

# Qihang Lin

Associate Professor  
Department of Business Analytics  
Henry B. Tippie College of Business  
University of Iowa

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## EDUCATION

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- Carnegie Mellon University**, Pittsburgh, PA **2008-2013**
  - Tepper School of Business
  - Ph.D., Algorithms, Combinatorics and Optimization
- Tsinghua University**, Beijing, China **2004-2008**
  - Department of Mathematical Sciences
  - B.S., with Highest Honors in Mathematics

## EXPERIENCE

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- Associate Professor**, Department of Business Analytics, Tippie College of Business, University of Iowa, Iowa City, IA **2019-present**
- Assistant Professor**, Department of Business Analytics, Tippie College of Business, University of Iowa, Iowa City, IA **2013-2019**
- Faculty in Applied Mathematical and Computational Sciences PhD Program **2013-present**

## RESEARCH INTERESTS

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- Continuous optimization, first-order methods, distributed optimization, error bound conditions
- Machine learning, predictive and prescriptive analytics, big data analysis
- Markov decision processes

## HONORS AND AWARDS

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- Tippie Full-Time MBA Business Analytics Professor of the Year, Tippie College of Business, University of Iowa **2019**
- INFORMS Data Science Workshop Best Paper Award Runner-Up, INFORMS College on Artificial Intelligence **2019**
- Early Career Research Award, Tippie College of Business, University of Iowa **2018**
- INFORMS Data Science Workshop Best Paper Award, INFORMS College on Artificial Intelligence **2017**
- Summer Research Award, Tippie College of Business, University of Iowa **2015**
- Old Gold Summer Fellowship, University of Iowa **2014**

## JOURNAL PUBLICATIONS

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- [J.23] Q. Lin, R. Ma, and Y. Xu. **Inexact Proximal-Point Penalty Methods for Non-Convex Optimization with Non-Convex Constraints**, 2022. Accepted. *Computational Optimization and Applications*.
- [J.22] T. Wang and Q. Lin. **Hybrid Predictive Model: When an Interpretable Model Collaborates with a Black-box Model**. *Journal of Machine Learning Research*. 22(137):1-38, 2021.
- [J.21] M. Liu, H. Rafique, Q. Lin, and T. Yang. **Solving Weakly-Convex-Weakly-Concave Saddle-Point Problems as Successive Strongly Monotone Variational Inequalities**. *Journal of Machine*

*Learning Research*. 22(169):1-34, 2021.

- [J.20] H. Rafique, M. Liu, Q. Lin and T. Yang. **Weakly-Convex-Concave Min-Max Optimization: Provable Algorithms and Applications in Machine Learning**, 2021. Forthcoming. *Optimization Methods and Software*.
- [J.19] X. Chen, Q. Lin, and G. Xu. **Distributionally Robust Optimization with Confidence Bands for Probability Density Functions**, 2021. Forthcoming. *INFORMS Journal on Optimization*.
- [J.18] Q. Lin, S. Nadarajah, N. Soheili, and T. Yang. **A Data Efficient and Feasible Level Set Method for Stochastic Convex Optimization with Expectation Constraints**. *Journal of Machine Learning Research*. 21(143):1–45, 2020.
- [J.17] T. Yang, L. Zhang, Q. Lin, S. Zhu, and R. Jin. **High-dimensional model recovery from random sketched data by exploring intrinsic sparsity**. *Machine Learning*. 109:899–938, 2020.
- [J.16] X. Chen, Q. Lin and Z. Wang. **Comparison-Based Algorithms for One-Dimensional Stochastic Convex Optimization**. *INFORMS Journal on Optimization*, 2(1): 34–56, 2020.
- [J.15] L. Xiao, W. Yu, Q. Lin and W. Chen. **DSCOVER: Randomized Primal-Dual Block Coordinate Algorithms for Asynchronous Distributed Optimization**. *Journal of Machine Learning Research*, 20(43):1–58, 2019.
- [J.14] Q. Lin, S. Nadarajah and N. Soheli, **Revisiting Approximate Linear Programming: Constraint-Violation Learning with Applications to Inventory Control and Energy Storage**. *Management Sciences*, 66(4), 1544-1562, 2020.
- [J.13] X. Chen, Q. Lin, B. Sen. **On Degrees of Freedom of Projection Estimators with Applications to Multivariate Nonparametric Regression**, Forthcoming. *Journal of the American Statistical Association*, 2019.
- [J.12] Q. Lin, S. Nadarajah and N. Soheli. **A Level-set Method For Convex Optimization with a Feasible Solution Path**. *SIAM Journal on Optimization*, 28(4): 3290–3311, 2018.
- [J.11] T. Yang and Q. Lin. **RSG: Beating Subgradient Method without Smoothness and Strong Convexity**. *Journal of Machine Learning Research*. 19(6):1–33, 2018.
- [J.10] J. D. Lee, Q. Lin, T. Ma and T. Yang. **Distributed Stochastic Variance Reduced Gradient Methods by Sampling Extra Data with Replacement**. *Journal of Machine Learning Research*. 18(122):1–43, 2017.
- [J.9] X. Chen, K. Jiao and Q. Lin. **Bayesian Decision Process for Cost-Efficient Dynamic Ranking via Crowdsourcing**. *Journal of Machine Learning Research*, 17(217):1–40, 2016.
- [J.8] Q. Lin, Z. Lu and L. Xiao. **An Accelerated Proximal Coordinate Gradient Method and its Application to Regularized Empirical Risk Minimization**. *SIAM Journal on Optimization*, 25(4):2244-2273, 2015.

