

# Rui Gao

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Google Scholar

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## Research Interests

My primary research focus is on **data-driven decision-making under uncertainty**. By developing innovative methods that integrate mathematical optimization and statistical analysis, my research aims to advance the understanding and application of trustworthy decision-making in machine learning, operations and risk management.

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## Academic Appointment

2018- **University of Texas at Austin**, *McCombs School of Business*, Austin, TX.  
Assistant Professor in Department of Information, Risk and Operations Management

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## Education

2013-2018 **Georgia Institute of Technology**, *School of Industrial & Systems Engineering*, Atlanta, GA.  
Ph.D. in Operations Research  
Thesis: Distributionally robust stochastic optimization with applications in statistical learning  
Advisor: Anton J. Kleywegt

2009-2013 **Xi'an Jiaotong University**, *School of Mathematics and Statistics*, Xi'an, China.  
B.Sc. in Mathematics and Applied Mathematics (Honors Program)  
Special Class for the Gifted Young

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## Professional Employment

2016 **SAS Institute Inc.**, *Advanced Analytics R&D*, Raleigh-Durham, NC.  
Revenue Management and Price Optimization Summer Fellow

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## Publications

Note: † indicates a student collaborator

### Journal Articles

- [A1] Luhao Zhang<sup>†</sup>, Jincheng Yang<sup>†</sup>, and Rui Gao. A short and general duality proof for Wasserstein distributionally robust optimization. **Operations Research**, (Forthcoming), 2024.
- [A2] Hao Wang<sup>†</sup>, Rui Gao, and Flavio P Calmon. Generalization bounds for noisy iterative algorithms using properties of additive noise channels. **Journal of Machine Learning Research**, 24(26):1–43, 2023.

- [A3] Luhao Zhang<sup>†</sup>, Jincheng Yang<sup>†</sup>, and Rui Gao. Optimal robust policy for feature-based newsvendor. **Management Science**, 70(4):2315–2329, 2023.
- [A4] Rui Gao. Finite-sample guarantees for Wasserstein distributionally robust optimization: Breaking the curse of dimensionality. **Operations Research**, 71(6):2291–2306, 2022.
- [A5] Rui Gao, Xi Chen, and Anton J Kleywegt. Wasserstein distributionally robust optimization and variation regularization. **Operations Research**, 72(3):1177–1191, 2022.
- [A6] Rui Gao and Anton Kleywegt. Distributionally robust stochastic optimization with Wasserstein distance. **Mathematics of Operations Research**, 48(2):603–655, 2022.
- [A7] Jie Wang<sup>†</sup>, Rui Gao, and Hongyuan Zha. Reliable off-policy evaluation for reinforcement learning. **Operations Research**, 72(2):699–716, 2022.
- [A8] Cheng Wang<sup>†</sup>, Rui Gao, Wei Wei, Miadreza Shafie-khah, Tianshu Bi, and Joao PS Catalao. Risk-based distributionally robust optimal gas-power flow with Wasserstein distance. **IEEE Transactions on Power Systems**, 34(3):2190–2204, 2019.
- [A9] Cheng Wang<sup>†</sup>, Rui Gao, Feng Qiu, Jianhui Wang, and Linwei Xin. Risk-based distributionally robust optimal power flow with dynamic line rating. **IEEE Transactions on Power Systems**, 33(6):6074–6086, 2018.

