

CONTACT INFORMATION

Name: Shaocong Ma

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RESEARCH INTERESTS

Optimization and Stochastic Approximation

Driven by real-world challenges, my research is centered on optimization techniques applied in diverse fields such as (multi-agent) reinforcement learning and physic-informed machine learning. More specifically, I prioritize creating data-efficient and environment-robust algorithms that are substantiated with theoretical guarantees.

EDUCATION

B.S. in Statistics

Sichuan University

Sep. 2013-Jun. 2017

GPA: 3.6/4.0

M.A. in Statistics

University of California, Santa Barbara

Sep. 2017-Jun. 2019

GPA: 3.9/4.0

PhD in Electrical and Computer Engineering

University of Utah

Sep. 2019-Jun. 2024

GPA: 4.0/4.0

WORKING PAPERS

Shaocong Ma, Ximing Ding, Yi Zhou. *General Convergence Analysis of a Variant of Robust Policy Gradient Algorithms with Model Uncertainty*. In progress.

Shaocong Ma, Cheng Chen, James Diffenderfer, Bhavya Kailkhura, and Yi Zhou. *A Hybrid Meta-Learning Model with Black-Box PDE Solver for Fluid Flow Prediction*. In progress.

PUBLICATIONS

Shaocong Ma, Yi Zhou. *Understanding the Impact of Model Incoherence on Convergence of Incremental SGD with Random Reshuffle*. ICML 2020.

Shaocong Ma, Yi Zhou, Shaofeng Zou. *Variance-Reduced Off-Policy TDC Learning: Non-Asymptotic Convergence Analysis*. NeurIPS 2020.

Shaocong Ma, Ziyi Chen, Yi Zhou, Shaofeng Zou. *Greedy-GQ with Variance Reduction: Finite-time Analysis and Improved Complexity*. ICLR 2021.

Ziyi Chen, **Shaocong Ma**, Yi Zhou. *Sample Efficient Stochastic Policy Extragradient Algorithm for Zero-Sum Markov Game*. ICLR 2022.

Ziyi Chen, **Shaocong Ma**, Yi Zhou. *Accelerated Proximal Alternating Gradient-Descent-Ascent for Nonconvex Minimax Machine Learning*. IEEE ISIT 2022.

Shaocong Ma, Ziyi Chen, Yi Zhou, Kaiyi Ji, Yingbin Liang. *Data Sampling Affects the Complexity of Online SGD over Dependent Data*. UAI 2022.

Ziyi Chen, **Shaocong Ma**, Yi Zhou. *Finding Correlated Equilibrium of Constrained Markov Game: A Primal-Dual Approach*. NeurIPS 2022.

Shaocong Ma, Ziyi Chen, Shaofeng Zou, Yi Zhou. *Decentralized Robust V-Learning for Solving Markov Games with Model Uncertainty*. Accepted by JMLR in 2023.

Shaocong Ma, James Diffenderfer, Bhavya Kailkhura, and Yi Zhou. *End-to-End Mesh Optimization of a Hybrid Deep Learning Black-Box PDE Solver*. NeurIPS 2023 (ML4PS Workshop).

Shaocong Ma, James Diffenderfer, Bhavya Kailkhura, and Yi Zhou. *When Non-Differentiable PDE Solver Meets Deep Learning: Partially Differentiable Learning for Efficient Fluid Flow Prediction*. Submitted to AAAI 2024.

EXPERIENCES

Student Intern (AI4Science)

May. 2022-Aug. 2022

Lawrence Livermore National Security, LLC

Mentors: James Diffenderfer, Bhavya Kailkhura

- Designed a hybrid model with external black-box PDE solvers, addressing the non-differentiability challenges in fluid flow predictions.
- Rigorously assessed the Physics-Informed Graph Neural Network's resilience in out-of-distribution scenarios, achieving comparable performance with differentiable solvers.

Research Collaborator (AI4Science)

Aug. 2022-present

Lawrence Livermore National Security, LLC

Mentors: James Diffenderfer, Bhavya Kailkhura

- Integrated a MAML-type meta-learning model with a non-differentiable external PDE solver, enhancing fluid flow prediction capabilities.
- Led and managed experiments progress using Git and conducted comprehensive analysis of results.

PROFESSIONAL SERVICES

Conference Reviewer:

ICML; ICLR; NeurIPS; IEEE BigData; IJCAI; UAI; AAAI; AISTAT.

Journal Reviewer:

Transactions on Machine Learning Research (TMLR); IEEE Transactions on Emerging Topics in Computational Intelligence (TETCI); European Journal of Control.

TEACHING EXPERIENCES

Teaching Assistant at UC Santa Barbara:

PSTATE 5A: Statistics; PSTATE 5LS: Statistics for Life Science; PSTAT 109: Statistics for Economics; PSTAT 175: Survival Analysis; PSTAT 172: Actuarial Statistics.

Teaching Assistant at University of Utah:

ECE 3500: Fundamentals of Signals and Systems.