Tianyi Lin

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ACADEMIC APPOINTMENTS

Columbia University   New York, NY

Department of Industrial Engineering and Operations Research (IEOR)

– Assistant Professor, July 2024 - Present

Massachusetts Institute of Technology   Cambridge, MA

Laboratory for Information and Decision Systems (LIDS)

– Postdoctoral Associate, July 2023 - June 2024
– Advisor: Asuman Ozdaglar

EDUCATION

University of California, Berkeley   Berkeley, CA

Ph.D. in Electrical Engineering and Computer Science   August 2016 - May 2023

– Advisor: Michael I. Jordan
– Track: Optimization and Machine Learning
– Thesis: Structure-driven Algorithm Design in Optimization and Machine Learning

University of California, Berkeley   Berkeley, CA

M.S. in Industrial Engineering and Operations Research   August 2016 - May 2017

University of Cambridge   Cambridgeshire, United Kingdom

M.S. in Pure Mathematics and Statistics   September 2011 - June 2012

Nanjing University   Nanjing, China

B.S. in Mathematics and Applied Mathematics   September 2007 - June 2011

RESEARCH INTERESTS

- Optimization and Game Theory.
- Machine Learning.
- Optimal Transport.
- Economic and Social Networks.

PUBLICATIONS

Preprints ($\star$ refers to equal contribution)

(P3) **Curvature-independent last-iterate convergence for games on Riemannian manifolds**
Y. Cai*, M. I. Jordan*, T. Lin*, A. Oikonomou* and E. Vlatakis*
International Conference on Learning Representations (ICLR), 2025, submitted.

(P2) **Two-timescale gradient descent ascent algorithms for nonconvex minimax optimization**

T. Lin, C. Jin and M. I. Jordan
Journal of Machine Learning Research, major revision.

(P1) **Explicit second-order min-max optimization methods with optimal convergence guarantee**
T. Lin, P. Mertikopoulos and M. I. Jordan
Mathematics of Operations Research, submitted.

Refereed Journal Publications (* refers to equal contribution)

(J22) **Doubly optimal no-regret online learning in strongly monotone games with bandit feedback**
W. Ba*, T. Lin*, J. Zhang* and Z. Zhou*
Operations Research, 2024.

(J21) **Perseus: A simple and optimal high-order method for variational inequalities**
T. Lin and M. I. Jordan
Mathematical Programming, 2024.

(J20) **Adaptive, doubly optimal no-regret learning in strongly monotone and exp-concave games with gradient feedback**
M. I. Jordan*, T. Lin* and Z. Zhou*
Operations Research, 2024.

(J19) **A continuous-time perspective on global acceleration for monotone equation problems**
T. Lin and M. I. Jordan
Communications in Optimization Theory, 2024.
Invited paper on Special issue dedicated to the memory of Professor Hedy Attouch.

(J18) **Monotone inclusions, acceleration and closed-loop control**
T. Lin and M. I. Jordan
Mathematics of Operations Research, 48(4): 2353-2382, 2023.

(J17) **First-order algorithms for nonlinear generalized Nash equilibrium problems**
M. I. Jordan*, T. Lin* and M. Zampetakis*
Journal of Machine Learning Research, 24(38): 1-46, 2023.

(J16) **A control-theoretic perspective on optimal high-order optimization**
T. Lin and M. I. Jordan
Mathematical Programming, 195 (1): 929-975, 2022.

(J15) **On the efficiency of entropic regularized algorithms for optimal transport**
T. Lin, N. Ho and M. I. Jordan
Journal of Machine Learning Research, 23(137): 1-42, 2022.

(J14) **Accelerating adaptive cubic regularization of Newton's method via random sampling**
X. Chen*, B. Jiang*, T. Lin* and S. Zhang*
Journal of Machine Learning Research, 23(90): 1-38, 2022.

(J13) **On the complexity of approximating multimarginal optimal transport**
T. Lin*, N. Ho*, M. Cuturi and M. I. Jordan
Journal of Machine Learning Research, 23(65): 1-43, 2022.

