P8110: Applied Regression II

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Homework #9 [14 points]

Due on Apr 15, 11:59**AM**

**NOTE: Cut and paste relevant SAS/R output to appropriate places in the texts of your solutions. Attach the SAS/R codes to the end of your homework.**

We continue to use the “hwdata4.csv” dataset for tree growth.

1. Draw the spaghetti plots of the size of the tree on the growing time with separate panels for the two growing environments. [2 points]

A screenshot of a graph

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1. Write a random intercept model with the covariates including time, environment, and their interaction. [2 points]
2. Was the trajectory of growth in the tree size over time different between the two environments? Perform a statistical test. Show the hypotheses, test statistic, p-value, and conclusion. [3 points]

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Hypotheses:

Test Statistic: Wald Test

1. Calculate the within-subject correlation coefficient. What’s your observation? [2 points]

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We see that is close to 1, indicating there is there is a strong clustering effect, with observations within the same tree being highly similar and a significant amount of the variability in tree size is attributed to differences between individual trees.

1. Write a random intercept and slope model with the covariates including time, environment, and their interaction, and random slope for time. [2 points]
2. Do we need the random intercept and slope model in addition to the random intercept model? Perform a statistical test. Show the hypotheses, test statistic, p-value, and conclusion. [3 points]

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Hypotheses:

Test Statistic: Likelihood Ratio Test

P-value:

Conclusion:

We reject H0 at the 5% level of significance. There is sufficient evidence to conclude the random intercept and slope model is better than the random intercept model.