A Simulation Approach to Optimal Stopping under Partial Information

Mike Ludkovski
Department of Statistics & Applied Probability, University of California, Santa Barbara
ludkovski@pstat.ucsb.edu

Abstract. We study the numerical solution of nonlinear partially observed optimal stopping problems. The system state is taken to be a multi-dimensional diffusion and drives the drift of the observation process, which is another multi-dimensional diffusion with correlated noise. Such models where the controller is not fully aware of her environment are of interest in applied probability and financial mathematics. We propose a new approximate numerical algorithm based on the particle filtering and regression Monte Carlo methods. The algorithm maintains a continuous state-space and yields an integrated approach to the filtering and control sub-problems. Our approach is entirely simulation-based and therefore allows for a robust implementation with respect to model specification. We carry out the error analysis of our scheme and illustrate with several computational examples. An extension to discretely observed stochastic volatility models is also considered.

Keywords optimal stopping, nonlinear filtering, particle filter, Snell envelope, regression Monte Carlo here