Data603 Statistical Modelling with R Assignment 4

Completely Randomized Design

Deadline: Dec 6th, 2019, by 4pm. Submit to Dropbox via D2L.

Problem 1. Numerous factors contribute to the smooth running of an electric motor ("Increasing Market Share Through Improved Product and Process Design: An Experimental Approach," Quality Engineering, 1991: 361-369). In particular, it is desirable to keep motor noise and vibration to a minimum. To study the effect that the brand of bearing has on motor vibration, five different motor bearing brands were examined by installing each type of bearing on different random samples of six motors. The amount of motor vibration (measured in microns) was recorded when each of the 30 motors was running. The data for this study is given in the data file **vibration.csv**

a. What are the response variable and an experimental unit?

b. What is the treatment and how many treatment levels of this experiment?

c. Write the hypotheses testing, test and conclude if the average amount of motor vibrations are different at significance level =0.05.

d. Construct the Anova table for the test.

e. Construct the boxplots for all levels. Do you detect any influencial outliers?

f. Test all possible pariwise t tests (both Unadjusted and adjusted P-value), Tukey HSD , Newman-Keuls , and Scheffe Test. Compare all outputs and report your results.

g. Check all basic assumptions for CRD and report your result. If some assumptions are not met, what would you proceed?

Problem 2. Members of the golf league at Eastern Electric are looking for a new golf course; the course they've used for years has been sold to developers of a retirement community. A search team has gathered the data in **golfleague.csv** on four local courses; for each course, they have the most recent scores for players like those in the Eastern Electric golf league.

a. Perform an ANOVA to determine whether there is a significant difference in average score among the four local golf courses.

b. Check all basic assumptions for CRD and report your result. If some assumptions are not met, perform an alternative test and a posthoc analysis to determine whether there is a significant difference in average score among the four local golf courses.