

Applied Statistics

Assignment #3 and Term paper

Due February 4th, 2020

Submit at a box located on the 5th floor (Economic Research Building) by 5pm on February 4th (Tue).

(The box opens during January 14th -February 4th).

1. Assignment #3. Consider the model and the dataset of Exercise 4 in Chapter 5 (Section 5.13). Use WinBUGS to answer the following questions.
 - (1) Estimate posterior means, standard deviations and 95% credible intervals of β_0 and β_1 .
 - (2) Plot the estimated marginal posterior densities of β_0 and β_1 .
 - (3) Show your “MCMC output analysis”.
 - Show trace plots, and sample autocorrelation functions of β_0 and β_1 .
 - Is the sampling algorithm efficient?
 - Does your Markov chain converge?
2. Empirical study using Markov chain Monte Carlo method
 - (1) Use real data (do not use simulated data). Where do you get the dataset?
 - (2) Describe your statistical model. What are model parameters?
 - (3) Specify your prior distributions and write the likelihood.
 - (4) Show your “MCMC output analysis”
 - Sample paths (trace plots) of parameters of interest
 - Explain how you determine the burn-in period
 - Does your Markov chain converge?
 - Sample autocorrelation functions of parameters of interest
 - Is your sampling algorithm efficient?
 - Summary statistics of parameters of interest
 - Posterior means, posterior standard deviations, and 95% credible intervals
 - Plot of the marginal posterior densities
 - Interpret your MCMC estimation results
 - (5) Sensitivity analysis
 - Check the prior sensitivity. What if you change your prior distributions?
 - (6) Attach your WinBUGS code to the empirical paper.