Mixed–Integer Programming Approaches to Risk–Averse Optimization

Simge Küçükyavuz, PhD
Associate Professor
Integrated Systems Engineering
Ohio State University

Abstract: Decision-making problems that arise in complex systems (e.g., power grids, emergency logistics, communications networks and supply chains) invariably involve uncertainty and risk. These problems are further complicated by the combinatorial nature of the decisions involved. First, we consider two-stage linear optimization problems under reliability or quality of service considerations, which we model as chance-constrained linear programs. At the first stage, decisions must be made when some parameters are uncertain. As the uncertainty unfolds, recourse decisions are made at the second stage to mitigate the risk. We propose branch-and-cut and decomposition algorithms to solve the resulting large-scale mixed-integer programs. Next, we review new models and methods for multicriteria risk-averse optimization problems under conditional value-at-risk constraints. Our computational experiments on staff scheduling and homeland security problems show that our methods scale well with increasing number of scenarios.

Bio: *Simge Küçükyavuz* is an associate professor in the Integrated Systems Engineering Department at the Ohio State University. Prior to joining the faculty at Ohio State, Dr. Küçükyavuz was an assistant professor at the University of Arizona, and a research associate at Hewlett-Packard Laboratories. She received her PhD in Industrial Engineering and Operations Research from the University of California, Berkeley. Her research interests are in mixed-integer programming, large-scale optimization, optimization under uncertainty, and their applications. Her research is supported by multiple grants from the National Science Foundation, including the 2011 CAREER Award. She is the co-winner of the 2015 ICS (INFORMS Computing Society) Prize. She serves on the editorial boards of several journals, including Computational Optimization and Applications, Networks and Journal of Global Optimization, and on the Board of Directors of the INFORMS Computing Society.

Tuesday, February 9, 2016
1:30 – 2:20 p.m.
MEB 106