

Tianyi Lin

Department of Industrial Engineering and Operations Research (IEOR), Columbia University
500 W. 120th Street, New York, NY 10027

Tel: (510)-660-2939

Email: tl3335@columbia.edu

Homepage: <https://tydlin.github.io/>

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 - July 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.
- Large-Scale Text Analytic.

PUBLICATIONS

Preprints (* 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. Vlastakis*

Neural Information Processing Systems (NeurIPS), 2024, submitted.

- (P2) **A nonasymptotic analysis of gradient descent ascent for nonconvex-concave minimax problems**
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
SIAM Journal on Optimization, major revision.

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
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
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**) *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
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
Artificial Intelligence and Statistics (AISTATS), 2022.
- (C17) **A variational inequality approach to Bayesian regression games**
W. Guo*, M. I. Jordan* and T. Lin*
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
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**) *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
Neural Information Processing Systems (NeurIPS), 2020.
- (C12) **New proximal Newton-type methods for convex optimization**
I. Adler*, Z. Hu* and T. Lin*
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
 - Journal of Machine Learning Research
 - Operations Research
 - Mathematics of Operations Research
 - Mathematical Programming
 - SIAM Journal on Optimization
 - SIAM Journal on Mathematics of Data Science
 - Foundations of Computational Mathematics
 - Annals of Statistics
 - Information and Inference: A Journal of the IMA

- IEEE Transactions on Pattern Analysis and Machine Intelligence
 - IEEE Transactions on Knowledge and Data Engineering
 - ACM Transactions on Knowledge Discovery from Data
 - SIAM Journal on Imaging Science
 - INFORMS Journal on Optimization
 - INFORMS Journal on Computing
 - Computational Optimization and Applications
 - Journal of Scientific Computing
 - European Journal of Operational Research
 - Optimization Letters
 - Statistics, Optimization and Information Computing
 - Probability in Engineering and Information Sciences
 - Journal of Mathematical Imaging and Vision
 - IEEE Transactions on Circuits and Systems for Video Technology
 - IEEE Transactions on Neural Networks and Learning Systems
 - World Wide Web Journal
 - Information Science
 - Service Science
- 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 (Graduate), Fall 2019, Fall 2018.
 - IEOR 262A. Mathematical Programming I (Graduate), 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 July 5, 2024