

Implementation and Comparison of MCMC strategies

Your Name

November 13, 2008

1 Summary

In this project, I will investigate two sampling strategies from probability distributions. I will implement the following methods:

- Metropolis-Hastings
- Slice Sampling (MacKay 29.7)

and test the methods on toy examples. The second method was not covered during the lecture; but seems to be interesting. My goal is achieving a better understanding of these methods.

2 Problems

We will consider the following problems:

1. A one dimensional multimodal distribution
2. A two dimensional distribution, like the AR model example covered during the lecture
3. Gaussian mixture model with 16 components in \mathbb{R}^{10} .

We will compute the mean and variance of these distributions using exact numeric methods or analytically and study the convergence properties in terms of computation time and approximation quality, as done in the graph for the Buffon needle example. I would like to find out which method is better for the examples above.

3 Deliverables

I will deliver the following:

1. Matlab implementations of the Metropolis method and the Slice sampler where algorithm parameters are well documented.
2. A program to visualise and illustrate the progress of the algorithms and a program to calculate and produce the graphs used in the final report.
3. A Report about the size of a conference paper summarising the results and the findings.