BOTAO HAO

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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　　　　　　　　　　　　　　　　　　　　　　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

▲ 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

▲ **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
Submitted. [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*
▲ 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
▲ Reviewers for Conferences: AAAI 2021-2022, ICLR 2021-2023, NeurIPS 2019-2022, AISTATS 2020-2023, ICML 2020-2022, UAI 2020-2022, SODA 2022