Bayesian Analysis: Practical Sessions

Session 3: Comparison of two treatments

Goals:

- Estimate the difference between two proportions

Exercise 3.1 Burns: Estimating the difference between two proportions. We have carried out a clinical trial to assess whether patients recover faster from hypodermic burns when one uses the conventional treatment or the experimental treatment. The number of patients treated in both treatments is the same, 40. The nurses have already used both treatments, so they have some prior information. In fact, they believe that using the conventional treatment the probability to get better in five days is mainly between 0.4 and 0.8. On the other hand they believe that using the experimental treatment the probability to get better will be mainly between 0.6 and 0.9.

The results of the clinical trial are:

Treatment	**Improve**	**Not improve**	**Total**
Experimental	30	10	40
Conventional	24	16	40
Total	54	26	80

a) Choose a priori distribution for every treatment according to the statement
b) Draw the prior distribution, the posterior distribution and the likelihood function for every treatment in the same graph.
c) Draw the posterior distribution of the difference between rates of improvement.
d) Compute the probability that the probability to improve using the experimental treatment is larger than using the conventional treatment.
e) Compute and draw the posterior distribution for the Odds Ratio and give a 95% credible interval for it. Interpret the result.

Exercise 3.2 basketball. How would you carry out an analysis to compare the number of points that are scored in a NBA's match with the number of points that are scored in an ACB's match? In the data file *Basquet.txt* you will find the total number of points of 20 matches taken randomly from ACB and 20 taken from NBA. What is the probability that more points will be scored in a randomly selected match of the Spanish league than in a randomly selected match of the NBA league? What is the probability that the points scored in a NBA match will be 60 points larger than the points scored in a ACB match?