- [J.7] T. Yang, R. Jin, S. Zhu, Q. Lin. **On Data Preconditioning for Regularized Loss Minimization.** *Machine Learning*, 103(1):57-79, 2016
- [J.6] Q. Lin, X. Chen and J. Peña. **A Trade Execution Model under a Composite Dynamic Coherent Risk Measure.** *Operations Research Letters*, 43(1):52-58, 2015.
- [J.5] Q. Lin and L. Xiao. **An Adaptive Accelerated Proximal Gradient Method and its Homotopy Continuation for Sparse Optimization.** *Computational Optimization and Applications*, 60(3): 633-674, 2015.
- [J.4] X. Chen, Q. Lin and D. Zhou. **Statistical Decision Making for Optimal Budget Allocation in Crowd Labelling.** *Journal of Machine Learning Research*, 16(1):1-46, 2015.
- [J.3] Q. Lin, X. Chen and J. Peña. **A Sparsity Preserving Stochastic Gradient Method for Composite Optimization.** *Computational Optimization and Application*, 58(2):455-482, 2014.
- [J.2] Q. Lin, X. Chen and J. Peña. **A Smoothing Stochastic Gradient Method for Composite Optimization.** *Optimization Methods and Software*, 29(6):1281-1301, 2014.
- [J.1] X. Chen, Q. Lin, S. Kim, J. Carbonell and E. Xing. **Smoothing Proximal Gradient Methods for General Structured Sparse Learning.** *Annals of Applied Statistics*, 6(2):719-752, 2012.

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REFEREED CONFERENCE PUBLICATIONS

- [C.21] X. Wang, X. Chen, Q. Lin and W. Liu. **Bayesian Decision Process for Budget-efficient Crowdsourced Clustering.** *International Joint Conference on Artificial Intelligence (IJCAI)*, 2020.
- [C.20] Y. Yan, Y. Xu, Q. Lin, W. Liu and T. Yang. **Optimal Epoch Stochastic Gradient Descent Ascent Methods for Min-Max Optimization.** *Neural Information Processing Systems (NeurIPS)*, 2020.
- [C.19] H. Rafique, T. Wang, Q. Lin. and A. Singhani. **Transparency Promotion with Model-Agnostic Linear Competitors.** *International Conference of Machine Learning (ICML)*, 2020.
- [C.18] R. Ma, Q Lin, and T. Yang. **Quadratically Regularized Subgradient Methods for Weakly Convex Optimization with Weakly Convex Constraints.** *International Conference of Machine Learning (ICML)*, 2020.
- [C.17] Y. Xu, Q. Qi, Q. Lin, R. Jin and T. Yang. **Stochastic optimization for DC functions and non-smooth non-convex regularizers with non-asymptotic convergence.** *International Conference of Machine Learning (ICML)*, 2019.
- [C.16] Y. Yan, T. Yang, Z. Li, Q. Lin and Y. Yang. **A Unified Analysis of Stochastic Momentum Methods For Deep Learning.** *International Joint Conferences on Artificial Intelligence (IJCAI)*, 2018.
- [C.15] Q. Lin, R. Ma and T. Yang. **Level-Set Methods for Finite-Sum Constrained Convex Optimization.** *International Conference of Machine Learning (ICML)*, 2018.
- [C.14] Y. Xu, M. Liu, T. Yang, and Q. Lin. **ADMM without a Fixed Penalty Parameter: Faster Convergence with New Adaptive Penalization.** *Neural Information Processing Systems (NIPS)*,

2017.

