

A Simulation-Based Approach to Two-Stage Stochastic Programming with Recourse

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Abstract

In this paper we consider stochastic programming problems where the objective function is given as an expected value function. We discuss Monte Carlo simulation based approaches to a numerical solution of such problems. In particular, we discuss in detail and present numerical results for two-stage stochastic programming with recourse where the random data have a continuous (multivariate normal) distribution. We think that the novelty of the numerical approach developed in this paper is twofold. First, various variance reduction techniques are applied in order to enhance the rate of convergence. Successful application of those techniques that is what makes the whole approach numerically feasible. Second, a statistical inference is developed and applied to estimation of the error, validation of optimality of a calculated solution and statistically based stopping criteria for an iterative algorithm.

Key words: Two-stage stochastic programming with recourse, Monte Carlo simulation, likelihood ratios, variance reduction techniques, confidence intervals, hypotheses testing, validation analysis, nonlinear programming.

Abbreviation title: Simulation-Based Stochastic Programming

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