

Zhaoyi Zhou

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EDUCATION

Institute for Interdisciplinary Information Sciences (IIIS), Tsinghua University

Expected June 2024

B.E. in Computer Science and Technology (Yao Class)

Beijing, China

- **Selected Coursework:** Machine Learning, Theory of Computation, Game Theory, Algorithm Design
- **GPA:** 3.97/4.00

PUBLICATIONS AND PREPRINTS

- Free from Bellman Completeness: Trajectory Stitching via Model-based Return-conditioned Supervised Learning.
Zhaoyi Zhou, Chuning Zhu, Runlong Zhou, Qiwen Cui, Abhishek Gupta, and Simon S. Du.
To appear as ORAL presentation at Foundation Models for Decision Making (FMDM) workshop of NeurIPS 2023.
- Convergence Rates for Localized Actor-Critic in Networked Markov Potential Games.
Zhaoyi Zhou, Zaiwei Chen, Yiheng Lin, and Adam Wierman.
Conference on Uncertainty in Artificial Intelligence (UAI) 2023. (31% acceptance rate)

SELECTED HONORS

- Yao Award, Recognition Prize (presented by Dean Andrew C. Yao of IIIS), Tsinghua University, 2023;
- Scholarship of Academic Excellence, Tsinghua University, 2023 & 2022;
- Scholarship of Scientific Innovation, Tsinghua University, 2023 & 2022;
- Scholarship of Comprehensive Excellence, Tsinghua University, 2021.

RESEARCH EXPERIENCE

University of Washington

Feb. 2023 - Aug. 2023

Research Intern. Supervisor: Simon Shaolei Du

Seattle, USA

Led research in offline reinforcement learning (RL).

- Discovered freedom from Bellman completeness requirement as an advantage of return-conditioned supervised learning (RCSL) over dynamic-programming (DP) based offline RL methods.
- Conducted both theoretical and empirical analysis on explicit examples to demonstrate strength of RCSL over DP-based methods in near-deterministic environments given expert dataset.
- Theoretically prove that RCSL cannot do trajectory stitching, a limitation of RCSL observed in previous literature.
- Developed model-based return-conditioned supervised learning (MBRCSL) framework, which enables trajectory stitching of RCSL while avoiding Bellman completeness requirements.
- Tested MBRCSL on offline RL benchmarks, in which MBRCSL outperforms state-of-the-art model-based and model-free offline RL algorithms.

California Institute of Technology

Feb. 2022 - Feb. 2023

Research Intern. Supervisor: Adam Wierman

Remote

Led research in networked multi-agent RL.

- Introduced the class of networked Markov potential games as relaxation of Markov potential games (MPG), encompassing practical examples such as Markov congestion game.
- Designed localized actor-critic algorithm with linear function approximation, overcoming the curse of dimensionality.
- Derived the first finite-sample bound for multi-agent competitive games that is independent of the number of agents.
- Developed localized stochastic approximation (SA) framework as foundation of localized multi-agent policy evaluation.
- Derived finite-time convergence result of localized SA via a reduction approach.

PROJECT EXPERIENCE

Parameter-free Stochastic Optimization

June. 2023 - Present

Student Researcher, IIIS, Tsinghua University

Beijing, China

- Designed stochastic DoWG algorithm, a stochastic optimization method without manual parameter-tuning.
- Derived universal convergence rates of stochastic DoWG for smooth and non-smooth convex functions, matching optimal rate of tuned stochastic optimization methods up to an extra logarithm factor.
- Derive optimal step size for stochastic gradient descent (SGD) variants given strongly-convex objective functions.

OTHERS

Software: Python, C/C++, Go, Verilog, MATLAB

Languages: English (Fluent), German (Fluent), Chinese (Native)