- [C.13] Y. Xu, Q. Lin and T. Yang. **Adaptive SVRG Methods under Error Bound Conditions with Unknown Growth Parameter.** *Neural Information Processing Systems (NIPS)*, 2017.
- [C.12] T. Yang, Q. Lin and L. Zhang. **A Richer Theory of Convex Constrained Optimization with Reduced Projections and Improved Rates.** *International Conference of Machine (ICML)*, 2017.
- [C.11] Y. Xu, Q. Lin and T. Yang. **Stochastic Convex Optimization: Faster Local Growth Implies Faster Global Convergence.** *International Conference of Machine Learning (ICML)*, 2017.
- [C.10] M. T. Lash, Q. Lin, W. Street, J. Robinson and J. Ohlmann, **Generalized Inverse Classification,** *SIAM International Conference on Data Mining (SDM)*, 2017.
- [C.9] Y. Xu, Y. Yan, Q. Lin and T. Yang. **Homotopy Smoothing for Non-Smooth Problems with Lower Complexity than  $O(1/\epsilon)$ .** *Neural Information Processing Systems (NIPS)*, 2016.
- [C.8] J. Chen, T. Yang, L. Zhang, Q. Lin and Y. Chang. **Optimal Stochastic Strongly Convex Optimization with a Logarithmic Number of Projections.** *Uncertainty in Artificial Intelligence (UAI)*, 2016.
- [C.7] Q. Lin, Z. Lu and L. Xiao. **An Accelerated Proximal Coordinate Gradient Method.** *Neural Information Processing Systems (NIPS)*, 2014.
- [C.6] Q. Lin and L. Xiao. **An Adaptive Accelerated Proximal Gradient Method and its Homotopy Continuation for Sparse Optimization.** *International Conference of Machine Learning (ICML)*, 2014.
- [C.5] Q. Lin, X. Chen and D. Zhou. **Optimistic Knowledge Gradient Policy for Optimal Budget Allocation in Crowdsourcing.** *International Conference of Machine Learning (ICML)*, 2013.
- [C.4] X. Chen, Q. Lin and J. Peña. **Optimal Regularized Dual Averaging Methods for Stochastic Optimization.** *Neural Information Processing Systems (NIPS)*, 2012.
- [C.3] X. Chen, Q. Lin, S. Kim, J. Carbonell and E. Xing. **Smoothing Proximal Gradient Methods for General Structured Sparse Learning.** *Uncertainty in Artificial Intelligence (UAI)*, 2011.
- [C.2] X. Chen, Y. Qi, B. Bai, Q. Lin and J. Carbonell. **Sparse Latent Semantic Analysis.** *SIAM International Conference on Data Mining (SDM)*, 2011.
- [C.1] X. Chen, Y. Qi, B., Q. Lin, and J. Carbonell. **Learning Preferences using Millions of Parameters by Enforcing Sparsity.** *IEEE International Conference on Data Mining (ICDM)*, 2010.

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MANUSCRIPTS UNDER REVIEW OR REVISION

- [M.4] Q. Lin and Y. Xu. **Inexact Accelerated Proximal Gradient Method with Line Search and Reduced Complexity for Affine-Constrained and Bilinear Saddle-Point Structured Convex Problems,** 2022. Under review in *SIAM Conference on Optimization*.
- [M.3] Q. Lin, R. Ma, S. Nadarajah, and N. Soheili. **First-Order Methods for Convex Constrained**

**Optimization under Error Bound Conditions with Unknown Growth Parameters**, 2020.  
Under prepare for submission.

- [M.2] P. Pakiman, S. Nadarajah, N. Soheili and Q. Lin. **Self-guided Approximate Linear Programs**, 2020. Under review in *Management Sciences*.
- [M.1] Y. Yan, Y. Xu, Q. Lin, L. Zhang, and T. Yang. **Stochastic Primal-Dual Algorithms with Faster Convergence than  $O(1/\sqrt{T})$  for Problems without Bilinear Structure**, 2019. Prepare for submission.

