

6.5 Model Comparison

Zongyi Liu

2023-06-14

6.5 Model Comparison

Here we need to compare the two model; suppose we have two models, $M1$ and $M2$, with prior beliefs $p(M1)$ and $p(M2)$. We want to determine the posterior beliefs, $p(M1|D)$ and $p(M2|D)$, recall from above, we have

$$\frac{p(M1|D)}{p(M2|D)} = \frac{p(D|M1)}{p(D|M2)} \frac{p(M1)}{p(M2)}.$$

where

$$p(D|M) = \int d\theta p(D|\theta, M) p(\theta|M).$$

For discrete values, we have

$$p(D|M) \approx \sum_{\theta} p(D|\theta, M) p(\theta|M)$$

Then we can have a comparison of models:

$$\frac{p(M1|D)}{p(M2|D)} = \frac{\sum_{\theta} p(D|\theta) p(\theta|M1) p(M1)}{\sum_{\theta} p(D|\theta) p(\theta|M2) p(M2)}.$$

This expression is useful where priors are not beta distributions.