

RESEARCH INTERESTS

Reinforcement Learning, Online Learning & Multi-Armed Bandits, Large Language Models

EDUCATIONS

Ph.D. in Statistics Sep. 2014 - Dec. 2019

Department of Statistics, Purdue University

Thesis Advisor: Dr. Guang Cheng

B.S. in Statistics Sep. 2010 - Aug. 2014

School of Mathematics, Nankai University

Thesis Advisor: Dr. Changliang Zou

PROFESSIONAL EXPERIENCES

▲ Deepmind Nov. 2020 - Present

Research Scientist

▲ Princeton University Dec. 2019 - Nov. 2020

Postdoctoral Researcher

Mentor(s): Dr. Mengdi Wang

▲ Deepmind May 2019 - Sep. 2019

Research Intern

Mentor(s): Dr. Tor Lattimore, Dr. Csaba Szepesvári

▲ Adobe Research May 2018 - Aug. 2018

Research Intern

Mentor(s): Dr. Zheng Wen

JOURNAL PUBLICATIONS

▲ Sparse Tensor Additive Regression

Botao Hao, Boxiang Wang, Pengyuan Wang, Emma Jingfei Zhang, Jian Yang, Will Wei Sun

Journal of Machine Learning Research (2021). [[ArXiv](#)]

▲ Sparse and Low-rank Tensor Estimation via Cubic Sketchings

Botao Hao, Anru Zhang, and Guang Cheng

IEEE Transactions on Information Theory (2020). [[ArXiv](#)]

▲ Nonparametric Bayesian Aggregation for Massive Data

Zuofeng Shang, **Botao Hao**, and Guang Cheng

Journal of Machine Learning Research (2019). [[ArXiv](#)]

▲ Simultaneous Clustering and Estimation of Heterogeneous Graphical Models

Botao Hao, Will Wei Sun, Yufeng Liu, and Guang Cheng

Journal of Machine Learning Research (2018). [[ArXiv](#)]

CONFERENCE PUBLICATIONS

▲ Leveraging Demonstrations to Improve Online Learning: Quality Matters

Botao Hao, Rahul Jain, Tor Lattimore, Benjamin Van Roy, Zheng Wen

ICML 2023. [[ArXiv](#)]

- ▲ **Regret Bounds for Information-Directed Reinforcement Learning**
Botao Hao, Tor Lattimore
NeurIPS 2022. [[ArXiv](#)]
- ▲ **The Neural Testbed: Evaluating Predictive Distributions**
 Ian Osband, Zheng Wen, Mohamammad Asghari, Vikranth Dwaracherla, **Botao Hao**,
 Morteza Ibrahimi, Dieterich Lawson, Xiuyuan Lu, Brendan O'Donoghue, Benjamin Van Roy
NeurIPS 2022. [[ArXiv](#)][[GitHub](#)]
- ▲ **Contextual Information-Directed Sampling**
Botao Hao, Tor Lattimore, Chao Qin
ICML 2022. [[ArXiv](#)]
- ▲ **Interacting Contour Stochastic Gradient Langevin Dynamics**
 Wei Deng, Siqi Liang, **Botao Hao**, Guang Lin, Faming Liang
ICLR 2022. [[OpenReview](#)]
- ▲ **Confident Least Square Value Iteration with Local Access to a Simulator**
Botao Hao, Nevena Lazic, Dong Yin, Yasin Abbasi-Yadkori, Csaba Szepesvári
AISTATS 2022. [[ArXiv](#)]
- ▲ **Efficient Local Planning with Linear Function Approximation**
 Dong Yin, **Botao Hao**, Yasin Abbasi-Yadkori, Nevena Lazic, Csaba Szepesvári
ALT 2022. [[ArXiv](#)]
- ▲ **Bandit Phase Retrieval**
 Tor Lattimore, **Botao Hao**
NeurIPS 2021. [[ArXiv](#)]
- ▲ **Information Directed Sampling for Sparse Linear Bandits**
Botao Hao, Tor Lattimore, Wei Deng
NeurIPS 2021 (spotlight). [[ArXiv](#)]
- ▲ **Bootstrapping Statistical Inference for Off-Policy Evaluation**
Botao Hao, Xiang Ji, Yaqi Duan, Hao Lu, Csaba Szepesvári, Mengdi Wang
ICML 2021. [[ArXiv](#)]
- ▲ **Sparse Feature Selection Makes Batch Reinforcement Learning More Sample Efficient**
Botao Hao, Yaqi Duan, Tor Lattimore, Csaba Szepesvári, Mengdi Wang
ICML 2021. [[ArXiv](#)]
- ▲ **Online Sparse Reinforcement Learning**
Botao Hao, Tor Lattimore, Csaba Szepesvári, Mengdi Wang
AISTATS 2021. [[ArXiv](#)]
- ▲ **Adaptive Approximate Policy Iteration**
Botao Hao, Nevena Lazic, Yasin Abbasi-Yadkori, Pooria Joulani, Csaba Szepesvári
AISTATS 2021. [[ArXiv](#)]
- ▲ **High-Dimensional Sparse Linear Bandits**
Botao Hao, Tor Lattimore, Mengdi Wang
NeurIPS 2020. [[ArXiv](#)]
- ▲ **Adaptive Exploration in Linear Contextual Bandit**
Botao Hao, Tor Lattimore, and Csaba Szepesvári
AISTATS 2020. [[ArXiv](#)]
- ▲ **Sparse and Low-rank Tensor Estimation via Cubic Sketchings**