#### COURSES TAUGHT

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- **Quantitative Finance and Deep Learning** (Master of Business Analytics and Master of Finance, Spring 2021, Spring 2022; taught jointly with Tong Yao; University of Iowa)
- **Data Programming in R** (Master of Business Analytics, Fall 2019, Spring 2022; University of Iowa)
- **Business Analytics** (MBA, Spring 2014; Master of Business Analytics, Fall 2014; University of Iowa)
- **Advanced Analytics** (MBA, Fall 2013, Fall 2014, Fall 2015, Fall 2017, Fall 2018; Master of Business Analytics, Spring 2015, Spring 2016, Spring 2020, Fall 2021; University of Iowa)
- **Text Analytics** (Master of Business Analytics, Fall 2015, Fall 2016, Fall 2017, Spring 2018, Spring 2021, Fall 2021; University of Iowa)
- **Analytics Experience** (Master of Business Analytics, Spring 2017, Spring 2018; University of Iowa)
- **Management Science Topics: Convex Analysis and Optimization** (Ph.D. course, Spring 2019, Spring 2017; University of Iowa)
- **Logistics and Supply Chain Management** (Business Undergraduate, Spring 2013; Carnegie Mellon University)
- **Mathematical Models for Consulting** (Business Undergraduate, Summer 2011; Carnegie Mellon University)

#### PRESENTATIONS

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- *A Fully Adaptive Restarting Level Set Method for Constrained Convex Optimization under Error Bound Conditions*. SIAM Conference on Optimization, Online, July, 2021.
- *First-Order Methods for Convex Constrained Optimization under Error Bound Conditions*. Seminar of Mathematics in Imaging, Data and Optimization, Department of Mathematical Science, Rensselaer Polytechnic Institute, 2021.
- *First-order Methods For Min-max Non-convex Optimization*. The 6th International Conference on Continuous Optimization. Berlin, Germany, 2019.
- *First-order Methods For Min-max Non-convex Optimization*. INFORMS Annual Meeting, Phoenix, AZ, November, 2018.
- *Level-Set Methods for Expectation Constrained Optimization*. 18th Annual MOPTA, Lehigh University, Bethlehem, PA. August, 2018.
- *Level-Set Methods for Finite-Sum Constrained Convex Optimization*. The 23rd International Symposium on Mathematical Programming (ISMP). Bordeaux, France, July 2018.

- *Smoothing First-order Method for Piecewise Linear Non-convex Optimization*. INFORMS Optimization Society Conference. Denver, CO. March, 2018.
- *A Stochastic Level Set Method for Convex Optimization with Expectation Constraints*. INFORMS Optimization Society Conference. Denver, CO. March, 2018.
- *Progress on Stochastic Variance-Reduced Methods in Machine Learning: Adaptive Restart and Distributed Optimization*. Data Science Seminar of Institute for Mathematics and its Applications Minneapolis, MN. December, 2017.
- *Searching in the Dark: Practical SVRG Methods under Error Bound Conditions with Guarantee*. INFORMS Annual Meeting, INFORMS, Houston, TX. October, 2017.
- *Searching in the Dark: Practical SVRG Methods under Error Bound Conditions with Guarantee*. 17th Annual MOPTA, Lehigh University, Bethlehem, PA. August, 2017.
- *Restarted SGD: Beating SGD without Smoothness and/or Strong Convexity*. SIAM Conference on Optimizaiton, Vancouver, Canada, May, 2017.
- *Homotopy Smoothing for Non-Smooth Problems with Lower Complexity than  $O(1/\epsilon)$* . INFORMS Annual Meeting, Nashville, Tennessee, November, 2016.
- *Distributed Stochastic Variance Reduced Gradient Methods and A Lower Bound for Communication Complexity*. The 5th International Conference on Continuous Optimization, Tokyo, Japan, August, 2016.
- *Distributed Stochastic Variance Reduced Gradient Methods and A Lower Bound for Communication Complexity*. INFORMS Conference of Optimization, Princeton, PA, March 2016.
- *Bayesian Decision Process for Cost-Efficient Dynamic Ranking by Crowdsourcing*. School of Systems and Enterprises, Stevens Institute of Technology, NJ, March 2016.
- *Bayesian Decision Process for Cost-Efficient Dynamic Ranking by Crowdsourcing*. INFORMS Annual Meeting, Philadelphia, PA, November 2015.
- *Optimal Budget Allocation for Online Crowdsourcing*. Department of Information and Decision Sciences, University of Illinois at Chicago, September 2015.
- *Distributed Stochastic Variance Reduced Gradient Methods*. 15th Annual MOPTA Conference, Bethlehem, PA, July 2015.
- *Doubly Stochastic Primal-Dual Coordinate Method for Regularized Empirical Risk Minimization with Factorized Data*. The 22nd International Symposium on Mathematical Programming. Pittsburgh, PA, July 2015.
- *Big Data Analytics: Optimization and Randomization*, Proceedings of the 21th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, Sydney, Australia, August 2015.
- *An Accelerated Proximal Coordinate Gradient Method and its Application to Regularized Empirical*