#### Conference Proceedings

- [C1] Hao Wang<sup>†</sup>, Luxi He<sup>†</sup>, Rui Gao, and Flavio P Calmon. Aleatoric and epistemic discrimination in classification. **NeurIPS (Spotlight)**, 36:27040–27062, 2023.
- [C2] Jie Wang<sup>†</sup>, Rui Gao, and Yao Xie. Two-sample test with kernel projected Wasserstein distance. **AISTATS (Oral)**, 151:8022–8055, 2022.
- [C3] Shixiang Zhu<sup>†</sup>, Liyan Xie<sup>†</sup>, Zhang Minghe<sup>†</sup>, Rui Gao, and Yao Xie. Distributionally robust weighted k-nearest neighbors. **NeurIPS**, 35:29088–29100, 2022.
- [C4] Yang An<sup>†</sup> and Rui Gao. Generalization bounds for (Wasserstein) robust optimization. **NeurIPS**, 34:10382–10392, 2021.
- [C5] Hao Wang<sup>†</sup>, Yizhe Huang<sup>†</sup>, Rui Gao, and Flavio P Calmon. Analyzing the generalization capability of sgld using properties of Gaussian channels. **NeurIPS**, 34:24222–24234, 2021.
- [C6] Qitian Wu<sup>†</sup>, Rui Gao, and Hongyuan Zha. Bridging explicit and implicit deep generative models via neural Stein estimators. **NeurIPS**, 34:11274–11286, 2021.
- [C7] Rui Gao, Liyan Xie<sup>†</sup>, Yao Xie, and Huan Xu. Robust hypothesis testing using Wasserstein uncertainty sets. **NeurIPS (Spotlight)**, 31:7902–7912, 2018.

#### Works under Revision

- [W1] Rohit Arora<sup>†</sup>, Rui Gao, and Stathis Tompaidis. Choosing scenarios to estimate resilience and stress test financial institutions. Major Revision at Management Science, 2024.

- [W2] Rui Gao, Rohit Arora<sup>†</sup>, and Yizhe Huang<sup>†</sup>. Data-driven multistage distributionally robust linear optimization with nested distance. *Reject & Resubmit at Management Science*, 2024.
- [W3] Jie Wang<sup>†</sup>, Rui Gao, and Yao Xie. Sinkhorn distributionally robust optimization. *Major Revision at Operations Research*, 2024.
- [W4] Jincheng Yang<sup>†</sup>, Luhao Zhang<sup>†</sup>, Ningyuan Chen, Rui Gao, and Ming Hu. Decision-making with side information: A causal transport robust approach. *Major Revision at Operations Research*, 2024.
- [W5] Zhen Yang<sup>†</sup> and Rui Gao. Wasserstein regularization for 0-1 loss functions. *Reject & Resubmit at Operations Research*, 2024.

## Selected Awards

Note: <sup>†</sup> indicates the award is received by a student coauthor

- 2024 McCombs School CBA Foundation Research Excellence Award for Assistant Professors
- 2023 Department Nominee for Trammell/CBA Foundation Teaching Award for Assistant Professors
- 2022,2023 Distinguished Service Award for Management Science
- 2023 Winner in INFORMS Data Mining and Decision Analytics Workshop Best Paper Competition<sup>†</sup>
- 2022 Winner in INFORMS Best Poster Award<sup>†</sup>
- 2020 Winner in INFORMS Junior Faculty Interest Group (JFIG) Paper Competition
- 2020 Honorable Mention in INFORMS Section on Finance Best Student Paper Competition<sup>†</sup>
- 2020 Best Paper Award in IEEE Transactions on Power Systems
- 2019 Runner-up in INFORMS Computing Society Student Paper Competition<sup>†</sup>
- 2017 Winner in INFORMS Data Mining Best Paper Award
- 2017 Runner-up in INFORMS Computing Society Student Paper Competition
- 2017 Finalist in Computational Management Science Best Student Paper Award
- 2016 Finalist in INFORMS George E. Nicholson Student Paper Competition

## Professional Service

### Associate Editor:

- Mathematical Programming (2022-)
- Naval Research Logistics (Guest AE, 2022-2023)

### Journal and Conference Referee for:

- Business: Operations Research, Management Science, Manufacturing & Service Operations Management, Production and Operations Management, Mathematics of Operations Research, Mathematical Finance, Computational Management Science

