Haofeng Zhang

hz2553@columbia.edu | https://hz0000.github.io/ | Update: 12/05/2023

Education

Columbia University, New York City, New York *2018 - 2024*
Department of Industrial Engineering and Operations Research

- Doctor of Philosophy (Ph.D.) in Operations Research, 2024
- Master of Science (M.S.) in Operations Research, 2019

Overall GPA: 4.16/4.33

University of Science and Technology of China, Hefei, China *2013 - 2017*
Department of Mathematics

- Bachelor of Science (B.S.) in Mathematics and Applied Mathematics, 2017

Overall GPA: 4.04/4.30 or 93.15/100

Research Interests

My primary research interests are in methodology and theory for data-driven decision-making and prediction at the intersection of operations research and data science. I am particularly interested in the following fields:

- Decision-making under uncertainty, including data-driven stochastic (contextual) optimization and sequential decision-making under uncertainty (e.g., bandit problems).
- Uncertainty quantification and reduction, including simulation-based approaches, calibration, distributional robustness and shift.

Publications & Working Papers

Author ordering in most papers is alphabetical as is convention in OR/IE/MS, while exceptions are marked by *.

Published papers

- Ziyi Huang, Henry Lam, and **Haofeng Zhang**. Efficient Uncertainty Quantification and Reduction for Over-Parameterized Neural Networks. *Advances in Neural Information Processing Systems (NeurIPS)*, 2023.
- Ziyi Huang, Henry Lam, Amirhossein Meisami, and **Haofeng Zhang**. Optimal Regret Is Achievable with Bounded Approximate Inference Error: An Enhanced Bayesian Upper Confidence Bound Framework. *Advances in Neural Information Processing Systems (NeurIPS)*, 2023.
- Henry Lam and **Haofeng Zhang**. Doubly Robust Stein-Kernelized Monte Carlo Estimator: Simultaneous Bias-Variance Reduction and Supercanonical Convergence. *Journal of Machine Learning Research (JMLR)*, 24(85):1-58, 2023.

  New England Statistics Symposium Student Paper Award 2022
- Ziyi Huang, Henry Lam, and **Haofeng Zhang**. Conditional Coverage Estimation for High-Quality Prediction Intervals. *Journal of Systems Science and Systems Engineering* (Invited Paper to the Special Issue on Simulation and AI), 1-31, 2023.
- Ziyi Huang, Yu Gan, Theresa Lye, Yanchen Liu, **Haofeng Zhang**, Andrew Laine, Elsa Angelini, and Christine Hendon.* Cardiac Adipose Tissue Segmentation via Image-Level Annotations. *IEEE Journal of Biomedical and Health Informatics (JBHI)*, 2023.
- Henry Lam and **Haofeng Zhang**. Neural Predictive Intervals for Simulation Metamodeling. In *Winter Simulation Conference (WSC)*, pp. 1-12. IEEE, 2021.
- Haoxian Chen, Ziyi Huang, Henry Lam, Huajie Qian, and **Haofeng Zhang**. Learning Prediction Intervals for Regression: Generalization and Calibration. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, pp. 820-828. PMLR, 2021.
- Ziyi Huang, **Haofeng Zhang**, Andrew Laine, Elsa Angelini, Christine Hendon, and Yu Gan.* Co-Seg: An Image Segmentation Framework against Label Corruption. In *IEEE International Symposium on Biomedical Imaging (ISBI)*, pp. 550-553. IEEE, 2021.

- Ziyi Huang, Yu Gan, Theresa Lye, **Haofeng Zhang**, Andrew Laine, Elsa Angelini, and Christine Hendon.* Heterogeneity Measurement of Cardiac Tissues Leveraging Uncertainty Information from Image Segmentation. In *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, pp. 782-791. Springer, Cham, 2020.
- Henry Lam and **Haofeng Zhang**. On the Stability of Kernelized Control Functionals on Partial and Biased Stochastic Inputs. In *Winter Simulation Conference (WSC)*, pp. 344-355. IEEE, 2019.

  ACM SIGSIM WSC 2019 Student Award 2019

Papers under review/revision

- Adam N. Elmachtoub, Henry Lam, **Haofeng Zhang**, and Yunfan Zhao. Estimate-Then-Optimize versus Integrated-Estimation-Optimization versus Sample Average Approximation: A Stochastic Dominance Perspective. Under review in *Operations Research*.

  Finalist, INFORMS George Nicholson Student Paper Competition 2023
- Henry Lam and **Haofeng Zhang**. Prediction Intervals for Simulation Metamodeling. Under revision in *ACM Transactions on Modeling and Computer Simulation (TOMACS)*.

