Xin Jiang

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Research interests

My research is rooted in the mathematical foundations of data science and artificial intelligence, with primary focuses on theory and algorithms for large-scale optimization problems from engineering, data science, and machine learning for graphical data.

Employment

Postdoctoral researcher 2024/07 – present
Cornell University *Ithaca, NY*

- Advised by Adrian S. Lewis
- Instructor of ORIE 3300/5300 Optimization I (Fall 2024)

Postdoctoral researcher 2022/08 – 2024/07
Lehigh University *Bethlehem, PA*

- Hosted by Program in the Foundations and Applications of Mathematical Optimization and Data Science
- Member in Institute for Data, Intelligent Systems, and Computation (I-DISC) at Lehigh University
- Worked closely with Frank E. Curtis

Education

Ph.D. Electrical and Computer Engineering 2017/09 – 2022/06
University of California, Los Angeles *Los Angeles, CA*

- Thesis: Bregman first-order proximal splitting methods: Theory and applications
- Advisor: Lieven Vandenberghe

M.S. Electrical and Computer Engineering 2015/09 – 2017/06
University of California, Los Angeles *Los Angeles, CA*

- Thesis: Minimum rank positive semidefinite matrix completion with chordal sparsity pattern
- Advisor: Lieven Vandenberghe

B.Eng. Electronic and Communication Engineering 2012/09 – 2015/07
The University of Hong Kong *Hong Kong, China*

- First class honors. Minor in Finance
- Thesis: Power optimization in hybrid localization mechanism for logistic applications
- Advisor: Victor O. K. Li

Awards and Honors

Cornell ORIE Young Researcher	2024
Summer Mentored Research Fellowship (SMRF)	2021
Ph.D. Preliminary Exam Fellowship	2018
Dean's Honors List	2013 – 2015
URFP Research Internship Award	2015
Tso Chiu Kit Scholarship	2015
Kai Chong Tong Scholarship	2013 – 2014
Chiap Hua Cheng's Foundation Scholarship	2013
S. Y. King Prize	2012
HKU Worldwide U/G Student Exchange Scholarship	2012

Publications

Preprints (α as alphabetical order; underlined names indicate the student collaborators I advise)

[P1] E. D. H. Nguyen, B. Ying, W. Yin, and **X. Jiang**. A general framework for an exact decentralized optimization problem under time-varying networks. 2024. Under review for *Mathematical Programming*.

[P2] (α) F. E. Curtis, **X. Jiang**, and Q. Wang. Single-loop deterministic and stochastic interior-point algorithms for nonlinearly constrained optimization. 2024. Under review for *Mathematical Programming*. [preprint]

[P3] E. D. H. Nguyen, **X. Jiang**, B. Ying, and C. A. Uribe. On graphs with finite-time consensus and their use in gradient tracking. 2023. Major revision at *SIAM Journal on Optimization*. [preprint]

[P4] J. Liu and **X. Jiang**. Improved stochastic controlled averaging for distributed and federated learning. 2024. *Submitted.*

[P5] C. Yao and **X. Jiang**. A globally convergent difference-of-convex algorithmic framework and application to log-determinant optimization problems. 2023. *Submitted.* [preprint]

[P6] **X. Jiang**, K. Cheng, S. Jiang, and Y. Sun. Chordal-GCN: Exploiting sparsity in training large-scale graph convolutional networks. 2019. [preprint]

Journal articles

[J1] (α) **X. Jiang**, E. D. H. Nguyen, C. A. Uribe, and B. Ying. Sparse factorization of the square all-ones matrix of arbitrary order. 2024. To appear in *SIAM Journal on Matrix Analysis and Applications*. [preprint]

[J2] (α) F. E. Curtis, **X. Jiang**, and Q. Wang. Almost-sure convergence of iterates and multipliers in stochastic sequential quadratic optimization. 2023. To appear in *Journal of Optimization Theory and Applications*. [preprint]

[J3] **X. Jiang**, Y. Sun, M. S. Andersen, and L. Vandenberghe. Minimum-rank positive semidefinite matrix completion with chordal patterns and applications to semidefinite relaxations. *Applied Set-Valued Analysis and Optimization*. 2023. [doi]

[J4] **X. Jiang** and L. Vandenberghe. Bregman three-operator splitting methods. *Journal of Optimization Theory and Applications*. 2023. [doi] [preprint]

[J5] **X. Jiang** and L. Vandenberghe. Bregman primal–dual first-order method and application to sparse semidefinite programming. *Computational Optimization and Applications*, 2022. [doi] [preprint]

Conference Proceedings

[C1] R. Huang, J. Xu, Z. Yang, X. Si, **X. Jiang**, H. Yuan, C. Wang, and Y. Yang. Extracting training data from molecular pre-trained models. In *Proceedings of the 38th Conference on Neural Information Processing Systems (NeurIPS)*, 2024.