- Statistics & Machine Learning: Annals of Statistics, Biometrika, Journal of the American Statistical Association, Annals of Applied Probability, Journal of / Advances in Applied Probability, SIAM Journal on Mathematics of Data Science, SIAM/ASA Journal on Uncertainty Quantification, Machine Learning, NeurIPS, ICML, ICLR, AISTATS
- Optimization: Mathematical Programming, SIAM Journal on Optimization, SIAM Journal on Control and Optimization, INFORMS Journal on Computing, INFORMS Journal on Optimization, European Journal of Operational Research, Journal of Optimization Theory and Applications, ESAIM: Control, Optimisation and Calculus of Variations, Computers & Operations Research, Mathematical Methods of Operations Research, Applied Mathematics and Optimization, OR Spectrum, Optimization letters, Computational Optimization and Applications
- Engineering: IEEE Transactions on Automatic Control, IEEE Transactions on Power Systems, IIEE Transactions, Transportation Research Part E

**Competition Judge for:**

- MSOM Sustainable OM SIG Conference 2022
- INFORMS Nicholson Student Paper Competition 2021-2022
- INFORMS Data Mining Best Paper Competition 2020

**Conference Organization:**

- Session chair: INFORMS Annual Meeting 2018, 2020, 2021, 2022, 2023, 2024; ICCOPT 2019; ICSP 2023

**Committee Service:**

- McCombs School Undergraduate Academic Committee (2024-2026)
- Departmental Executive Committee (2020-2021, 2024-2025)
- Departmental Seminar Organizer (2019-2021, 2023-2025)
- Departmental Faculty Search Committee (2019)
- Committee for Undergraduate Business Analytics Courses (2019)

## Doctoral Students

Graduated:

- Rohit Arora (co-advisor), Fall 2019 – Spring 2022  
First placement: SimCorp
- Jincheng Yang (co-author), Fall 2020 – Spring 2022  
First placement: Postdoc at University of Chicago
- Luhao Zhang (co-author, thesis committee member), Fall 2020 – Summer 2023  
First placement: Assistant Professor at Johns Hopkins University

In progress:

- Zhi Wang (advisor), Fall 2019 –
- Yizhe Huang (advisor), Fall 2020 –
- Zhen Yang (advisor), Fall 2023 –

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## Teaching Experience

@ University of Texas at Austin

- BAX 358 Optimization Methods and Decision Making  
Spring 2024 (4.6)
- D S 235 Introduction to Decision Science  
Spring 2024 (4.4)
- D S 235H Introduction to Decision Science  
Spring 2022 (4.3, 4.4, 4.7, 4.8), Spring 2024 (4.4, 4.6, 4.8)
- STA 371G Statistics and Modeling  
Fall 2018 (3.3, 3.4), Fall 2019 (4.3, 4.5, 4.6), Spring 2021 (4.4, 4.4, 4.6)

@ Georgia Institute of Technology

- ISyE 3770 Statistics and Applications: Summer 2017 (4.9)

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## Invited Seminars

- 10/2024 University of Waterloo, Department of Statistics and Actuarial Science
- 10/2024 University of Southern California, Marshall School of Business
- 09/2024 Texas A&M, Department of Industrial & Systems Engineering
- 06/2024 New York University Shanghai
- 05/2024 University of Chicago, Booth School of Business
- 04/2024 Boston University, Center for Information and Systems Engineering
- 03/2024 Banff International Research Station, Canada
- 02/2024 Rice University, Department of CMOR
- 10/2023 University of Michigan, Department of Mathematics
- 10/2023 Georgia Tech, School of ISyE & AI Institute for Advances in Optimization
- 09/2023 University of Science and Technology of China, School of Management
- 09/2023 Cornell University, Johnson College of Business
- 09/2023 Purdue University, Daniels School of Business
- 08/2023 Carnegie Mellon University, Department of Mathematical Sciences
- 06/2023 University of Washington, The Kantorovich Initiative
- 04/2023 Chinese University of Hong Kong at Shenzhen, School of Data Science
- 04/2023 Xi'an Jiaotong University, School of Management
- 03/2023 Zhejiang University, School of Management
- 03/2023 East China Normal University, School of Computer Science and Technology
- 03/2023 Nanjing University, School of Management and Engineering
- 03/2023 Nanjing Normal University, Department of Mathematics
- 03/2023 University of Chinese Academy of Science, School of Economics and Management
- 11/2022 Hong Kong University of Science and Technology, IEDA
- 10/2022 Rensselaer Polytechnic Institute, Department of Mathematical Sciences