Working papers

- Ziyi Huang, Henry Lam, Amirhossein Meisami, **Haofeng Zhang**, Jie Zhang, and Yunfan Zhao. Calibration of Deep Bayesian Bandits via Off-Policy Evaluations.
- Ziyi Huang, Henry Lam, and **Haofeng Zhang**. Validating Stochastic Simulation Models via Maximum Mean Discrepancy.
- Ziyi Huang, Hongshan Liu, **Haofeng Zhang**, Fuyong Xing, Andrew Laine, Elsa Angelini, Christine Hendon, and Yu Gan.* Push the Boundary of SAM: A Pseudo-label Correction Framework for Medical Segmentation.

Funding & Selected Awards

Supports from the following funding sources are gratefully acknowledged:

- Cheung-Kong Innovation Doctoral Fellowship 2021-2023 (covering tuition and stipend, approximately $160K in total)

The following awards are gratefully acknowledged:

- Finalist, INFORMS George Nicholson Student Paper Competition 2023
- NeurIPS Scholar Award 2023
- New England Statistics Symposium Student Paper Award 2022
- ACM SIGSIM WSC 2019 Student Award 2019
- Graduation Thesis Award 2017 (top 3%)
- Undergraduate Research Award 2016 (top 2%)
- National Scholarship 2015 (top 1%)

Professional Services

- **Co-Session Chair**: WSC 2022, INFORMS Annual Meeting 2021
- **Reviewer or contribute to reviewing**: Applied Probability Journals, INFORMS Journal on Computing, SIAM Journal on Optimization, AISTATS, NeurIPS, Operations Research, Management Science

Selected Talks

Estimate-Then-Optimize versus Integrated-Estimation-Optimization versus Sample Average Approximation: A Stochastic Dominance Perspective

- INFORMS Annual Meeting. Phoenix, AZ. October 2023.
- Purdue Research Symposium on Operations. West Lafayette, IN. September 2023.
- International Conference Stochastic Programming. Davis, CA. July 2023.
- SIAM Conference on Optimization. Seattle, WA. June 2023.

Doubly Robust Stein-Kernelized Monte Carlo Estimator: Simultaneous Bias-Variance Reduction and Supercanonical Convergence

- New England Statistics Symposium. Storrs, CT. May 2022.
- INFORMS Annual Meeting. Anaheim, CA. October 2021.

Validating Stochastic Simulation Models via Maximum Mean Discrepancy

- INFORMS Annual Meeting. Indianapolis, IN. October 2022.

Neural Predictive Intervals for Simulation Metamodeling

- ICML Workshop on Distribution-Free Uncertainty Quantification. Baltimore, MD. July 2022.
- Winter Simulation Conference. Phoenix, AZ. December 2021.

Learning Prediction Intervals for Regression: Generalization and Calibration

- AISTATS. Virtual. April 2021.
- INFORMS Annual Meeting. Virtual. November 2020.

On the Stability of Kernelized Control Functionals on Partial and Biased Stochastic Inputs

- Winter Simulation Conference. National Harbor, MD. December 2019.
- INFORMS Annual Meeting. Seattle, WA. October 2019.

Other Experience

Data Science Intern at Adobe Inc. (San Jose, CA) *May 2022 - August 2022*

- Improve existing algorithms for the personalized recommendation system by building a new module for model and hyperparameter calibration, which introduces the off-policy evaluation approaches into deep-learning-based Bayesian bandit algorithms. Investigate the algorithm performance in the presence of practical issues, including the low click-through rate, approximate Bayesian inference, changing action sets, and delayed feedback.

Data Science Intern at Adobe Inc. (San Jose, CA) *May 2021 - August 2021*

- Implement and compare multiple contextual bandit algorithms for the personalized recommendation system; discuss their pros and cons in practice. Propose a robust deep-learning-based Bayesian bandit algorithm that is highly effective and computationally efficient.

Teaching Assistant & Research Assistant at Columbia University (New York, NY) *2018 - 2024*

- As a teaching assistant: Introduction to Financial Engineering (Fall 2020); Quantitative Risk Management (Spring 2020); Credit Risks & Credit Derivatives (Fall 2019); Applications Programming for Financial Engineering (Spring 2019, Fall 2018)

Skills

- Python (including Tensorflow, Keras, PyTorch, Scipy, Numpy, Matplotlib);
- R; C; MATLAB; SQL; LaTeX

Personal

- Languages: English, Chinese
- Hobbies: Movies, piano, travel