

Homework 2 (Due on Sept 23)

September 16, 2014

STA 5934

Problem I

Compute the expected number of clusters induced by a Dirichlet Process on the observations (X_1, \dots, X_n) under the following hierarchical distribution: $X_i | P \sim P, P \sim DP(\alpha G_0)$ and show that it is asymptotically of the order $\alpha \log n$ as $n \rightarrow \infty$.

Problem II

1. Simulate data from the following mixture of normals as $y_i \sim 0.1N(-1, 0.2) + 0.5N(0, 1) + 0.4N(1, 0.4), i = 1, \dots, 100$
2. Obtain a frequentist estimate of the density & plot vs true density
3. Run the finite mixture model Gibbs sampler for $k = 10, a_h = \alpha/k, \mu_0 = 0, \kappa = \alpha_\tau = b_\tau = \alpha = 1$.
4. Run the blocked Gibbs sampler for $N = 10$ & the same hyperparameter specification.
5. Compare the resulting density estimates.