

# 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 - Present

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 foundations of machine learning for stochastic optimization. Through the lens of optimization, stochastic simulation, and statistical inference, I aim to develop: (i) fundamental tools in evaluation and selection of data-driven optimization models; (ii) efficient data integration models with performance guarantees, with applications in trustworthy machine learning, supply chain management, and pharmaceutical manufacturing.

## PUBLICATIONS AND PREPRINTS

Note. \*: Authors are listed in alphabetical order. +: Authors are equally contributed (listed alphabetically).

### JOURNAL ARTICLES PUBLISHED OR UNDER REVISION

1. 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.*
2. 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 Dupačová-Prékopa Best Student Paper Prize in Stochastic Programming 2025.*
3. 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]
4. Jiashuo Liu<sup>+</sup>, Tianyu Wang<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]
  - *Accepted for full presentation at the 2024 INFORMS Workshop on Data Science (with a student scholarship).*
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. Data-driven Dynamic Dispatch and Relocation of Ambulance Units in New York City, with Henry Lam, Derek Long, FDNY Collaborators. **Working paper**.
2. Henry Lam, Tianyu Wang\*. Achieving First-order Statistical Improvements in Data-Driven Optimization. **Working paper**.
3. 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**. [Link]
4. Tianyu Wang, Ningyuan Chen, Chun Wang. Contextual Optimization under Covariate Shift: A Robust Approach via Intersecting Wasserstein Ambiguity Balls. **Under review**. [Link]

## AWARDS AND HONORS

### RESEARCH

- 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

## 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

- 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*, *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

## 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)

## 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 9 real-world tabular distribution shift datasets.
- Implemented algorithms for shift pattern decomposition and risk region identification, enabling analysis of performance degradation under distribution shifts.

*Last updated on August 16, 2025.*