Final Project Guidelines

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As a final project I expect you to propose and develop an in-depth fully Bayesian analysis (using MCMC simulation) of some real data taken either from literature data or from other (possibly public) sources. You have to choose an appropriate statistical model to deal with your data. You might look at the various examples you can find from reference textbooks, vignette, or other software documentation. You can make use of Winbugs/JAGS as well as other R packages or alternative software.

Here is a list of steps I would like you to consider in developing and illustrating your statistical model and the real data analysis:

1. illustration of the dataset

2. explain the overall features of the statistical model such as the role of the parameters and the inferential goals of the analysis

3. illustrate the main inferential findings (Bayesian point and interval estimation, hypothesis testing)

4. discuss one possible alternative statistical model and illustrate results of model comparison through DIC and/or marginal likelihood (see also Chapter 11 in Ntzoufras (2010))

5. illustration of the features of the MCMC convergence diagnostics and error control.

The project should be submitted as a written report with enclosed figures and tables. You may want to consult the instructor or the tutor during project advances (using office hours or by email). When the project is complete and submitted you will be asked to illustrate it orally with a possible final face-to-face discussion.

In evaluating the project I will consider as an extra bonus for final evaluation:

- check the ability of a fully Bayesian analysis to recover model parameters with data simulated from the model

- use of model checking diagnostics (see Chapter 10 in Ntzoufras (2010))

- comparative analysis with frequentist inference

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