The Semi-Regenerative Method of Simulation Output Analysis

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We develop a class of techniques for analyzing the output of simulations of a semi-regenerative process. Called the semi-regenerative method, the approach is a generalization of the regenerative method, and it can increase efficiency.We consider the estimation of various performance measures, including steady-state means, expected cumulative reward until hitting a set of states, derivatives of steady-state means, and time-average variance constants. We also discuss importance sampling and a bias-reduction technique. In each case, we develop two estimators: one based on a simulation of a single sample path, and the other a type of stratified estimator in which trajectories are generated in an independent and identically distributed manner. We establish a central limit theorem for each estimator so confidence intervals can be constructed.