Botao Hao, Anru Zhang, and Guang Cheng
AISTATS 2020. [[Link](#)]

▲ **Bootstrapped Upper Confidence Bound**

Botao Hao, Yasin Abbasi-Yadkori, Zheng Wen, and Guang Cheng
NeurIPS 2019. [[ArXiv](#)]

BOOK CHAPTERS

▲ **Tensors in Modern Statistical Learning**

Will Wei Sun, **Botao Hao**, Lexin Li
In Wiley StatsRef: Statistics Reference Online. [[Link](#)]

PREPRINTS

▲ **Sequential Best-Arm Identification with Application to Brain-Computer Interface**

Xin Zhou, **Botao Hao**, Jian Kang, Tor Lattimore, Lexin Li
Submitted. [[ArXiv](#)]

▲ **Bridging Imitation and Online Reinforcement Learning: An Optimistic Tale**

Botao Hao, Rahul Jain, Dengwang Tang, Zheng Wen
Accepted with minor revision at Transactions on Machine Learning Research. [[ArXiv](#)]

▲ **Sample Efficient Deep Reinforcement Learning via Local Planning**

Dong Yin, Sridhar Thiagarajan, Nevena Lazic, Nived Rajaraman, **Botao Hao**, Csaba Szepesvari
Preprint. [[ArXiv](#)]

▲ **Optimization Issues in KL-Constrained Approximate Policy Iteration**

Nevena Lazic, **Botao Hao**, Yasin Abbasi-Yadkori, Dale Schurmans, Csaba Szepesvári
Preprint. [[ArXiv](#)]

▲ **Stochastic Low-rank Tensor Bandits for Multi-dimensional Online Decision Making**

Jie Zhou, **Botao Hao**, Zheng Wen, Jingfei Zhang, Will Wei Sun
Major revision at Journal of the American Statistical Association. [[ArXiv](#)]

▲ **Residual Bootstrap Exploration for Bandit Algorithms**

Chi-Hua Wang*, Yang Yu*, **Botao Hao**, Guang Cheng
Preprint. [[ArXiv](#)]

HONORS AND AWARDS

▲ AISTATS 2022 Top Reviewer

▲ NeurIPS 2019 Travel Award

▲ Bilsland Dissertation Fellowship 2019-2020

INVITED TALKS

▲ CMStatistics 2022, London, UK Dec. 2022

▲ RL Forum, Stanford University, CA Nov. 2022

▲ Deepmind for Google, Mountain View, CA Jan. 2020

▲ Institute of Statistics, Nankai University, Tianjin Dec. 2018

▲ International Conference on Data Science, Shanghai Dec. 2017

▲ The 25th ICSA Applied Statistics Symposium, Chicago Jun. 2017

▲ Conference on Statistical Learning and Data Science, Chapel Hill, NC Jun. 2016

TEACHING EXPERIENCES

▲ Lab Instructor, STAT 301: Elementary Statistical Methods, Spring 2015, Summer 2015, Fall 2015

▲ Lab Instructor, STAT 113: Statistics and Society, Summer 2017

- ▲ Grader, STAT 519: Introduction to Probability Theory, Fall 2014, Spring 2015, Fall 2016, Fall 2017
- ▲ Grader, STAT 516: Basic Probability and Applications, Fall 2015

SERVICES

- ▲ Session chair for Machine Learning/Intelligence Cluster at 2020 INFORMS annual meeting
- ▲ Co-chair of Ubicomp 2019 Workshop on [Continual and Multimodal Learning for Internet of Things](#), London, UK
- ▲ Reviewers for Journals:
 - Annals of Statistics
 - Annals of Applied Probability
 - Journal of the American Statistical Association
 - Journal of Machine Learning Research
 - Journal of Multivariate Analysis
 - Computational Statistics and Data Analysis
 - The IEEE Control Systems Letters
 - Statistica Sinica
 - Biostatistics
 - IEEE Transactions on Information Theory
 - IEEE Journal on Selected Areas in Information Theory
 - Transactions on Pattern Analysis and Machine Intelligence
 - Artificial Intelligence
 - Transactions on Machine Learning Research
- ▲ Reviewers for Conferences: NeurIPS, ICML, ICLR, AISTATS, AAAI, UAI, SODA