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Sampling the Optimal Solution of an Optimization Problem with Random Parameters

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We present a novel method for sampling the optimal solution of unconstrained, strictly convex optimization problems with random parameters. The motivating application are methods in two-stage stochastic programming, which often rely on computing (the expectation of) optimal dual variables for linear programs with random coefficients.

Conventional methods typically proceed by generating samples of the parameters and then solving the optimization problem for each individual realization. By contrast, we directly generate samples of the optimal solution by simulating an appropriately chosen diffusion process adapted to the target distribution, while implementing a metropolis correction step to improve numerical stability.

We present preliminary numerical results for the case where the random optimization problem is a log-barrier regularization of a linear program, and the simulated diffusion process is a version of the Metropolis Adjusted Langevin Algorithm (MALA).

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