

**University of California, Irvine
Statistics Seminar**

Multivariate Output Analysis for MCMC

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(Bldg. #314 on campus map)**

Markov chain Monte Carlo (MCMC) produces a correlated sample for estimating expectations with respect to a target distribution. A fundamental question is when should sampling stop so that we have good estimates of the desired quantities? The key to answering this question lies in assessing the Monte Carlo error through a multivariate Markov chain central limit theorem. The multivariate nature of this Monte Carlo error largely has been ignored in the MCMC literature. We present a multivariate framework for terminating simulation in MCMC using a relative standard deviation fixed-volume sequential stopping rule. Further, we show this stopping rule is equivalent to stopping when a multivariate effective sample size is sufficiently large. The finite sample properties of the proposed methods are demonstrated with a Bayesian dynamic space-time model on weather station data. Our results show the sequential stopping rule is easy to implement, provides uncertainty estimates, and performs well in high-dimensional settings.