Skart: A Skewness- and Autoregression-Adjusted Batch-Means Procedure for Simulation Analysis

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Abstract
This talk concerns Skart, an automated batch-means procedure for constructing a skewness- and autoregression-adjusted confidence interval (CI) for the steady-state mean of a simulation output process in either discrete time or continuous time. Skart is a sequential procedure designed to deliver a CI that satisfies user-specified requirements concerning not only the CI's coverage probability but also the absolute or relative precision provided by its half-length. Skart exploits separate adjustments to the half-length of the classical batch-means CI so as to account for the effects on the distribution of the underlying Student's $t$-statistic that arise from skewness (nonnormality) and autocorrelation of the batch means. The skewness adjustment is based on a modified Cornish-Fisher expansion for the classical batch-means Student's $t$-ratio, and the autocorrelation adjustment is based on an autoregressive approximation to the batch-means process for sufficiently large batch sizes. In an experimental performance evaluation involving a wide range of test processes, Skart compared favorably with other simulation analysis methods. Specifically, Skart exhibited competitive sampling efficiency and substantially closer conformance to the given CI coverage probabilities than the other procedures. Also presented is a nonsequential version of Skart, called N-Skart, in which the user supplies a single simulation-generated series of arbitrary length and specifies a coverage probability for a CI based on that series. In the same set of test processes previously mentioned and for a range of data-set sizes, N-Skart also achieved close conformance to the specified CI coverage probabilities.

Refreshments will be served in 401 Daniels Hall at 11:00 a.m.