[C2] R. Huang, J. Xu, **X. Jiang**, R. An, and Y. Yang. Can modifying data address graph domain adaptation? In *Proceedings of the 29th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD)*, 2024. [published version]

[C3] S. Feng, and **X. Jiang**. Accelerating gradient tracking with periodic global averaging. In *2024 Conference on Decision and Control*, 2024. [preprint]

[C4] **X. Jiang**, and C. Yao. Inexact proximal splitting methods for Euclidean distance matrix optimization. In *2024 INFORMS Optimization Society Conference*, 2024. [conference website] [preprint]

[C5] R. Huang, J. Xu, **X. Jiang**, C. Pang, C. Wang, and Y. Yang. Measuring task similarity and its implication in fine-tuning graph neural networks. In *Proceedings of the 38th AAAI Conference on Artificial Intelligence (AAAI)*, 2024. [published version]

[C6] J. Xu, R. Huang, **X. Jiang**, Y. Cao, C. Yang, C. Wang, and Y. Yang. Better with less: A data-centric perspective on pre-training graph neural networks. In *Proceedings of the 37th Conference on Neural Information Processing Systems (NeurIPS)*, 2023. [published version] [preprint]

[C7] J. Xu, Y. Sun, **X. Jiang**, Y. Wang, C. Wang, J. Lu, and Y. Yang. Blindfolded attackers still threatening: Strict black-box adversarial attacks on graphs. In *Proceedings of the 36th Conference on Artificial Intelligence (AAAI)*, 2022. [published version]

[C8] J. Xu, Y. Yang, J. Chen, **X. Jiang**, C. Wang, J. Lu, and Y. Sun. Unsupervised adversarially robust representation learning on graphs. In *Proceedings of the 36th Conference on Artificial Intelligence (AAAI)*, 2022. [published version]

[C9] Z. Jiao*, Z. Zhang*, **X. Jiang**, D. Han, S.-C. Zhu, Y. Zhu, and H. Liu. Consolidating kinematic models to promote coordinated mobile manipulations. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2021. [published version]

Presentations

A novel primal–dual algorithm for decentralized optimization 2024/11
SIAM New York-New Jersey-Pennsylvania Section Conference *Rochester, NY*

Graph sequences with finite-time convergence for decentralized average consensus 2024/10
Cornell ORIE Young Researchers Workshop *Ithaca, NY*

A novel primal–dual algorithm for decentralized optimization 2024/08
Modeling and Optimization: Theory and Applications (MOPTA) *Bethlehem, PA*

Improved stochastic controlled averaging for federated learning 2024/08
Modeling and Optimization: Theory and Applications (MOPTA) *Bethlehem, PA*

Graph sequences with finite-time consensus and use in decentralized optimization 2024/05
Invited talk in Sungho Shin's group at MIT *Boston, MA*

Recent advances in structure exploitation for semidefinite programming 2024/04
Guest lecture in Harvard ENG-SCI 257: Semidefinite optimization and relaxation *Boston, MA*

On graph sequences with finite-time consensus 2024/03
INFORMS Optimization Society Conference *Houston, TX*

On the almost-sure convergence of a stochastic SQP method 2023/10
INFORMS Annual Meeting *Phoenix, AZ*

A globally convergent difference-of-convex algorithmic framework

- Modeling and Optimization: Theory and Applications (MOPTA), Bethlehem, PA, 2023/08
- SIAM Conference on Optimization (OP23), Seattle, WA, 2023/05
- 57th Annual Conference on Information Sciences and Systems, Baltimore, MD, 2023/03

