Exercises

Example: A series of small randomized clinical trials were conducted to investigate whether electronic fetal heart rate monitoring (EFM) in labor, with the aim of early detection of altered heart-rate pattern, is associated with a reduction in perinatal mortality. The outcome measure is the odds ratios for perinatal mortality, with values less than 1 favoring EFM. The data represent frequency counts of deaths and patients with one active treatment group and one active control group. Several of the clinical trials had no deaths in one of the groups, which would have caused problems in the frequentist approach.

The data are stored in **sasuser.perinatal**. These are the variables in the data set:

trial clinical trial number

rt number of deaths in the EFM group

nt number of patients in the EFM group

rc number of deaths in the control group

nc number of patients in the control group

Note: The data were obtained with permission from Spiegelhalter et al. (2004).

1. Fitting a Bayesian Model for Meta-Analysis

a. Fit a hierarchical model with hyperparameters for the **sasuser.perinatal** data set. Output the posterior samples to a data set. Define two arrays in which one is the proportion of deaths in the treatment group and one is the proportion of deaths in the control group. Use the PARMS statements to define the mean effects of the treatment and control groups, a scaling factor for the treatment and control groups, and the proportion of deaths in the treatment and control groups. Then use four PRIOR statements to define the prior distributions for the mean effects, the scaling parameter, the proportion of deaths in the treatment group and the control group. Use the BEGINNODATA and ENDNODATA statements to define the hyperparameters and the mean effect difference, the relative risk, the between-trial standard deviations, and the odds ratio. Finally, use two MODEL statements to model the number of deaths in the treatment group and the number of deaths in the control group. Fit the model several times with different values in the PROC MCMC options.

1) Were the posterior autocorrelations a problem? Did you have to thin the Markov chain?

2) In the final model, was there any evidence of an association between EFM and perinatal mortality?

3) Is there any evidence of convergence problems with the Markov chain in the final model?

b. Create a box plot comparing the means for the treatment group and the means for the control group using the output data set from PROC MCMC.

Are there any apparent differences between the mean effects in the treatment group and the mean effects in the control group?

End of Exercises