Bioinformatics 525: Module 2

Introduction to Statistics

Lab #4

Read TROPHY.csv data in RStudio using "Import Dataset" on the Workspace Window.
IMPORTATNT: type attach(TROPHY) to have the variables accessible for analysis.

1. Test whether BMI is related to LDL: H_0: $\rho = 0$ vs. H_A: $\rho \neq 0$.

   a. Use a scatterplot to visually display the relationship between BMI and LDL.

   b. Add a line (best linear fit) and a lowess fit (non-parametric fit) to the scatterplot to help identify any linear or non-linear pattern between BMI and LDL.

   c. Calculate the Pearson and Spearman correlations and the corresponding 95%CI between BMI and LDL. Are these correlations different from zero? H_0: $\rho = 0$ vs. H_A: $\rho \neq 0$.

   d. Use simple linear regression to predict LDL based on BMI.

   e. Test whether the relationship between LDL and BMI is quadratic.

   f. Save the residuals in d) and check if they are normally distributed.

2. Test whether the association between BMI and LDL is different between males and females.

   a. Use separate scatterplots to visually display the relationship between BMI and LDL for males and females.

   b. Use one overlapping scatterplot to visually display the relationship between BMI and LDL for males and females.

   c. Use simple linear regression to predict LDL based on BMI for males and females separately.

   d. Save the residuals in c) and check if they are normally distributed for males and females.

   e. Test if the relationship between BMI and LDL is different between males and females. Use multiple regression with interaction term to test this.

   f. Repeat e), but adjusted for age and Cholesterol (include Age and Cholesterol in the model).

   g. Saving and using variables from the regression output. E.g. In f) save the fitted values (or predicted values) of LDL, as fittedLDL, and show that the square of the correlation between the actual LDL with fittedLDL equal to the R-Square derived in f.

Please complete the **muddy point assessment** of this lab available at:
http://tinyurl.com/w16bioinf525-lab2-4