

140.778 Homework 2

November 16, 2010

NOTE: Homework data can be downloaded from our course website <http://www.biostat.jhsph.edu/~hji/courses/computing>.

1. MM algorithm:

(1) Download `hwdata2-1.txt` from the course website. Each line in this file is a vector $\mathbf{x}_i = (x_{i1}, \dots, x_{iK})$. $\mathbf{x}_i \sim \text{Dirichlet-multinomial}(|\mathbf{x}_i|, \alpha)$, where $\alpha = (\alpha_1, \dots, \alpha_K)$. Lines are independent. Implement an MM algorithm to obtain the MLE of α .

(2) Write a program to generate random vectors from Dirichlet-multinomial distribution. Use your own random variates to test your MM algorithm.

2. Metropolis algorithm:

Let $\pi(x)$ be $N(0, 1)$. Implement a Metropolis algorithm to sample from π . Plot the autocorrelation curve for the corresponding chain.

3. Reading (preparation for the final project):

Read the paper about “Mixtures of Factor Analyzers” on the course website.