*Risk Minimization*, INFORMS Annual Meeting, San Francisco, CA, November 2014.

- *An Accelerated Proximal Coordinate Gradient Method and its Application to Regularized Empirical Risk Minimization*, 14th Annual MOPTA Conference, Bethlehem, PA, August 2014.
- *Accelerated Proximal-Gradient Homotopy Method for the Sparse Least-Squares*, International Conference of Machine Learning, Beijing, China, July 2014.
- *Accelerated Proximal-Gradient Homotopy Method for the Sparse Least-Squares*, SIAM Conference on Optimization, San Diego, CA, May 2014.
- *Optimal Trade Execution with Coherent Dynamic Risk Measures using Limit Orders*, American Mathematical Society Sectional Meetings, Albuquerque, NM, April 2014.
- *Optimal Trade Execution with Coherent Dynamic Risk Measures using Limit Orders*, INFORMS Annual Meeting, Minneapolis, MN, USA, October 2013.
- *Optimal Trade Execution with Coherent Dynamic Risk Measures using Limit Orders*, 5th Annual Modeling High Frequency Data in Finance Conference, Hoboken, NJ, October 2013.
- *Optimistic Knowledge Gradient Policy for Budget Allocation in Crowdsourcing*, International Conference of Machine Learning, Atlanta, GA, USA, June 2013.
- *Optimization for Big Data Analysis: Complexity and Scalability*, Tippie College of Business, University of Iowa, Iowa City, IA, USA, February 2013
- *Optimistic Knowledge Gradient Policy for Budget Allocation in Crowdsourcing*, INFORMS Computing Society Conference, Santa Fe, NM, USA, January 2013.
- *Accelerated Proximal-Gradient Homotopy Method for the Sparse Least-Squares*, INFORMS Annual Meeting, Phoenix, AZ, USA, October 2012.
- *Optimal Trade Execution with Coherent Dynamic Risk Measures*, INFORMS Annual Meeting, Phoenix, AZ, USA, October 2012.
- *Optimal Trade Execution with Coherent Dynamic Risk Measures*, 12th Annual MOPTA Conference, Bethlehem, PA, USA, August 2012
- *Optimal Trade Execution with Coherent Dynamic Risk Measures*, 21st International Symposium on Mathematical Programming (ISMP), Berlin, Germany, August 2012.
- *Optimal Trade Execution with Coherent Dynamic Risk Measures*, SIAM Conference on Financial Mathematics and Engineering, Minneapolis, MN, USA, July 2012.
- *A Sparsity Preserving Stochastic Gradient Method for Composite Optimization*, INFORMS Annual Meeting, Charlotte, NC, USA, November 2011.
- *Optimal Trade Execution with Coherent Dynamic Risk Measures*, Industrial-Academic Workshop on Optimization in Finance and Risk Management Toronto, Canada, October 2011.

