JITAO WANG

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SUMMARY

Jitao Wang is a final year Ph.D. candidate at the Biostatistics Department, University of Michigan. His research primarily focuses on developing innovative **statistical and machine learning** methods, with a strong emphasis on

(1) **Reinforcement Learning**, applying and adapting policy learning and evaluation techniques to address challenges in mobile health applications.;

(2) **Causal Inference**, performing treatment effect estimation and dynamic mediation analysis within the context of sequentially randomized trials.

EDUCATION

University of Michigan, Ann Arbor, Michigan *2020.9-2025(expected)*
Ph.D. in Biostatistics
Dissertation Topic: Data-driven Statistical Learning Methods for Personalized Interventions in Mobile Health.
Supervised by: Dr. Zhenke Wu & Dr. Chengchun Shi

University of Michigan, Ann Arbor, Michigan *2017.9-2019.4*
M.S. in Biostatistics
Selected Coursework: **L**inear Regression, **S**tatistical Inference, **C**omputational Data Science & Machine Learning, **S**tatistical Computing, **S**tochastic Process, **C**onvex Optimization, **T**ime Series Analysis.

Shanghai Jiaotong University, Shanghai, China *2013.9-2017.6*
B.S. in Bioinformatics

SELECTED PROJECT EXPERIENCE

Counterfactually Fair Offline RL via Sequential Data Preprocessing *2023.4 - present*

- Developed a structural equation model-based framework for counterfactually fair policy learning in RL.
- Designed and implemented a novel algorithm to effectively mitigates unfairness for policy learning.
- Applied the algorithm to a digital health dataset involving 207 opioid overuse patients over 12 weeks, achieving over 20% improvement in reducing disparities for socioeconommically-vulnerable subgroups.

Multivariate Dynamic Mediation Analysis under a RL Framework *2023.4 - present*

- Introduced a novel framework to formalize the individual mediation analysis in a longitudinal setting.
- Developed a novel multivariate dynamic mediation analysis approach using recursion-based method.
- Analyzed the 26 week's mobile health data of 1196 medical interns and found out that the resting heart rate and sleep mediates the long-term effect of in-the-moment mobile prompts on mood score.

Testing Stationarity Assumption in Sequential Decision Making *2021.11 - 2023.4*

- Developed a DL-based algorithm to test the stationarity assumption in high-dimensional RL settings.
- Proved the size and double robustness property under a general bidirectional asymptotic framework.
- Demonstrated the efficacy of the test through extensive numerical studies and real-world examples.

A Reinforcement Learning Framework for Dynamic Mediation Analysis *2022.10 - 2023.4*

- Integrated the dynamic mediation analysis within the framework of RL over an infinite time horizon.

· Created a robust algorithm to estimate the dynamic mediation effects against model misspecification.
· Conducted analysis of a six-month mobile health dataset with 1565 participants, finding that physical activity and sleep negatively mediate the long-term effect of mobile prompts on daily mood.

TECHNICAL SKILLS

Coding Skills

· Programing language: Python(advanced), R(advanced), C/C++(intermediate), SQL(intermediate).
· Tools: PyTorch, TensorFlow, GitHub, Linux, Pandas, Tidyverse, Julia.

Statistical Skills

· Reinforcement learning: Experienced in applying RL algorithms for policy learning and evaluation.
· Machine Learning: Skilled in utilizing machine and deep learning tools for data modeling and analysis.
· Causal Inference: Expertise in treatment effects estimation and causal mediation analysis.
· Data Analysis: Proficient in exploratory data analysis, including missing data imputation techniques.
· Data Visualization: Experienced in creating informative and visually appealing data visualizations.

PUBLICATIONS

Wang, J., Shi, C., & Wu, Z. (2023). A Robust Test for the Stationarity Assumption in Sequential Decision Making. Proceedings of the 40th International Conference on Machine Learning, 3635536379.

Ge, L., **Wang, J.**, Shi, C., Wu, Z., & Song, R. (2023). A Reinforcement Learning Framework for Dynamic Mediation Analysis. Proceedings of the 40th International Conference on Machine Learning, 1105011097.

Wang, J., Wu, Z., Choi, S. W., Sen, S., Yan, X., Miner, J. A., Sander, A. M., Lyden, A. K., Troost, J. P., & Carlozzi, N. E. (2023). The Dosing of Mobile-Based Just-in-Time Adaptive Self-Management Prompts for Caregivers: Preliminary Findings From a Pilot Microrandomized Study. *JMIR Formative Research*.

Wang, J., Fang, Y., Frank, E., Walton, M. A., Burmeister, M., Tewari, A., Dempsey, W., NeCamp, T., Sen, S., & Wu, Z. (2023). Effectiveness of gamified team competition as mHealth intervention for medical interns: A cluster micro-randomized trial. Npj Digital Medicine, 6(1), 1-8.

*Luo, L., *Shi, C., ***Wang, J.**, Wu, Z., & Li, L. (2023). Multivariate dynamic mediation analysis under a reinforcement learning framework. arXiv preprint arXiv:2310.16203. (*co-first authors).

Wang, J., Shi, C., Piette, J., Loftus, J., & Wu, Z. (2024). Counterfactually Fair Offline Reinforcement Learning via Sequential Data Preprocessing. *In preparation*.