIPS'20].

Teaching Experiences

- *Teaching assistant* for **Convex Optimization and Its Applications** (Harvard University) Spring 2022
- *Teaching assistant* for **Algorithmic Game Theory** (Peking University) Fall 2019

Academic Services

- Organizer of Harvard EconCS seminar 2023 – 2024
- Conference Review: NeurIPS'25 '24 '23, ICML'25 '24, ICLR'25 '24, AAAI'25, AISTATS'25, ACML'24, PPAI'24, STOC'24, SODA'24, ITCS'23, IJTCS'24, EC'25 '20
- Journal Review: Theoretical Computer Science, SIAM Journal on Computing

Selected Talks

- Chinese University of Hong Kong, Computer Science and Engineering Seminar 11/2024
  Title: *How to Avoid Polarization in Recommender Systems with Dual Influence?*
- INFORMS Annual Meeting, "Innovations in Data-driven Marketplaces" session 10/2024
  Title: *Bayesian Persuasion with a Learning Agent*
- ESIF Economics and AI+ML Meeting 08/2024
  Title: *Generalized Principal-Agent Problem with a Learning Agent*
- *Invited* talk at CCF Annual Conference on Computational Economics 08/2023
  Title: *Private Data Manipulation in Sponsored Search Auctions*
- Peking University Turing Class "CS peer talk" 06/2023
  Title: *Sample Complexity of Forecast Aggregation*
- Harvard EconCS seminar 03/2023
  Title: *Persuading a Behavioral Agent: Approximately Best Responding and Learning*
- *Invited* talk at AAMAS Workshop on Learning with Strategic Agents 05/2022
  Title: *Nash Convergence of Mean-Based Learning Algorithms in First Price Auctions*
- Institute for Theoretical Computer Science (ITCS), SUFE 06/2020
  Title: *Robustness of Empirical Revenue Maximization in Auction Learning*

Awards

- Siebel Scholarship 2024
  (Annually awarded for academic excellence and demonstrated leadership to 80 top students from the world's leading graduate schools.)
- Peking University Turing Class "Tu Ling Ben Jing" Prize 2019
- Peking University "Fang Zheng" Scholarship 2017
- Chinese National Olympiad in Informatics, Silver Medal 2015

References

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