Stats 225 Final Report

Yadong Lu
Department of Statistics
University of California, Irvine
Irvine, CA 92617
yadongl1@uci.edu

Problem 1: Spike and Slab Regression

Part 1

Below is the pseudo code for implementing SSVS.

Algorithm 1 Gibbs sampling steps for SSVS, George & McCullogh (1993)

Set appropriate value for $\tau_i, c_i; R, v_\gamma; \lambda_\gamma; p_i$
Initialize: $\beta^0, \sigma^0, \gamma^0$
Gibbs Steps:
for i from 1 to N **do**
Sample $\beta^j \sim f(\beta^j|Y, \sigma^{j-1}, \gamma^{j-1}) = N_p(A_{\gamma^{j-1}}(\sigma^{j-1})^{-2}X'X\hat{\beta}_{LS}, A_{\gamma^{j-1}})$, where $A_{\gamma^{j-1}} = ((\sigma^{j-1})^{-2}X'X + D^{-1}_{\gamma^{j-1}}R^{-1}D^{-1}_{\gamma^{j-1}})^{-1}$
Sample $\sigma^j \sim f(\sigma^j|Y, \beta^j, \gamma^{j-1}) = IG(\frac{n+v_{\gamma^{j-1}}}{2}, \frac{|Y-X\beta^j|^2+v_{\gamma^{j-1}}\lambda_{\gamma^{j-1}}}{2})$
Sample $\gamma^j_i \sim f(\gamma^j_i|Y, \beta^j, \sigma^j, \gamma^j(i)) = f(\gamma^j_i|\beta^j, \sigma^j, \gamma^j(i))$
end for