Performance Bounds and Suboptimal Policies for Linear Stochastic Control via LMIs

Y. Wang and S. Boyd

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- Paper

In a recent paper, the authors showed how to compute performance bounds for infinite horizon stochastic control problems with linear system dynamics and arbitrary constraints, objective, and noise distribution. In this paper we extend these results to the finite-horizon case, with asymmetric costs and constraint sets. The method is based on bounding the objective with a general quadratic function, and using linear matrix inequalities (LMIs) and semidefinite programming (SDP) to optimize the bound. The resulting LMIs are more complicated than in the previous paper (which only used quadratic forms) but this extension allows us to obtain good bounds for problems with substantial asymmetry, such as supply chain problems. The method also yields very good suboptimal control policies, using control-Lyapunov methods.