Operations Research and Engineering Management

Sampling-based algorithms for two-stage stochastic programs and applications

Ph.D. Dissertation Defense

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Abstract: In this dissertation, we present novel sampling-based algorithms for solving two-stage stochastic programming problems. Sampling-based methods provide an efficient approach to solving large-scale stochastic programs where uncertainty is possibly defined on continuous support. When sampling-based methods are employed, the process is usually viewed as two steps - sampling and optimization. When these two steps are performed in sequence, the overall process can be computationally very expensive. In this dissertation, we utilize the framework of internal-sampling where sampling and optimization steps are performed concurrently. The dissertation comprises two parts. In the first part, we design a new sampling technique for solving two-stage stochastic linear programs with continuous recourse. We incorporate this technique within an internal-sampling framework of stochastic decomposition. In the second part of the dissertation, we design an internal-sampling-based algorithm for solving two-stage stochastic mixed-integer programs with continuous recourse. We design a new stochastic branch-and-cut procedure for solving this class of optimization problems. Finally, we show the efficiency of this method for solving large-scale practical problems arising in logistics and finance.

Biography: Siavash received the B.S. degree in Civil Engineering from Iran University of Science and Technology, Tehran, Iran, and the M.S. degree in Industrial Engineering from Sharif University of Technology, Tehran, Iran. He is currently a Ph.D. candidate in the Department of Operations Research and Engineering Management at Southern Methodist University, Dallas, Texas, USA. His research interests include sampling-based algorithms for stochastic optimization with applications in logistics and finance.