

An enhanced Metropolis-Hastings algorithm based on Gaussian processes

The Metropolis-Hastings algorithm is one of the MCMC (Markov chain Monte Carlo) methods. This algorithm is used for obtaining samples in multi-dimensional distributions. Regular Gaussian distribution with standard deviation of 1 shows very plane sampling with not much data. Similarly for standard deviation of 100 most of the samples are subsided due to the sampling malfunctioning. Whereas in MCMC the standard deviation of 10 can also project discrete samples with required rate. Evaluating $P(x)$ is costly because calling $P(x)$ number of times is not a feasible solution. We then try to approximate on $P(x)$ if the approximation is certain then the sample of approximation is the key.

Metropolis Hastings and Metropolis Hastings based on Gaussian process (MHGP) has same results but in MHGP the target distribution is called fewer number of times which in turn reduces the cost. Plain Metropolis-Hastings has 10,000 calls & MHGP has 200 calls to reach the same results.