

**The Hong Kong Polytechnic University
Department of Applied Mathematics**

Colloquium Series on Young Scholars in Optimization and Data Science

Decentralized Stochastic Bilevel Optimization over Communication Networks

By

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Abstract

Bilevel optimization have gained growing interests, with numerous applications found in meta learning, minimax games, reinforcement learning, and nested composition optimization. This paper studies the problem of distributed bilevel optimization over a network where agents can only communicate with neighbors, including examples from multi-task, multi-agent learning and federated learning. In this paper, we propose a gossip-based distributed bilevel learning algorithm that allows networked agents to solve both the inner and outer optimization problems in a single timescale and share information via network propagation. We show that our algorithm enjoys the $\mathcal{O}(\frac{1}{K \epsilon^2})$ per-agent sample complexity for general nonconvex bilevel optimization and $\mathcal{O}(\frac{1}{K \epsilon})$ for strongly convex objective, achieving a speedup that scales linearly with the network size. The sample complexities are optimal in both ϵ and K . We test our algorithm on the examples of hyperparameter tuning and decentralized reinforcement learning. Simulated experiments confirmed that our algorithm achieves the state-of-the-art training efficiency and test accuracy.



Date: 2 December 2022 (Friday)

Time: 15:00-16:00 (Hong Kong Standard Time GMT +8)

Venue: Online Talk via Zoom (Meeting ID: 965 7220 9607)

Speaker: Dr. Shuguang Yang, Hong Kong University of Science and Technology

Host: Dr. Yancheng Yuan, The Hong Kong Polytechnic University

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