Primal–dual proximal optimization methods with Bregman distances

- Invited talk in Optimal Transport and Mean Field Games Seminar, University of South Carolina, 2022/122
- Invited talk in Optimization and Data Science Seminar, UCSD, 2022/10
- Invited talk in Department of Mathematics, UCLA, 2022/09
- SIAM Conference on Mathematics of Data Science (MDS22), San Diego, CA, 2022/09

Bregman proximal methods for semidefinite optimization

- EUROPT Workshop on Continuous Optimization, Toulouse, France, 2021/07
- SIAM Conference on Optimization (OP21), virtual, 2021/07

Bregman primal–dual first-order methods 2020/11
INFORMS Annual Meeting *Virtual*

Teaching and Mentorship

Teaching Experience

Instructor Fall 2024
ORIE 3300/5300 Optimization I *Cornell University*

- a core course in ORIE for upper-level undergraduate and master students
- around 200 students from ORIE, CS, ECE, Statistics, and Applied Mathematics

Teaching Assistant (five times) 2017 – 2022
ECE 236B Convex Optimization *UCLA*

Teaching Assistant (four times) 2017 – 2021
ECE 133A Applied Numerical Computing *UCLA*

Teaching Assistant (twice) 2019 – 2022
ECE 236C Optimization Methods for Large-Scale Systems *UCLA*

Teaching Assistant Fall 2020
ECE 205A Matrix Analysis for Scientists and Engineers *UCLA*

Mentorship Experience

Summer Research Program Supervisor 2021/06 – 2021/08
Summer Undergraduate Research Program (SURP) *UCLA*

- Project: Solving large-scale non-metric multidimensional scaling using ADMM
- Co-supervised (with Prof. Lieven Vandenberghe) two undergraduate students on a summer research project

Academic Mentor 2019/06 – 2019/08
Research in Industrial Projects for Students (RIPS) Program *IPAM, UCLA*

- Project: Obstacle avoidance of autonomous vehicles
- Guided four international undergraduates to work on an industrial project
- Communicated with industrial sponsor Amazon for technical assistance

I am also fortunate to supervise self-motivated junior students on various research projects.

- Ning Fang (MS, SysEng, Cornell), Edward D. H. Nguyen (PhD, ECE, Rice), Qi Wang (PhD, ISE, Lehigh), Jiaxin Liu (PhD, CSE, Lehigh), Shujing Feng (MS, CSE, Lehigh), Rishad Islam Shantho (PhD, CSE, Lehigh), Shuohao Ping (MS, CS, UCLA), Renhong Huang (MS, CS, ZJU)

Professional Services

Journal reviewer

Mathematical Programming · SIAM Journal on Optimization · Mathematics of Operations Research · Journal of Machine Learning Research · IEEE Transactions on Pattern Analysis and Machine Intelligence · Journal of Scientific Computing · Optimization Letters · Journal of Industrial and Management Optimization · IEEE Transactions on Automatic Control · IEEE Transactions on Neural Networks and Learning Systems

Conference reviewer

International Conference on Machine Learning (ICML) · AAAI Conference on Artificial Intelligence (AAAI) · International Conference on Learning Representations (ICLR) · Conference on Neural Information Processing Systems (NeurIPS)

Organization of workshops and seminars

- Session chair in Model and Optimization: Theory and Applications (MOPTA), 2024
- Session chair in INFORMS Optimization Society (IOS) Conference, 2024
- Session chair in INFORMS Annual Meeting, 2023
- Session chair in Model and Optimization: Theory and Applications (MOPTA), 2023
- Session chair in SIAM Conference on Optimization (OP23), 2023
- Session chair in SIAM Conference on Mathematics of Data Science (MDS22), 2022
- Session chair in International Conference on Continuous Optimization (ICCOPT), 2022

Experience

Research Internship 2020/01 – 2020/09

Damo Academy, Alibaba *Seattle, WA*

- Worked in the Decision Intelligence (Foundation) Group, supervised by Wotao Yin
- Participated in designing MindOpt, an optimization solver for large-scale linear programs
- Developed algorithms for bottom-level numerical linear algebra, and re-designed data structure

IEEE Eta Kappa Nu (HKN) 2014/01 – present

Department of Electrical and Electronic Department, HKU *Hong Kong, China*

- Participated as a student member of Lambda Iota Chapter, IEEE-HKN, a student honor society of IEEE
- Conducted tutorials to mentor juniors on their coursework