Algorithm for Simulating from Conditional Distributions

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Abstract:

Simulations play an important role in wide range of subjects. There are effective algorithms for different cases, such as Monte Carlo methods, rejection sampling, inverse transform sampling etc. In the case of conditional distributions, we need a different method, as the analytical expression is generally not available. We review and complement a general approach for Monte Carlo computations of simulations, given a statistic value. The core concept is about defining a function and finding the corresponding artificial conditional distribution to it. Next, we draw samples from that distribution using the Metropolis-Hastings algorithm and apply the function to the samples. Resulting sample ends up being from the desired conditional distribution. The method is illustrated by examples of uniform, normal, Gamma and inverse Gaussian distributions. Drawing samples from a conditional distribution is widely used in goodness of fit tests. This is demonstrated by a real life example, in which case the method can be applied for deciding if a model is appropriate for a data set.