

## RESEARCH INTERESTS

Reinforcement Learning, Online Learning & Multi-Armed Bandits, Statistical Machine Learning, Tensor Learning

## 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, London, UK** Nov. 2020 - Present  
*Research Scientist*

**▲ Department of Electrical Engineering, Princeton University, NJ** Dec. 2019 - Nov. 2020  
*Postdoctoral Researcher*  
Mentor(s): Dr. Mengdi Wang

**▲ Deepmind, London, UK** May 2019 - Sep. 2019  
*Research Intern*  
Mentor(s): Dr. Tor Lattimore, Dr. Csaba Szepesvári

**▲ Adobe Research, San Jose, CA** May 2018 - Aug. 2018  
*Research Intern*  
Mentor(s): Dr. Zheng Wen

## VISITING EXPERIENCES

**▲ Simons Institute, Berkeley, CA** Aug. 2020 - Dec. 2020  
*Visiting Postdoc* [[Profile](#)]  
Theory of Reinforcement Learning Program

**▲ School of Mathematics, Institute for Advanced Study, NJ** Jan. 2020 - Apr. 2020  
*Visiting Postdoc*  
Special Year on Optimization, Statistics, and Theoretical Machine Learning

## 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

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▲ **Interacting Contour Stochastic Gradient Langevin Dynamics**

Wei Deng, Siqi Liang, **Botao Hao**, Guang Lin, Faming Liang

*ICLR 2022*.

▲ **Confident Least Square Value Iteration with Local Access to a Simulator**

**Botao Hao**, Nevena Lazic, Dong Yin, Yasin Abbasi-Yadkori, Csaba Szepesvári

*AISTATS 2022*.

▲ **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](#)]

- ▲ CML-IOT 2019: the first workshop on continual and multimodal learning for internet of things  
Tong Yu, Shijia Pan, Susu Xu, Yilin Shen, **Botao Hao**  
*UbiComp/ISWC 2019*. [[Link](#)]

## BOOK CHAPTERS

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- ▲ **Tensors in Modern Statistical Learning**  
Will Wei Sun, **Botao Hao**, Lexin Li  
*In Wiley StatsRef: Statistics Reference Online*. [[Link](#)]

## PREPRINTS

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- ▲ **Evaluating Predictive Distributions: Does Bayesian Deep Learning Work?**  
Ian Osband, Zheng Wen, Mohamammad Asghari, Vikranth Dwaracherla, **Botao Hao**,  
Morteza Ibrahimi, Dieterich Lawson, Xiuyuan Lu, Brendan O'Donoghue, Benjamin Van Roy  
*Submitted*. [[ArXiv](#)][[GitHub](#)]
- ▲ **Optimization Issues in KL-Constrained Approximate Policy Iteration**  
Nevena Lazic, **Botao Hao**, Yasin Abbasi-Yadkori, Dale Schuurmans, Csaba Szepesvári  
*Submitted*. [[ArXiv](#)]
- ▲ **Low-rank Tensor Bandits**  
**Botao Hao**, Jie Zhou, Zheng Wen, Will Wei Sun  
*Submitted*. [[ArXiv](#)]
- ▲ **Residual Bootstrap Exploration for Bandit Algorithms**  
Chi-Hua Wang\*, Yang Yu\*, **Botao Hao**, Guang Cheng  
*Submitted*. [[ArXiv](#)]

## HONORS AND AWARDS

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- ▲ Bilsland Dissertation Fellowship *2019-2020*  
*Nominated and selected by members of the graduate faculty to support outstanding Ph.D. candidates in the final year of doctoral degree completion across the whole university.*
- ▲ NeurIPS 2019 Travel Award

## INVITED TALKS

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- ▲ 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

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- ▲ 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

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- ▲ 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

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

▲ Reviewers for Conferences: AAAI 2021-2022, ICLR 2021-2022, NeurIPS 2019-2021, AISTATS 2020-2022, ICML 2020-2022, UAI 2020-2021, SODA 2022