STA610 Lab08

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- Write down your answers in any blank sheet and submit your work in paper during the lab.
- Your work will not be graded. As long as you submit, you will get a full credit.
- For those who missed the lab today, you can submit it via email to me for half credit.

Conditional Expectation and Variances in Nested Models

Consider the following nested model:

$$y_{i,j,k,\ell} = \mu + a_i + b_{i,j} + c_{i,k} + d_{i,j,k} + \epsilon_{i,j,k,\ell},$$

where

$$a_i \overset{iid}{\sim} N(0, \tau_a^2),$$
$$b_{i,j} \overset{iid}{\sim} N(0, \tau_b^2),$$
$$c_{i,k} \overset{iid}{\sim} N(0, \tau_c^2),$$
$$d_{i,j,k} \overset{iid}{\sim} N(0, \tau_d^2),$$
$$\epsilon_{i,j,k,\ell} \overset{iid}{\sim} N(0, \sigma^2).$$

1. Describe/Design an application setting for this model.
2. Find the expectation $E[y_{i,j,k,\ell}]$ and discuss the cases for $Cov(y_{i,j,k,\ell}, y_{i',j',k',\ell'})$
3. Find the conditional expectations $E[y_{i,j,k,\ell}|a]$, $E[y_{i,j,k,\ell}|a,b]$ and conditional covariances $Cov(y_{i,j,k,\ell}, y_{i',j',k',\ell'}|a)$, $Cov(y_{i,j,k,\ell}, y_{i',j',k',\ell'}|a,b)$, $Cov(y_{i,j,k,\ell}, y_{i',j',k',\ell'}|a,b,c)$.

Comments from Office Hours

After fitting linear models in R, some coefficients are missing from the model summary. What is the typical reason of this?