

Statistics

Week 12 Recitation

ESD, SUTD

Term 5, 2017

Question 1 - Single Factor Experiment

Refer to the spreadsheet 'Caffaine', which records some test subjects' performance levels after consuming different dose of caffeine.

- Construct an ANOVA table, and calculate F . Use F to test if there are significant group differences.
- Construct a residual plot to test the normality assumption.
- Use the Bonferroni method to test which groups, if there is any, are significantly different.

Question 2 - Two-Factor Experiment

Refer to the spreadsheet 'PaperAirplane', which records the flying distances of some paper airplanes with different configurations (see recitation 1).

We want to detect how do the two design factors, the nose length and the wing angle, influence the airplane performance. (The third factor considered in recitation 1 is treated as noise.)

- Construct an ANOVA table for this two-factor experiment.
- What conclusions can you draw from the results?

Question 1&2 ANOVA with R

R functions

```
aovResult <- aov(formula, data) # run ANOVA
plot(aovResult) # residual diagnostics

pairwise.t.test(x, group, p.adj = "bonferroni")
# pairwise testing with Bonferroni adjustment
```

- Create boxplots to visualize data
- Include interaction term for the two-factor experiment
- Note: the outputs of the Bonferroni pairwise t-tests are the adjusted p-values

Question 3 - CI for the Median

Refer to the spreadsheet 'CI', which records 30 data points.

- Construct an approximate 95% CI for the median, using the sign test method
- Assuming normality, construct a 95% CI for the mean (median)
- How do the two CIs compare to each other?