Approximation Algorithms for 2-Stage Stochastic Scheduling Problems
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There has been a series of results deriving approximation algorithms for 2-stage discrete stochastic optimization problems, in which the probabilistic component of the input is given by means of "black box", from which the algorithm "learns" the distribution by drawing (a polynomial number of) independent samples. The performance guarantees proved for such problems, of course, is generally worse than for their deterministic analogue. We focus on a 2-stage stochastic generalization of the problem of finding the maximum-weight subset of jobs that can be scheduled on one machine where each job is constrained to be processed within a specified time window. Surprisingly, we show that for this generalization, the same performance guarantee that is obtained for the deterministic case can be obtained for its stochastic extension; that is, we show that one can find a 2-approximation algorithm for this 2-stage stochastic optimization problem, matching the bound shown for the deterministic case by Bar-Noy, Bar-Yehuda, Freund, Naor, and Schieber.

This is joint work with Mauro Sozio.