

# TIANYU WANG

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## EDUCATION

### Columbia University

*Ph.D. in Operations Research*

*M.S. in Operations Research*

Advisors: Garud Iyengar, Henry Lam

New York, United States

2021 - 2026 (Expected)

2021 - 2022

### Tsinghua University

*B.E. in Information Systems*

*B.S. in Pure and Applied Mathematics*

Beijing, China

2017 - 2021

2018 - 2021

### National University of Singapore

*Exchange Student*

Singapore

2019

## RESEARCH INTERESTS

My research studies the mathematical 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, inference and machine learning, I aim to develop: (i) tools and benchmarks to evaluate when methods succeed or fail with limited data, and (ii) optimization algorithms that are both 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. *Major revision at Management Science*. [Link]
  - **Honorable Mention of the Triennial Dupačová-Prékopa Best Student Paper Prize in Stochastic Programming 2025.**
2. Tianyu Wang<sup>+</sup>, Jiashuo Liu<sup>+</sup>, 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<sup>+</sup>, Tianyu Wang<sup>+</sup>, 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<sup>+</sup>, Tianyu Wang<sup>+</sup>, 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. Tianyu Wang<sup>+</sup>, Derek Long<sup>+</sup>, 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
- 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

### Professor Garud Iyengar

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### Professor Henry Lam

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### Professor Hongseok Namkoong

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