

HW 7 Problems

Ridge regression

Consider the following model

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + e_i$$

$$e_i \sim N(0, \sigma^2)$$

$$\begin{pmatrix} x_{i1} \\ x_{i2} \end{pmatrix} \sim N\left(0, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix}\right)$$

Simulate data $n = 100$ and consider different degrees of correlation on x_{i1} and x_{i2}

The following is a ridge type prior

$$\beta_j \sim N(0, \tau^{-1} \sigma^2)$$

$$\tau \sim Ga(a, b)$$

To do:

Apply MLE for β 's \rightarrow what happens in terms of MSE as ρ increases?

Apply Bayes ridge regression via 2 approaches:

(1) Hyper prior on "penalty" and Gibbs sampling

(2) Choose penalty by CV (10 test, 90 training, 10 splits that encompass full data set)

Compare all the approaches