Optimal Multiple Stopping: Theory and Applications

Gary Wayne Crosby

Preprint no. 2017-03

Abstract

The classical secretary problem was an optimal selection thought experiment for a decision process where candidates with iid value to the observer appear in a random order and the observer must attempt to choose the best candidate. For each observation the observer must choose to either permanently dismiss the candidate or hire the candidate without knowing any information on the remaining candidates beyond their distribution. We extend this framework into one of sequential events where we examine continuous payoff processes of a function of continuous stochastic processes. While the goal of the classical problem was to maximize the probability of a desired occurrence, here we are interested in maximizing the expectation of integrated functions of stochastic processes. Further, our problem is not one of observing and discarding, but rather one where we have a job or activity that must remain filled by some candidate for as long as it is profitable to do so. After posing the general problem we examine several specific cases with a single stochastic process providing explicit solutions in the infinite horizon using PDE and change of numeraire approaches and providing limited solutions and Monte Carlo simulations in the finite horizon, and finally we examine the two process switching case.

Department of Mathematics, UNC Charlotte, Charlotte, NC 28223