

Computer-Intensive Statistics

Assessment Exercises

Students should talk to their supervisors to find out whether or not their department requires some of this work as part of any formal accreditation process.

Ex 1 There is another type of bootstrap-based confidence interval not discussed in the lectures, called *ABC*. Use the references to find out about it, and write up a description of the method and a comparison of its strengths and weaknesses (compared to the methods included in the lecture notes).

Ex 2 Thursday's practical analysed only part of the Australian AIDS survival data. Extend the analysis to the complete dataset: you will need to take 'state' into account (for a classical analysis see Venables & Ripley, 2002, 379ff), and should allow for many minutes of computation.

Write up the analysis you did (and for those of you who have not written up a Bayesian analysis before, you need to think about the choice of priors).

Ex 3 Consider a probit model for LD50 for the following data

dose	animals	deaths
50	5	1
100	10	4
200	5	2
300	10	6
2000	5	4

with a suitable vague prior. Find a suitable HPD region for LD50. How does it compare to a logit model and to a classical GLM analysis such as that shown for the budworm data in Venables & Ripley?

Ex 4 (For those with computer-intensive projects.)

Think about how you could organize the algorithms that are used in your field to make use of multiple CPUs, either a shared-memory computer with 24 conventional CPUs or of a GPU-based 'personal supecomputer'. Prepare a page or two (no more) of write-up for a non-specialist audience on which approaches are most promising in such an environment (and why).

Ex 5 (For those with previous experience of BUGS or JAGS.)

WinBUGS, OpenBUGS and JAGS all support models with censoring in slightly different ways (see Appendix A).

Program exercise 2 in the BUGS dialect you use, necessarily using proper priors.

(There are examples in the BUGS examples manuals which will help you, e.g. those on ‘mice’ and ‘kidney’. This is a large dataset for BUGS and you might want to experiment with a subset at first.)