

STAT 489-01: Bayesian Methods of Data Analysis

Problem Set 10

Assigned 2017 April 27
Due 2017 May 4

Show your work on all problems! Be sure to give credit to any collaborators, or outside sources used in solving the problems. Note that if using an outside source to do a calculation, you should use it as a reference for the method, and actually carry out the calculation yourself; it's not sufficient to quote the results of a calculation contained in an outside source.

1 Multiple Regression

Using the `WaffleDivorce` data set from the `rethinking` package, find the parameters of the posterior distributions $p(\sigma^{-2}|\mathbf{y}, \mathbf{X}, I)$ and $p(\alpha, \boldsymbol{\beta}|\sigma = s, \mathbf{y}, \mathbf{X}, I)$ for the linear model

$$y_i \sim N(\mu_i, \sigma^2) \tag{1.1a}$$

$$\mu_i = \alpha + \sum_{j=1}^k \beta_j \frac{x_{ij} - \bar{x}_j}{s_{x_j}} \tag{1.1b}$$

with the following predictor variables

- (a) `WaffleHouses`
- (b) `Marriage`
- (c) `MedianAgeMarriage`
- (d) `Marriage` and `MedianAgeMarriage`
- (e) `WaffleHouses`, `Marriage`, and `MedianAgeMarriage`

2 McElreath Chapter 5, Exercises 5H1-5H2

You may use the `map` function, or construct the parameters of the posterior yourself.

3 Project Status Report (one per team)

Submit a progress report on your proposal, including any partial results, and a rough draft of your report. (You'll get feedback on this, so the more you can submit, the better.)