- *A Sparsity Preserving Stochastic Gradient Method for Composite Optimization*, 11th Annual MOPTA Conference, Bethlehem, PA, USA, August 2011.
- *A Sparsity Preserving Stochastic Gradient Method for Composite Optimization*, SIAM Conference on Optimization, Darmstadt, Germany, May 2011

#### PROFESSIONAL SERVICE

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- Committee Member, INFORMS George Nicholson Student Paper Competition **2021, 2022**
- Reviewer, INFORMS JFIG Paper Competition **2020, 2021**
- Area Chair, Neural Information Processing Systems (NeurIPS 2021) **2021**
- PhD Program Committee, Business Analytics Department, University of Iowa **2019-2020**
- Organization Committee Member of Master Program in Business Analytics, University of Iowa. **2014-2019**
- Research Committee, Tippie College of Business, University of Iowa **2019**
- Research Committee, Business Analytics Department, University of Iowa **2019**
- Faculty Search Committee Member, Management Sciences Department, University of Iowa **2015**
- Co-Organizer of ICML '13 Workshop: Machine Learning Meets Crowdsourcing, Atlanta, GA. **2013**

#### CONFERENCE SESSION CHAIR

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- 6th International Conference on Continuous Optimization, Berlin, Germany, 2019
- *INFORMS Annual Meeting*, Phoenix, AZ, November, 2018
- *International Symposium on Mathematical Programming*, Bordeaux, France, July, 2018
- *INFORMS Optimization Society Conference*, Denver, CO, March, 2018
- *INFORMS Annual Meeting*, Houston, TX, October, 2017
- *SIAM Conference on Optimization*, Vancouver, Canada, May, 2017
- *INFORMS Annual Meeting*, Nashville, TN, 2016
- 5th International Conference on Continuous Optimization, Tokyo, Japan, 2016
- *INFORMS Conference on Optimization*, Princeton, PA, 2016
- *INFORMS Annual Meeting*, Philadelphia, PA, 2015
- 15th Annual MOPTA Conference, Bethlehem, PA, 2015
- *International Symposium on Mathematical Programming*, Pittsburgh, PA, 2015
- *14th Annual MOPTA Conference*, Bethlehem, PA, 2014
- *INFORMS Annual Meeting*, San Francisco, CA, 2014
- *INFORMS Annual Meeting*, Minneapolis, MN, 2013
- *12th Annual MOPTA Conference*, Bethlehem, PA, 2012
- *INFORMS Annual Meeting*, Phoenix, AZ, 2012
- *International Symposium on Mathematical Programming*, Berlin, Germany, 2012
- *11th Annual MOPTA Conference*, Bethlehem, PA, 2011
- *INFORMS Annual Meeting*, Charlotte, NC, 2011
- *SIAM Conference on Optimization*, Darmstadt, Germany, 2011

#### PHD STUDENTS SUPERVISED

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- **Yankun Huang**, 2024 (expected), Business Analytics, University of Iowa
- **Yao Yao**, 2024 (expected), Applied Mathematical and Computational Sciences, University of Iowa



- **Runchao Ma**, 2021, Business Analytics, University of Iowa
- **Hassan Rafique**, 2020, Applied Mathematical and Computational Sciences, University of Iowa

#### PHD COMMITTEES

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- **Senay Yasar Saglam**, 2015, Management Sciences, University of Iowa
- **Guanglin Xu**, 2016, Management Sciences, University of Iowa
- **Huan Jin**, 2016, Management Sciences, University of Iowa
- **Xi Chen**, 2016, Management Sciences, University of Iowa
- **Myung Cho**, 2017, Electrical and Computer Engineering, University of Iowa
- **Michael Lash**, 2018, Computer Sciences, University of Iowa
- **Zhe Li**, 2018, Computer Sciences, University of Iowa
- **Yi Xu**, 2019, Computer Sciences, University of Iowa
- **Mingrui Liu**, 2020, Computer Sciences, University of Iowa
- **Jirong Yi**, 2021, Electrical and Computer Engineering, University of Iowa
- **Kyungchan Park**, 2022, Business Analytics, University of Iowa

#### REFEREE WORK

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- SIAM Journal on Optimization
- International Conference of Machine Learning
- Neural Information Processing Systems
- Journal of Machine Learning Research
- Operations Research
- Information Systems Research
- Management Science
- Mathematical Programming
- Other journals and conference proceedings

#### MEMBERSHIPS

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