Tianyu Wang

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Education

Columbia University New York, United States
Ph.D. in Operations Research 2021 - 2026 (Expected)
M.S. in Operations Research 2021 - 2022
Advisors: Garud Iyengar, Henry Lam

Tsinghua University Beijing, China
B.E. in Information Systems 2017 - 2021
B.S. in Pure and Applied Mathematics 2018 - 2021

National University of Singapore Singapore
Exchange Student 2019

Research Interests

My research studies the foundations of designing and evaluating data-driven decision-making problems, with applications in trustworthy machine learning, supply chain management, and pharmaceutical manufacturing. Through the lens of optimization, stochastic simulation, and statistical inference, I aim to develop: (i) tools and benchmarks to assess the performance of data-driven decisions; (ii) algorithms that are adapted to the problem structure with computational and statistical performance guarantees.

Publications and Preprints

Note. *: Authors are listed in alphabetical order. +: Authors are equally contributed.

JOURNAL ARTICLES PUBLISHED OR UNDER REVISION

1. Garud Iyengar*, Henry Lam*, Tianyu Wang*. Optimizer's Information Criterion: Dissecting and Correcting Bias in Data-Driven Optimization. *Major revision at Management Science.* [Link]

   - **Honorable Mention of the Triennial Dupačová-Prékopa Best Student Paper Prize in Stochastic Programming 2025.**

2. Tianyu Wang+, Jiashuo Liu+, Peng Cui, Hongseok Namkoong. Rethinking Distribution Shifts: Empirical Analysis and Inductive Modeling for Tabular Data. *Major revision at Management Science.* Preliminary version appeared in NeurIPS 2023. [Link]

3. Tianyu Wang, Naz Pinar Taskiran, Garud Iyengar. Optimizing Pharmaceutical Control with Multi-Task Contextual Bandits: Addressing Batch Heterogeneity for Improved Manufacturing Efficiency. *Major revision at Manufacturing & Service Operations Management.* [Link]

   - **Finalist of MSOM Data-Driven Research Challenge 2025.**

4. Garud Iyengar*, Henry Lam*, Tianyu Wang*. Hedging Complexity in Generalization via a Parametric Distributionally Robust Optimization Framework. *Major revision at Management Science.* Preliminary version appeared in AISTATS 2023. [Link]

5. Chi Seng Pun*, Tianyu Wang*, Zhenzhen Yan*. Data-Driven Distributionally Robust CVaR Portfolio Optimization Under Regime-Switching Ambiguity Set. *Manufacturing & Service Operations Management,* 25(5):1779-1795, 2023. [Link]

REFEREED CONFERENCE PUBLICATIONS

1. Garud Iyengar*, Henry Lam*, Tianyu Wang*. Is Cross-Validation the Gold Standard to Estimate Out-of-sample Model Performance? *Neural Information Processing Systems (NeurIPS) 2024.* [Link]

2. Jiashuo Liu, Jiayun Wu, Tianyu Wang, Hao Zou, Peng Cui. Geometry-Calibrated DRO: Combating Over-Pessimism with Free Energy Implications. *International Conference on Machine Learning (ICML) 2024.* [Link]

3. Jiashuo Liu+, Tianyu Wang+, Peng Cui, Hongseok Namkoong. On the Need for a Language Describing Distribution Shifts: Illustrations on Tabular Datasets. *Neural Information Processing Systems (NeurIPS) 2023, Datasets and Benchmarks Track.* [Link]
   - **Highlighted as NeurIPS 2023 Favorite Papers by Two Sigma (9/3500+).**

4. Garud Iyengar*, Henry Lam*, Tianyu Wang*. Hedging against Complexity: Distributionally Robust Optimization with Parametric Approximation. *Artificial Intelligence and Statistics (AISTATS) 2023.* [Link]
   - **Notable Paper (Oral Presentation), 32/1689 = 1.9% of submissions.**

PREPRINTS

1. Tianyu Wang, Ningyuan Chen, Chun Wang. Contextual Optimization under Covariate Shift: A Robust Approach via Intersecting Wasserstein Ambiguity Balls. *Under review at Manufacturing & Service Operations Management.* [Link]

2. Jiashuo Liu+, Tianyu Wang+, Henry Lam, Hongseok Namkoong, Jose Blanchet. DRO: A Python Library for Distributionally Robust Optimization in Machine Learning. *Under review at Journal of Machine Learning Research.* [Link] [Website]

3. Henry Lam*, Tianyu Wang*. Achieving First-order Statistical Improvements in Data-Driven Optimization. *To be submitted to Operations Research.*

4. Data-Driven Dynamic Dispatch and Relocation of Ambulance Units in New York City, with Henry Lam, Derek Long, FDNY Collaborators. *Working paper.*

AWARDS AND HONORS

RESEARCH

- Finalist, NUS Next-Gen Scholar Symposium   2025
- Honorable Mention of Dupačová-Prékopa Best Student Paper Prize in Stochastic Programming 2025
- Finalist, MSOM Data-Driven Research Challenge   2025
- Rising star, ISyE-MS&E-IOE Joint Workshop   2025
- AISTATS Notable Paper (Oral Presentation)   2023

