Bounding and estimating MCMC convergence rates using common random number simulations

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Special session: MCMC: Convergence and Robustness

The common random number (CRN) simulation technique consists of using the same sequence of random variables to simulate two copies of a Markov chain with different initial values. We will explore how and when to use CRN simulation to evaluate Markov chain Monte Carlo (MCMC) convergence rates. We will discuss how CRN simulation is closely related to theoretical convergence rate techniques such as one-shot coupling and coupling from the past. We will present conditions under which the CRN technique generates an unbiased estimate of the squared L^2-Wasserstein distance between two random variables. We will provide an upper bound on the Wasserstein distance of a Markov chain to its stationary distribution after N steps in terms of averages over CRN simulations.