(J12) **An ADMM-based interior-point method for large-scale linear programming**
T. Lin, S. Ma, Y. Ye and S. Zhang
Optimization Methods and Software, 36(2-3): 389-424, 2021.
Invited paper on Special issue dedicated to the memory of Professor Masao Iri.

(J11) **A unified adaptive tensor approximation scheme to accelerate composite convex optimization**
B. Jiang*, T. Lin* and S. Zhang*
SIAM Journal on Optimization, 30(4): 2897-2926, 2020.

(J10) **Structured nonconvex optimization models: Algorithms and iteration complexity analysis**
B. Jiang*, T. Lin*, S. Ma* and S. Zhang*
Computational Optimization and Applications, 72(1): 115-157, 2019.

(J9) **On the iteration complexity analysis of stochastic primal-dual hybrid gradient approach with high probability**
L. Qiao, T. Lin, Q. Qin and X. Lu
Neurocomputing, 307: 78-90, 2018.

(J8) **Global convergence of unmodified 3-block ADMM for a class of convex minimization problems**
T. Lin, S. Ma and S. Zhang
Journal of Scientific Computing, 76(1): 69-88, 2018.

(J7) **Stochastic primal-dual proximal extragradient descent for compositely regularized optimization**
T. Lin, L. Qiao, T. Zhang, J. Feng and B. Zhang
Neurocomputing, 273: 516-525, 2018.

(J6) **Distributed linearized alternating direction method of multipliers for composite convex consensus optimization**
N. S. Aybat, Z. Wang, T. Lin and S. Ma
IEEE Transactions on Automatic Control, 63(1): 5-20, 2018.

(J5) **An extragradient-based alternating direction method for convex minimization**
T. Lin, S. Ma and S. Zhang
Foundations of Computational Mathematics, 17(1): 35-59, 2017.

(J4) **Exploiting interactions of review text, hidden user communities and item groups, and time for collaborative filtering**
Y. Xu, Q. Yu, W. Lam and T. Lin
Knowledge and Information Systems, 52(1): 221-254, 2017.

(J3) **Iteration complexity analysis of multi-block ADMM for a family of convex minimization without strong convexity**
T. Lin, S. Ma and S. Zhang
Journal of Scientific Computing, 69: 52-81, 2016.

(J2) **On the sublinear convergence rate of multi-block ADMM**
T. Lin, S. Ma and S. Zhang
Journal of the Operations Research Society of China, 3(3): 251-274, 2015.

(J1) **On the global linear convergence of the ADMM with multi-block variables**
T. Lin, S. Ma and S. Zhang
SIAM Journal on Optimization, 25(3): 1478-1497, 2015.

Refereed Conference Proceedings (* refers to equal contribution)

(C24) **A specialized semismooth Newton method for kernel-based optimal transport**
T. Lin, M. Cuturi and M. I. Jordan
International Conference on Artificial Intelligence and Statistics (AISTATS), 2024.

(C23) **Deterministic nonsmooth nonconvex optimization**
M. I. Jordan⋆, G. Kornowski⋆, T. Lin⋆, O. Shamir⋆ and M. Zampetakis⋆
Conference on Learning Theory (COLT), 2023.

(C22) **Gradient-free methods for deterministic and stochastic nonsmooth nonconvex optimization**
T. Lin, Z. Zheng and M. I. Jordan
International Conference on Neural Information Processing Systems (NeurIPS), 2022.

(C21) **First-order algorithms for min-max optimization in geodesic metric spaces**
M. I. Jordan⋆, T. Lin⋆ and E. Vlatakis⋆
(Oral) *International Conference on Neural Information Processing Systems (NeurIPS), 2022.*

(C20) **Online nonsubmodular minimization with delayed costs: From full information to bandit feedback**
T. Lin⋆, A. Pacchiano⋆, Y. Yu⋆ and M. I. Jordan
International Conference on Machine Learning (ICML), 2022.

(C19) **Fast distributionally robust learning via variance reduced min-max optimization**
Y. Yu⋆, T. Lin⋆, E. Mazumdar⋆ and M. I. Jordan
International Conference on Artificial Intelligence and Statistics (AISTATS), 2022.

(C18) **On structured filtering-clustering: Global error bound and optimal first-order algorithms**
N. Ho⋆, T. Lin⋆ and M. I. Jordan
International Conference on Artificial Intelligence and Statistics (AISTATS), 2022.

