Lesson 8

Тест, 8 вопроса

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Баллы

1.
Which of the following variables qualifies as a "factor" variable?

- Weight of a patient reported in kilograms
- Pre-treatment temperature reported in degrees Celsius
- Patient age in years
- Treatment with either an experimental drug or a control placebo

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2.
In an ANOVA model for a single factor with four levels, there are multiple ways we can parameterize our model for $\mathrm{E}(y)$. These include the cell means model or a linear model with a baseline mean and adjustments for different levels. Regardless of the model chosen, what is the maximum number of parameters we use to relate this factor with $\mathrm{E}(y)$ in a linear model and still be able to uniquely identify the parameters?

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3.

For Questions 3-8, refer to the plant growth analysis from the lesson.

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Re-fit the JAGS model on plant growth from the lesson with a separate variance for each of the three groups. To do so, modify the model code to index the precision in the normal likelihood by group, just as we did with the mean. Use the same priors as the original model (except in this case it will be three independent priors for the variances).

Compare the estimates between the original lesson model and this model with the `summary` function. Notice that the posterior means for the three μ parameters are essentially unchanged. However, the posterior variability for these parameters has changed. The posterior for which group's mean was most affected by fitting separate group variances?

- Group 1: control
- Group 2: treatment 1
- Group 3: treatment 2
- The effect on the marginal posterior was the same for all three groups.

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4.

Compute the deviance information criterion (DIC) for each of the two models and save the results as objects `dic1` (for the original model) and `dic2` (for the new model). Wha is the difference: DIC1 - DIC2?

Hint: You can compute this directly with the following code: `dic1 − dic2`.

-3.946014

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5.

Based on the DIC calculations for these competing models, what should we conclude?

- The DIC is lower for the original model, indicating preference for the model with one common variance across groups.
- The DIC is higher for the original model, indicating preference for the model with one common variance across groups.
- The DIC is higher for the new model, indicating preference for the model with separate variances across groups.

The DIC is lower for the new model, indicating preference for the model with separate variances across groups.

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6.

Use the original model (single variance) to calculate a 95% interval of highest posterior density (HPD) for $\mu_3 - \mu_1$. Which of the following is closest to this interval?

- (-0.14, 1.13)
- (0.22, 1.49)
- (-0.20, 1.19)
- (-1.01, 0.25)

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7.

What is the correct interpretation of $\mu_3 - \mu_1$ in the context of the plant growth analysis?

- It is the effect (change) of treatment 2 with respect to the control in mean plant weight.
- It is the effect (change) of treatment 2 with respect to the control in plant weight.
- It is the difference in plant weight between treatment 2 and control.
- It is the mean range of plant weight across the three treatment groups.

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8.

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The linear model with a baseline mean and group effects is the default in R. However, we can also fit the cell means model in R using the following code:

```
1  mod_cm = lm(weight ~ -1 + group, data=PlantGrowth)
2  summary(mod_cm)
```

where the -1 in the model formula tells R to drop the intercept. Because we used fairly noninformative priors for the μ parameters in the analysis with JAGS, the results are very similar.

In addition to allowing different prior specifications, what is one advantage of posterior sampling with JAGS over fitting the reference model in R?

- We can obtain posterior mode estimates for each mean (or coefficient).
- We can use the posterior samples to obtain simulated posterior distributions of any function of the parameters that may interest us (e.g., $\mu_3 - \mu_1$).
- We can estimate the proportion of the variation in plant weight attributable to the treatment group assignment.
- We can obtain posterior standard deviations (standard errors) for each mean (or coefficient).

Оплатить курс

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