Kelly W. Zhang

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https://kellywzhang.github.io/

Research Interests

I am interested in understanding and addressing the challenges people face when applying reinforcement learning algorithms to real-world problems, particularly mobile health. I am currently working on statistical inference methods for data collected by bandit or reinforcement learning algorithms, i.e., adaptively collected data. I also work on developing the reinforcement learning algorithm to be used in Oralytics, a mobile health app to help users develop healthy oral hygiene habits, in collaboration with Oral-B and researchers at UCLA and UMichigan.

Education

Harvard University, School of Engineering and Applied Sciences — Cambridge MA
Computer Science, Ph.D. — September 2018 - May 2023 (Expected)
Advisors: Susan A Murphy and Lucas Janson

New York University, College of Arts and Sciences — New York, NY
Computer Science, BA; *summa cum laude* — May 2018
Advisors: Sam Bowman and Yann LeCun

Work Experience

Apple — Seattle, WA
HealthAI Research Intern — May 2022 - August 2022
Working on causal inference methods for mobile health problems.

Facebook AI Research — New York, NY
Research Intern — May 2018 - August 2018
Worked on sparse coding and text generation with Yann LeCun.

eBay — New York, NY
Software Engineering Intern on Recommendations Team — May 2017 - August 2017
Worked on detecting "Not Suitable for Work" content, like nudity, in products sold on eBay to prevent these items from being recommended to users.

Honors

Institute of Mathematical Hannan Graduate Student Travel Award 2022
National Science Foundation GFRP Fellowship (Awarded in 2019)
Computer Science Prize for Academic Excellence in the Honors Program, New York University, 2018

Invited Talks

INFORMS Annual Meeting 2022, Session on *Efficient Learning via Adaptive Experimentation* organized by Daniel Russo

Joint Statistical Meeting 2022, Session on *Prediction and Inference in Statistical Machine Learning* organized by Tracy Ke

Institute of Mathematical Sciences Annual Meeting 2022, Session on *Inference Methods for Adaptively Collected Data* as a speaker and the session organizer

École Polytechnique Fédérale de Lausanne (EPFL), *Statistics Seminar*, December 2021 (https://tube.switch.ch/videos/pCYwBwSYh6)

Pennsylvania State University, *Statistics Colloquium*, November 2021

Pennsylvania State University, *QuantDev Methodology Brown-Bag Seminar*, November 2021

INFORMS Annual Meeting 2021, Session on *Advances in Causal Inference and Reinforcement Learning for the Online Service Industry* organized by Tim Keaton

London School of Hygiene and Tropical Medicine, *Health Data Science Seminar Series*, June 2021

Cambridge University, *Medical Research Council Biostatistics Unit Seminar*, April 2021 (`https://www.youtube.com/watch?v=jflR7KOrqNA&t=2s`)

Publications

Kelly W. Zhang, Lucas Janson, and Susan A. Murphy. "Statistical Inference After Adaptive Sampling in Non-Markovian Environments." *Preprint, 2022.*

Anna L. Trella, **Kelly W. Zhang**, Inbal Nahum-Shani, Vivek Shetty, Finale Doshi-Velez, Susan A. Murphy. "Designing Reinforcement Learning Algorithms for Digital Interventions: Pre-implementation Guidelines." *The 5th Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM 2022).* **(Selected for an Oral)**

Kelly W. Zhang, Lucas Janson, and Susan A. Murphy. "Statistical Inference with M-Estimators on Adaptively Collected Data." *35th Conference on Neural Information Processing Systems (NeurIPS 2021).*

Kelly W. Zhang, Lucas Janson, and Susan A. Murphy. "Inference for Batched Bandits." *34th Conference on Neural Information Processing Systems (NeurIPS 2020).*

Kelly W. Zhang, Omer Gottesman, and Finale Doshi-Velez. "A Bayesian Approach to Learning Bandit Structure in Markov Decision Processes." *Challenges of Real-World Reinforcement Learning (NeurIPS 2020 Workshop).*

Kelly W. Zhang and Samuel R. Bowman. "Language Modeling Teaches You More Syntax than Translation Does: Lessons Learned Through Auxiliary Task Analysis." *BlackboxNLP 2018 (Workshop at Conference on Empirical Methods in Natural Language Processing).*

Jake (Junbo) Zhao, Yoon Kim, **Kelly Zhang**, Alexander M. Rush, and Yann LeCun. "Adversarially Regularized Autoencoders." *Thirty-fifth International Conference on Machine Learning (ICML 2018).*

Service

Organizing Invited Session: Organizing invited session on *Inference Methods for Adaptively Collected Data* at the 2022 Institute of Mathematical Sciences Annual Meeting. Susan Murphy will chair the session and the speakers will be Stefan Wager, Nathan Kallus, Koulik Khamaru, and myself.

Organizing Workshops: Machine Learning for Mobile Health Workshop at NeurIPS 2020; Causal Inference Challenges in Sequential Decision Making at NeurIPS 2021.

Reviewing: NeurIPS 2020, 2021; Conference on Causal Learning and Reasoning 2022; Challenges of Real World Reinforcement Learning NeurIPS 2020 Workshop.

Ethics Work: Literature review for the Radcliffe Institute Exploratory Seminar on "Ethical Considerations in the Use of Big Data, AI, and Real-Time Information for Prediction of Behavioral Health Outcomes" organized by Jordan Smoller and Matthew Nock.

Mentoring: Mentor for the Harvard Women in STEM Mentorship Program.