(C17) **A variational inequality approach to Bayesian regression games**
W. Guo⋆, M. I. Jordan⋆ and T. Lin⋆
IEEE Conference on Decision and Control (CDC), 2021.

(C16) **On projection robust optimal transport: Sample complexity and model misspecification**
T. Lin, Z. Zheng, E. Chen, M. Cuturi and M. I. Jordan
International Conference on Artificial Intelligence and Statistics (AISTATS), 2021.

(C15) **Relaxed Wasserstein and applications to GANs**
X. Guo⋆, J. Hong⋆, T. Lin⋆ and N. Yang⋆
International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2021.

(C14) **Projection robust Wasserstein distance and Riemannian optimization**
T. Lin⋆, C. Fan⋆, N. Ho, M. Cuturi and M. I. Jordan
(Spotlight) *International Conference on Neural Information Processing Systems (NeurIPS), 2020.*

(C13) **Fixed-support Wasserstein barycenters: Computational hardness and fast algorithm**
T. Lin, N. Ho, X. Chen, M. Cuturi and M. I. Jordan
International Conference on Neural Information Processing Systems (NeurIPS), 2020.

(C12) **New proximal Newton-type methods for convex optimization**
I. Adler⋆, Z. Hu⋆ and T. Lin⋆
IEEE Conference on Decision and Control (CDC), 2020.

(C11) **Finite-time last-iterate convergence for multi-agent learning in games**
T. Lin⋆, Z. Zhou⋆, P. Mertikopoulos and M. I. Jordan
International Conference on Machine Learning (ICML), 2020.

(C10) **On gradient descent ascent for nonconvex-concave minimax problems**
T. Lin, C. Jin and M. I. Jordan
International Conference on Machine Learning (ICML), 2020.

(C9) Near-optimal algorithms for minimax optimization
T. Lin, C. Jin and M. I. Jordan
Conference on Learning Theory (COLT), 2020.

(C8) Improved sample complexity for stochastic compositional variance reduced gradient
T. Lin, C. Fan, M. Wang and M. I. Jordan
American Control Conference (ACC), 2020.

(C7) On efficient optimal transport: An analysis of greedy and accelerated mirror descent algorithms
T. Lin⋆, N. Ho⋆ and M. I. Jordan
International Conference on Machine Learning (ICML), 2019.

(C6) Sparsemax and relaxed Wasserstein for topic sparsity
T. Lin, Z. Hu and X. Guo
International Conference on Web Search and Data Mining (WSDM), 2019.

(C5) Understanding sparse topical structure of short text via stochastic variational-Gibbs inference
T. Lin, S. Zhang and H. Cheng
International Conference on Information and Knowledge Management (CIKM), 2016.

(C4) On stochastic primal-dual hybrid gradient approach for compositely regularized minimization
L. Qiao, T. Lin, Y. Jiang, F. Yang, W. Liu and X. Lu
European Conference on Artificial Intelligence (ECAI), 2016.

(C3) Collaborative filtering incorporating review text and co-clusters of hidden user communities and item groups
Y. Xu, W. Lam and T. Lin
International Conference on Information and Knowledge Management (CIKM), 2014.

(C2) Latent aspect mining via exploring sparsity and intrinsic information
Y. Xu, T. Lin, W. Lam, Z. Zhou, H. Cheng and A. Man-Cho So
International Conference on Information and Knowledge Management (CIKM), 2014.

(C1) The dual-sparse topic model: Mining focused topics and focused terms in short text
T. Lin⋆, W. Tian⋆, Q. Mei and H. Cheng
International Conference on World Wide Web (WWW), 2014.

