3rd November 2016

Bayesian statistics, prior distribution

1. Go through the R introduction on Normal distribution available at homepage, and then use the code to answer the following questions:

   - Compute the probability that a persons Height is greater then 190 cm, using the estimated normal distribution.

   - Compute the probability that a persons Height is greater then 190 cm given the weight is 100 kg, using the estimated normal distribution.

   - Install the package **mvtnorm**, use help on the function **pmvnorm**. Then use **pmvnorm** to compute the probability that a person is greater then 190 cm and weighs less then 100 kg.

2. In this exercise, we study the effect of the maternal condition known as placenta previa. In a German study of 980 births where the mother had placenta previa, 437 of the babies were female. This imposes a likelihood of the data

$$n_f \sim Bin(n, \theta),$$

   here n_f is number of girls born, n is total number of babies and θ the probability of a baby being a girl.

   - First go through the tutorial on binomial distribution.

   - Assuming a uniform prior plot the posterior distribution of θ.

   - Compute the posterior probability that θ is less then the population average 0.485.

   - Change the prior in such way that the posterior probability that $\theta > 0.5$ is larger then 0.5.