Jianliang He

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RESEARCH INTERESTS

Statistical Machine Learning, Multiple Hypothesis Testing & Distribution-free inference.

EDUCATION

Fudan University, Shanghai 2020.9 - Present
Department of Statistics and Data Science, School of Management.
Bachelor of Statistics.
Core courses: Nonparametric Statistics, Statistical Inference, Time Series, Regression, Stochastic Process, Categorical Data Analysis, Multivariate Analysis, Optimization, Econometrics (Graduate).

PUBLICATIONS AND PREPRINTS

1. Trambak Banerjeea*, Bowen Gang*, **Jianliang He***. "Harnessing the Collective Wisdom: Fusion Learning using Decision Sequences from Diverse Sources" (2023). Submitted to *Journal of the Royal Statistical Society, Series B (Statistical Methodology).* arXiv:2308.11026. Under review.
2. **Jianliang He**, Han Zhong, Zhuoran Yang. "Sample-Efficient Learning of Infinite-Horizon Average-Reward MDPs with General Function Approximation" (2023). Submitted to *International Conference on Learning Representations, 2024.* Link. Under review.

W1. "Large-scale Multiple Testing with Side Information" with Trambak Banerjeea, Bowen Gang. *In progress.*

W2. "Large Language Model for Hierarchical Planning" with Siyu Chen, Jingyu Zhu, Fengzhuo Zhang, Chuanhao Li, Zhuoran Yang. *In progress.*

RESEARCH EXPERIENCE

Reinforcement Learning Theory 2023.2 - Present
Independent Research, Advisor: Prof. Zhuoran Yang *Yale University*

- General Function Approximation for Infinite-horizon Average-reward MDPs
- Introduced average-reward generalized eluder coefficients (AGEC) as complexity measures for AMDP problems in general function approximation, capturing almost all existing tractable AMDPs.
- Developed a novel unified algorithmic framework—FLOP to solve both value-based and model-based problems in AMDPs, featuring a unique confidence set construction and a low-switching policy update scheme.

- Large Language Model for Hierarchical Planning
- Proposed a Planner-Actor-Reporter system to provide a general theoretical analysis framework for LLMs-empowered task planning. Demonstrated that LLMs planned via Bayesian Aggregated imitation learning.

Large-Scale Multiple Testing 2022.7 - Present
Independent Research, advisor: Prof. Bowen Gang *Fudan University*

- Large-Scale Testings with Multiple Covariates
- Developed a mirror sequence filter to achieve valid false discovery rate (FDR) control beyond requirment of consistent estimators for effective error rate control in complex scenarios with multiple covariates.
- Presented a nonparametric estimation of conditional local false discovery rate (Clfdr) using a deconvolution approach, bulit upon features extracted from covariates using kernel PCA as the external feature decoder;

- Integrative Multiple Testing

- Proposed Integrative Ranking and Thresholding (IRT) framework to aggregate testing results from diverse sources, ensuring FDR control in the presence of heterogeneities (e.g control rate/method) across sources.
- Pioneered in constructing nonparametric decision-based evidence indices, measuring evidence against corresponding null hypotheses, which are generalized e-values and facilitate error rate control via eBH procedure.

Gene Regulatory Network Inference 2022.1 - 2022.10

Group Leader, technical report, advised by Prof. Qinfeng Xu *Fudan University*

- Constructed gene regulatory network (GNR) with Bayesian model averaging (BMA). Introduced a graphical causality based approach to justify the regulatory relationship obtained from the standard KBoost approach.

HONORS AND FELLOWSHIPS

First Prize Scholarship for Outstanding Students (Top 1%), Fudan University 2022 - 2023

Research Grant of ¥10,000 (2022), ¥7,500 (2023), FDUROP 2022 - 2023

Outstanding Award, Fudan Undergraduate Research Opportunity Program (FDUROP) 2022

3^{rd} place, Group leader, International S&P Global Valuation Competition 2021

TEACHING

Teaching Assistant, MANA130083.01 Nonparametric, Fudan University Spring, 2022 - 2023

SKILLS & INTERESTS

Programming: Python, R, Matlab, SQL, C/C++, Latex ;
Languages: Chinese (Native), English (GRE score: 159+169+3.5, TOFEL: 104);
Finance: Financial Modeling, Software (Capital IQ, Wind, etc.);
Interests: Photography, Texas Holdem.