Local consistency of Markov chain Monte Carlo methods

Kengo Kamatani

Abstract   In this paper, we introduce the notion of efficiency (consistency) and examine some asymptotic properties of Markov chain Monte Carlo methods. We apply these results to the data augmentation (DA) procedure for independent and identically distributed observations. More precisely, we show that if both the sample size and the running time of the DA procedure tend to infinity, the empirical distribution of the DA procedure tends to the posterior distribution. This is a local property of the DA procedure, which may be, in some cases, more helpful than the global properties to describe its behavior. The advantages of using the local properties are the simplicity and the generality of the results. The local properties provide useful insight into the problem of how to construct efficient algorithms.

Keywords   Monte Carlo · Markov chain · Asymptotic normality