Advanced Bayesian Methods: Theory and Applications in R

01-BayesIntro - Exercises

Assume the following Bayesian model for $i = 1, \ldots, n$:

$$y_i \overset{iid}{\sim} \mathrm{N}(\mu, \sigma^2) \qquad \mu \sim \mathrm{N}(m, s^2) \qquad \sigma^2 \sim \mathrm{IG}(a, b)$$

The probability density function of an $\mathrm{IG}(a, b)$ distribution is

$$p(\sigma^2) = \frac{b}{\Gamma(a)} \left(\frac{1}{\sigma^2} \right)^{a+1} \exp\left(-\frac{b}{\sigma^2} \right).$$

- Identify the individual model parts: (a) observation model, (b) priors, (c) parameters, (d) hyperparameters.

- Sketch the generic approach for Gibbs sampling from the joint posterior distribution of μ and σ^2.

- Derive the full conditional for μ.

- Derive the full conditional for σ.