ACADEMIC

- Deming Fellowship, Columbia Business School   2025
- INFORMS APS Travel Grant   2025
- NeurIPS Scholar Award   2024
- Columbia IEOR Department Fellowship   2021

SERVICE

- AISTATS Best Reviewer Award   2025

PRE-DOCTORAL AWARDS

- Outstanding Undergraduate in Tsinghua *(2% in Tsinghua)*   2021
- Distinguished Undergraduate Thesis Award *(6 in Tsinghua SEM)*   2021
- Chen Daisun Scholarship *(3 in Tsinghua SEM)*   2021
- National Scholarship *(0.2% in China)*   2020

Teaching Experience

Columbia University

Business Analytics (IEOR 4650)   Spring 2022 and Spring 2024
- Head TA for MSc Business Analytics course; held office hours, delivered lectures on basic machine learning models, prepared exam questions (coding in R and Python) and evaluated group projects.
- Teaching score: 4.67/5 (Enrollment: 49, Spring 2022) and 4.75/5 (Enrollment: 29, Spring 2024).

Optimization Models and Methods (IEOR 4004)   Spring 2023
- Head TA for MSc Operations Research core course; held office hours, answered student questions, delivered lectures on optimization solvers, prepared and graded exams.
- Teaching score: 4.34/5 (Enrollment: 110, Spring 2023).

Tsinghua University

Foundations of Mathematics and Computer Science   Fall 2018 - Spring 2021
- Tutor for academic and problem-solving guidance in foundation courses such as *Calculus, Linear Algebra, Probability and Statistics*, and *Computer Programming* for junior students.
- Tutor score: 4.99/5 (Service duration: over 300 hours)

Invited Talks

Uncertainty Quantification of Decision Performance in Contextual Stochastic Optimization
- International Conference on Stochastic Programming (ICSP), Paris, France   July 2025

Achieving First-order Statistical Improvements in Data-Driven Optimization
- INFORMS APS Conference, Atlanta, GA   June 2025

Rethinking Distribution Shifts: Empirical Analysis and Inductive Modeling for Tabular Data
- INFORMS Data Science Workshop, Seattle, WA   October 2024
- Columbia Foundations of Data Science Workshop, New York, NY   April 2024
- Citadel PhD Summit, Miami, FL   April 2024

Optimizer's Information Criterion: Dissecting and Correcting Bias in Data-Driven Optimization
- Purdue Operations Conference, West Lafayette, IN   August 2025
- International Conference on Stochastic Programming (ICSP), Paris, France   July 2025
- INFORMS MSOM Conference, London, UK   June 2025
- Tsinghua SEM Seminar, Beijing, China   June 2025
- CMU YinzOR Conference, Pittsburgh, PA   August 2024
- International Symposium on Mathematical Programming (ISMP), Montréal, Canada   July 2024
- International Conference of the Chinese Scholars Association for Management Science and Engineering (CSAMSE), Xiamen, China   July 2024
- Columbia IEOR PhD Seminar, New York, NY   April 2024
- INFORMS Annual Meeting, Phoenix, AZ   October 2023

Hedging against Complexity: Distributionally Robust Optimization with Parametric Approximation
- INFORMS Annual Meeting, Seattle, WA   October 2024
- Modeling and Optimization: Theory and Applications (MOPTA), Bethlehem, PA   August 2024
- International Conference on Artificial Intelligence and Statistics, Valencia, Spain   April 2023

Distributionally Robust Prescriptive Analytics with Wasserstein Distance
- INFORMS Annual Meeting, Virtual   October 2021

Professional Service

Reviewer
- Journal referee for *Annals of Applied Probability, INFORMS Journal on Data Science, Operations Research, Management Science.*
- Conference referee for *AISTATS, ICLR, ICML, NeurIPS.*

Session Chair
- INFORMS Annual Meeting, Atlanta, GA   October 2025
- INFORMS MSOM Conference, London, UK   June 2025
- INFORMS Annual Meeting, Seattle, WA   October 2024
- International Symposium on Mathematical Programming (ISMP), Montréal, Canada   July 2024

Organizer
- NYC Joint Operations Research PhD Colloquium   May 2024

Department Service
- Foundation Member of IEOR PhD Council   2023 - 2025

Industry Experience

Amazon   Bellevue, United States
Research Scientist Intern   Summer 2023
- Worked on the *"Uncertainty Attribution in IPC Simulation"* project, developing a Shapley value-based framework to decompose changes in output uncertainty into contributions from input components, and implemented the approach on Amazon's inventory simulation system (return intern offer extended).

Open-Source Packages

DRO: A Package for Distributionally Robust Optimization in Machine Learning   2024-2025
- Built 79 DRO algorithms for classification and regression loss based on the CVXPY solver and Pytorch framework.

WhyShift: A Tabular Benchmark with Specific Distribution Shift Patterns   2023-2024
- Implemented 45 standard methods over 8 tabular datasets with 172 distribution shift pairs.
- Implemented algorithms for shift pattern decomposition and risk region identification, enabling analysis of performance degradation under distribution shifts.

References

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