Haofeng Zhang

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

- Decision-making under uncertainty: 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/MS/IE, while exceptions are marked by *.

Published papers

- 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**. 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.

- 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)*.

- 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.* Under review in *IEEE Transactions on Medical Imaging (TMI)*.

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.

SELECTED AWARDS

- Finalist, INFORMS George Nicholson Student Paper Competition 2023
- Cheung-Kong Innovation Doctoral Fellowship 2021-2023
- New England Statistics Symposium Student Paper Award 2022
- ACM SIGSIM WSC 2019 Student Award 2019
- Top-notch Graduation Thesis Award 2017 (top 3%)
- Top-notch 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)

Research Intern at University of Birmingham (Birmingham, United Kingdom) *June 2016 - August 2016*

- Work on the study of H^{∞} joint functional calculus with exponential estimate and Besov joint functional calculus, advised by Dr. Alessio Martini and Dr. Andrew Morris.

Teaching Assistant and Tutor at University of Science and Technology of China *2016 - 2017*

SKILLS

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

PERSONAL

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