Bayesian Analysis: Practical Sessions

Session 6: Hierarchical models

Goals:

- Implement a hierarchical model

Exercise 6.1 Dogs: Two anesthesias for dogs. We have a random sample of 20 dogs, 10 of them sleep using anesthesia A (Cyclopropane), and the other 10 using anesthesia B (Isofluorance). For every dog we measure the level of adrenaline before the anesthesia (the base level), and later during anesthesia. Some previous studies are in support of anesthesia A for several important reasons, but these studies have not taken into account the level of adrenaline.

Suppose that the veterinarian community decides to use anesthesia A, except when the level of adrenaline during the anesthesia could be higher than 1.5 with probability above 0.05. This probability will be computed after measuring the base level.

a) If the base level for a new dog is 0.6, what anesthesia does the veterinarian have to use? What is the probability that the level during the anesthesia will be higher than 1.5 if anesthesia A is used?

Exercise 6.2 Surgical: Institutional ranking. This exercise considers mortality rates in 12 hospitals performing cardiac surgery in babies. The data are shown below:

Hospital	No of ops	No of deaths
A	47	0
B	148	18
C	119	8
D	810	46
E	211	8
F	196	13
G	148	9
H	215	31
I	207	14
J	97	8
K	256	29
L	360	24

The objective of this study is to know the probability of death around all the hospitals in the country, not only in the hospitals that are in the sample.