Noah Tigner

GEOG 495

Exercise 6

Reference Distributions & Significance Testing

1. Both $\delta^{18}O$ and Insolation appear to have cycles of peaks and troughs throughout the years. Both appear to vary systematically with each other, rising and falling around roughly the same dates. Overall, however, the center of these cycles appears to increase for $\delta^{18}O$ over time, while staying relatively constant for insolation.
2. The distribution of $\delta^{18}O$ looks almost but not exactly normal. There is an irregularity around where $\delta^{18}O = 1.0$, which is almost as frequent as $\delta^{18}O = 0$ in the center of the distribution.
3. The present-day value of $\delta^{18}O$ falls outside the .95 confidence interval for the mean of $\delta^{18}O$. The value for $\delta^{18}O$ 1000 years ago also falls outside this confidence interval. The first value that falls inside this confidence interval and is therefore not significantly different from the long-term mean is from somewhere between 12 and 13 KA, or 11,000 and 12,000 years ago.
4. The normal probability plot for $\delta^{18}O$ has a pattern close to an "s curve" than a straight line, indicating that $\delta^{18}O$ values are not normally distributed. The same is true for the distribution of Insolation, but to a lesser extent. Insolation appears to be close to a normal distribution.
5. The value of the t-statistic for comparison of the simulated present and future January mean temperatures over Oregon is 9.4261. This t-value is large, and the p-value is small (< 2.2e-16), meaning that there is a significant difference in means.

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6. The two-tailed test has a small t-value and a large p-value, so we cannot reject the null hypothesis that PJan1x and PJan2x are equal. The one-tailed test has a small t-value and a small p-value, so we cannot accept the alternative hypothesis. We can therefore conclude that future winter precipitation is not significantly greater than present.
7. The value of the F-statistic for this data is 3.008, and the p-value is 0.0581. We therefore cannot reject the null hypothesis that there are not significant differences between the means. The homogeneity of variance test produces a X^2 statistic of 2.1286 with a p-value of 0.345. This large p-value means that we cannot reject the null hypothesis that there is not a significant difference among variances among countries in preference of joining the EU.
8. An analysis of variance of variable WidthWS grouped by Reach produces an F-statistic of 47.88 with a very small p-value, allowing us to accept the alternative hypothesis that there is a significant difference among means between Reaches. The test of homogeneity of variances produced a small X^2 statistic and a large p-value, so we cannot not reject the null hypothesis that there is not a significant difference among variances. Therefore the means of water-surface widths differ significantly among reaches, but not the variances.

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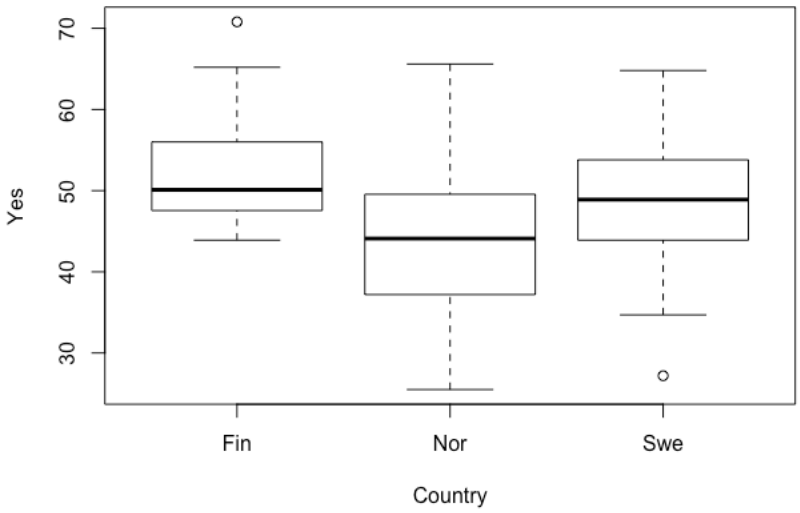

Fig. 1 boxplot(Yes ~ Country)