Johns Hopkins Engineering

625.464 Computational Statistics

Implementation Concerns Part 1

Module 6 Lecture 6D

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Implementation

Recall Goal of mcmc is to estimate features of f

$$\mu = \int h(x) f(x) dx$$

We should ask:

- Has the chain run long enough?
- Is the 1st part influenced by the starting value?
- Should the chain be run from several starting values?
- Are the sampled values approx draws from f?
- How shall we use the chain output to produce estimates & assess their precision?

Ensuring Good Mixing and Convergence

1. The mixing property of the Markov Chain.

2. The convergence of the Markov Chain.

Choice of Proposal

For Metropolis-Hastings we want:
--g should approximate f well so that the acceptance rate is high
--prefer that f/g is bounded
--g must be more diffuse than f
--use an iterative process where you adjust the variance to achieve a desired acceptance rate

For Gibbs Sampling we want:
--the components of X to be as independent as possible
--reparameterize to reduce dependence

Reparameterization example

Ex $[X_1, X_2]$ Bivariate Normal $\quad Y = [X_1 + X_2, X_1 - X_2]$

Number of Chains

How can you tell if your chain has become stuck in one or more modes?

Possible Solution: Run multiple chains from diverse stating values.