THE UNIVERSITY OF CHICAGO | DEPARTMENT OF STATISTICS

Joint Colloquium with the Data Science Institute (DSI)

Yuejie Chi

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"From Single-agent to Federated Reinforcement Learning"

Monday February 26, 2024, at 11:30 AM

Jones 303, 5747 S. Ellis Avenue

Pre-Seminar refreshments will be served at 11:00 AM in Jones 303

Abstract

Reinforcement learning (RL) has garnered significant interest in recent years due to its success in a wide variety of modern applications. Q-learning, which seeks to learn the optimal Q-function of a Markov decision process (MDP) in a model-free fashion, lies at the heart of RL practices. However, theoretical understandings on its non-asymptotic sample complexity remain unsatisfactory, despite significant recent efforts. In this talk, we first show a tight sample complexity bound of Q-learning in the single-agent setting, together with a matching lower bound to establish its minimax sub-optimality. We then show how federated versions of Q-learning allow collaborative learning using data collected by multiple agents without central sharing, where an importance averaging scheme is introduced to unveil the blessing of heterogeneity.

Bio: Dr. Yuejie Chi is the Sense of Wonder Group Endowed Professor of Electrical and Computer Engineering in AI Systems at Carnegie Mellon University, with courtesy appointments in the Machine Learning department and CyLab. She received her Ph.D. and M.A. from Princeton University, and B. Eng. (Hon.) from Tsinghua University, all in Electrical Engineering. Her research interests lie in the theoretical and algorithmic foundations of data science, signal processing, machine learning and inverse problems, with applications in sensing, imaging, decision making, and generative AI. Among others, Dr. Chi is a recipient of the Presidential Early Career Award for Scientists and Engineers (PECASE), NSF CAREER Award, ONR YIP Award, AFOSR YIP Award, the inaugural IEEE Signal Processing Society Early Career Technical Achievement Award for contributions to high-dimensional structured signal processing, and multiple paper awards including the SIAM Activity Group on Imaging Science Best Paper Prize and IEEE Signal Processing Society Young Author Best Paper Award. She is an IEEE Fellow (Class of 2023) for contributions to statistical signal processing with low-dimensional structures.

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