HONORS AND AWARDS		
• IBM Goldstine Fellowship (declined)		2023-2025
• Google-BAIR Commons Funding		2021-2022
• Berkeley Artificial Intelligence Research (BAIR) Funding		2020-2021
• Berkeley EECS Fellowship		2019
• Berkeley IEOR Marshall-Oliver-Rosenberger Fellowship		2018
• National Scholarship in China (2% of the department)		2009-2010

INVITED TALKS

- INFORMS Annual Meeting at Seattle. (October 2024)
- INFORMS Optimization Society Meeting at Houston. (March 2024)
- Information Science and Systems Conference at Princeton. (March 2024)
- INFORMS Annual Meeting at Phoenix. (October 2023)
- Math Department Seminar, University of South Caroline. (August 2023)
- IEOR Seminar, Columbia University. (February 2023)

- OR and STATS Seminar, MIT Sloan School of Management. (February 2023)
- ISE Department Seminar, Virginia Tech. (February 2023)
- Math Department Seminar, Rensselaer Polytechnic Institute. (February 2023)
- ISE Department Seminar, UIUC. (January 2023)
- IE Department Seminar, Clemson University. (January 2023)
- ORIE Colloquium, Cornell University. (January 2023)
- IMSE Department Seminar, Iowa State University. (January 2023)
- IE School Seminar, Purdue University. (January 2023)
- OPLOG Division Seminar, UBC Sauder School of Business. (December 2022)
- ISE Department Seminar, Texas A&M University. (December 2022)
- Tech Research Seminar, NYU Stern School of Business. (December 2022)
- Business Analytics Seminar, Iowa Tippie College of Business. (November 2022)
- INFORMS Annual Meeting at Indiana. (October 2022)
- International Conference on Continuous Optimization (ICCOPT). (July 2022)
- Learning and Games Program, Simons Institute. (April 2022)
- INFORMS Optimization Society Meeting at Greenville. (March 2022)
- INFORMS Annual Meeting at Anaheim. (October 2021)
- SIAM Conference on Optimization, Virtual. (July 2021)
- INFORMS Annual Meeting, Virtual. (November 2020)
- INFORMS Optimization Society, Cancelled. (March 2020)
- INFORMS Annual Meeting at Seattle. (October 2019)
- International Conference on Continuous Optimization (ICCOPT). (August 2019)
- INFORMS Annual Meeting at Phoenix. (November 2018)
- IEOR Department Seminar, UC Berkeley. (September 2018)
- Berkeley-Stanford Workshop on Math and Computational Finance. (July 2018)
- International Congress of Mathematical Optimization (ISMP). (July 2018)
- Berkeley-Columbia Meeting in Engineering and Statistics. (April 2018)
- INFORMS Optimization Society Meeting at Denver. (March 2018)

PROFESSIONAL
SERVICES

Session Chair: INFORMS (2021, 2020, 2019), ICCOPT (2022).

Ad-hoc Referee
- Referees for Journals

  - Operations Research
  - Journal of Machine Learning Research
  - Mathematics of Operations Research
  - Mathematical Programming
  - Foundations of Computational Mathematics
  - SIAM Journal on Optimization
  - SIAM Journal on Mathematics of Data Science
  - SIAM Journal on Imaging Science
  - INFORMS Journal on Computing

- INFORMS Journal on Optimization
- Computational Optimization and Applications
- Journal of Scientific Computing
- Annuals of Statistics
- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- ACM Transactions on Knowledge Discovery from Data (TKDD)
- Information and Inference: A Journal of the IMA
- Probability in Engineering and Information Sciences
- Journal of Mathematical Imaging and Vision
  - Referees for Conferences: ICML, NeurIPS, AISTATS, WWW, WSDM, CIKM.

Member
- The Institute for Operations Research and the Management Sciences (INFORMS)
- INFORMS Optimization Society
- INFORMS Computing Society
- INFORMS Applied Probability Society
- Society for Industrial and Applied Mathematics (SIAM)
- Mathematical Optimization Society (MOS)

TEACHING EXPERIENCE

- Weekly discussion sessions, office hours, and homework solutions.
  - STAT 2. Introduction to Statistics, Fall 2022.
  - CS 194. Networks: Models, Processes and Algorithms, Spring 2022.
  - IEOR 240. Optimization Analysis, Fall 2019, Fall 2018.
  - IEOR 262A. Mathematical Programming I, Fall 2017.

COMPUTER SKILLS

Programming:
- Expert level at development in MATLAB.
- Proficient at Python, C and C++.
- Experience with CPLEX and Pytorch.

Last updated in August 17, 2024