08/2022 Chinese University of Hong Kong, Business School  
05/2022 Tsinghua University, Department of Automation  
05/2022 University of Washington, Department of Economics  
05/2022 Shanghai Jiaotong University, Antai College of Economics and Management  
09/2021 Nanjing Normal University, Department of Mathematics  
08/2021 Xi'an Jiaotong University, Tianyuan Mathematical Center in Northwest China  
10/2019 IBM Thomas J. Watson Research Center, Yorktown Heights  
08/2019 Chinese University of Hong Kong at Shenzhen, IDDA  
04/2019 Alibaba Group, Seattle  
04/2019 University of Minnesota, IMA  
01/2019 East China Normal University, Department of Mathematics  
10/2018 University of Texas at Austin, ORIE  
02/2018 University of Pittsburgh, IE  
02/2018 University of Illinois at Chicago, Business School  
01/2018 University of Texas at Austin, McCombs School of Business  
01/2018 National University of Singapore Business School  
01/2018 Chinese University of Hong Kong, SE&EM  
01/2018 Chinese University of Hong Kong at Shenzhen, SSE  
01/2018 City University of Hong Kong, Business School  
01/2018 Hong Kong University of Science and Technology, IEDA  
01/2018 University of Toronto, MIE  
01/2018 Massachusetts Institute of Technology, Sloan School of Management  
12/2017 University of Illinois at Urbana Champaign, ISE  
12/2017 HEC Montréal  
12/2017 Miami Business School  
11/2017 North Carolina State University, ISE  
03/2017 Shenzhen Research Institute of Big Data  
03/2017 University of Illinois at Urbana Champaign, ISE  
10/2016 Cornell University, ORIE, 3rd Young Researchers Workshop  
10/2016 Georgia Tech, ISyE DOS seminar  
03/2016 Georgia Tech, ACO seminar

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## Conference Presentations

07/2024 International Symposium on Mathematical Programming, Montréal, Canada  
10/2023 INFORMS Annual Meeting, Phoenix  
08/2023 MOPTA Conference, Lehigh University  
07/2023 International Conference on Stochastic Programming, Davis  
06/2023 SIAM Conference on Financial Mathematics, Philadelphia

10/2022 INFORMS Annual Meeting, Indianapolis  
08/2022 International Conference on Continuous Optimization, Bethlehem  
03/2022 INFORMS Optimization Society Conference, Greenville  
07/2021 SIAM Annual Meeting, SIAM Conference on Optimization (Virtual)  
06/2021 MSOM Conference (Virtual)  
11/2020 INFORMS Annual Meeting (Virtual)  
10/2019 INFORMS Annual Meeting, Seattle  
08/2019 International Conference on Continuous Optimization, Berlin, Germany  
06/2019 Mostly OM, Shenzhen, China  
11/2018 INFORMS Annual Meeting, Phoenix  
10/2017 INFORMS Annual Meeting, Houston  
08/2017 MOPTA Conference, Lehigh University  
07/2017 INFORMS Applied Probability Society Conference, Chicago  
05/2017 Conference on Computational Management Science, Bergamo, Italy  
11/2016 INFORMS Annual Meeting, Nashville  
07/2016 International Conference on Stochastic Programming, Búzios, Brazil