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 statistical and computational foundations of evaluating and designing data-driven decision-making methods, with applications in trustworthy artificial intelligence, supply chain management, and pharmaceutical manufacturing. Through the lens of optimization, stochastic simulation, and machine learning, I aim to develop: (i) tools and benchmarks to evaluate the out-of-sample performance of data-driven methods with limited data, and (ii) optimization algorithms that are rigorous and scalable.

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. *Minor 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] [Python Package]
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 A 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+).** [Link]

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.* Preliminary version appeared in NeurIPS 2025 Optimization for Machine Learning Workshop. [Link] [Website] [Python Package]

3. Henry Lam*, Tianyu Wang*. Achieving First-order Statistical Improvements in Data-Driven Optimization. *To be submitted to Operations Research.* Preliminary version appeared in NeurIPS 2025 MLxOR Workshop.

4. Tianyu Wang^{+}, Derek Long^{+}, Henry Lam, Jay Sethuraman, Matthew Adams, Monish Dadlani, Kathleen Thompson. Dynamic Ambulance Dispatch and Relocation in New York City. *Working paper.*

Awards and Honors

Research

- Finalist, NUS Next-Gen Scholar Symposium 2025
- Deming Fellowship, Columbia Business School 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
- NeurIPS Scholar Award 2024
- AISTATS Notable Paper (Oral Presentation) 2023
- Columbia IEOR Department Fellowship 2021

Service

- INFORMS APS Travel Grant 2025
- 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
- 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

- Founding 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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