IE Decision Systems Engineering Spring ‘21 Seminar Series

Friday, March 26, 12-1 p.m.

Zoom https://asu.zoom.us/j/81413425044

This talk will be recorded / Q&A following presentation

“On the Tightness and Scalability of the Lagrangian Dual of Structured Nonconvex Optimization”

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Bio

Kibaek Kim is a Computational Mathematician in Laboratory for Applied Mathematics, Numerical Software, and Statistics, Mathematics and Computer Science Division at Argonne National Laboratory. He is a recipient of DOE Early Career Research Program award. His primary research focus is on optimization modeling and solutions for large-scale optimization capable of running on high performance computing systems, in applications to complex energy systems and resilient infrastructure systems. Before joining Argonne, he obtained a Ph.D. degree in Industrial Engineering and Management Sciences from Northwestern University.

Abstract

The dual decomposition is a method that solves large-scale optimization problem by decomposing the problem into many small subproblems. It has been successfully applied for solving structured nonconvex optimization problems, such as stochastic mixed-integer program, its distributionally robust variant, multiperiod planning problems, and large-scale network optimization problems. In this talk, we present a brief overview of recent advances in the dual decomposition method and then focus on two classes of nonconvex problems: (i) scenario decomposition of distributionally robust optimization; and (ii) network decomposition of alternating current optimal power flow (ACOPF). In particular, the first part of the talk introduces two-stage distributionally robust mixed-integer program with Wasserstein ambiguity set and develops the dual decomposition method for the problem. In the other part of the talk, we apply the method to decompose the network topology of ACOPF problem, which can provide the dual bound as tight as the well-known semi-definite relaxation. For both parts, we present numerical experiments to demonstrate our algorithmic performance and scalability.

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