



George Michailidis
Department of Statistics & Data Science
University of California, Los Angeles

A Penalty-Based Method for Communication-Efficient Decentralized Bilevel Optimization

Wednesday, October 2nd, 2024

12:00 PM

110 Frelinghuysen Road, Hill Center, Room 116

Zoom Meeting: Meeting ID: 969 0606 4706

Password: 745339

<https://rutgers.zoom.us/j/96906064706?pwd=ZklvbExpRVBJQ3c5dUhhYTFuR2ZrZz09>

Light refreshments will be served in Hill 452, 11:20am

Abstract: Bilevel optimization (BLO) is an optimization problem that involves two levels of hierarchy (*i.e.*, upper and lower levels), wherein obtaining the solution to the upper-level problem requires solving the lower-level one. BLO has recently attracted a lot of attention due to novel applications in machine learning that involve optimizing nested objective functions, including hyperparameter tuning and related automated ML tasks, few shot robust, representation, coresets and reinforcement learning. In the first part of the talk, a very brief overview of the BLO problem, selected machine learning applications that can be cast as BLO problems and algorithms to obtain its solution will be given.

In the second part of the talk, we introduce the decentralized version of the BLO problem (without assuming a star-shape network topology) and present a penalty function-based decentralized algorithm with theoretical guarantees under both convex and non-convex assumptions for the upper level functions. Specifically, a distributed alternating gradient-type algorithm for solving consensus BLO over a decentralized network is developed. A key feature of the proposed algorithm is the estimation of the hyper-gradient of the penalty function through decentralized computation of matrix-vector products and few vector communications. Further, the theoretical results highlight improvements in the iteration complexity of decentralized BLO. Empirical results demonstrate that the proposed method performs well in real-world settings.

Bio: I am a Professor in the Department of Statistics & Data Science at UCLA. Prior to joining UCLA in 2022, I was a Professor of Statistics and Computer Science at the University of Florida. I also served as the the Founding Director of the Informatics Institute at the University of Florida. Before that I spent 17 years as a faculty member in Statistics and EECS at the University of Michigan. My research focuses on methodological and theoretical work in high-dimensional statistics, optimization, machine learning and neural networks, change point analysis, and network modeling. I am also interested in applications of statistical methods to engineering, biomedicine and economic/finance problems.

