STOCHASTIC DYNAMIC DECISION SIMULATION: MARKOV CHAINS IN MULTI-STAGE STOCHASTIC PROGRAMMING

Suvrajeet Sen, University of Southern California, Los Angeles, CA, s.sen@usc.edu

Stochastic Programming (SP) grew out of the need to incorporate probabilistic information into constrained optimization models such as Linear Programming. Unfortunately, the nature of probabilistic information that is currently allowed in Multi-stage Stochastic Programming leaves much to be desired. For instance, most sampling-based algorithms are unable to guarantee asymptotic convergence for instances in which the stochastic process exhibits dependence between stages of the multi-stage model. In this talk, we will illustrate that the Multi-stage Stochastic Decomposition (MSD) algorithm ensures asymptotic convergence (wp1) even if stagewise independence is violated. Indeed for Markov chains, we can show that the MSD approximations can be streamlined in a manner that requires at most m approximations per stage, where m denotes the number of states of the Markov chain. Interestingly, no further discretization of the state-space is necessary in the multi-stage SLP setting.