Portfolio 1
PA 606: Seminar in Quantitative Techniques (Spring 2020)

25 points

Due: February 22, 2020

Topics:

Central Tendency, Dispersion/Variability, Normal Curve, Assessing Normality (Assumptions), Graphing, Confidence Levels, Confidence Intervals

Data Sources:

`survey` (data set from the `MASS` package)

Overview:

Answer each of the questions below, **in full sentences**, and show your plots (if necessary) inline (interspersed within the text). For full credit, you must append (copy and paste) your R Script at the end of this portfolio as the final page(s).

Problems

Assessing Normality

- Report (show the output and describe the output) mean, median, and standard deviation for the hand length (`Wr.Hnd`) variable. Based on the output, describe the symmetry/skewness of the variable (e.g. is the variable somewhat symmetrical or is it skewed? If it is skewed, describe the type of skewness. For the hand length (`Wr.Hnd`) variable, describe its kurtosis.
- Plot (and show) a histogram for the hand length (`Wr.Hnd`) variable, overlaying a curve for the distribution. Based on the plot, describe whether or not the variable seems normally distributed.
- Plot (and show) a box-and-whiskers plot for the hand length (`Wr.Hnd`) variable. Based on the plot, describe whether or not the variable seems normally distributed.
- Plot (and show) a Quantile-Quantlie (Q-Q) plot for the hand length (`Wr.Hnd`) variable. Based on the plot, describe whether or not the variable seems normally distributed.

Confidence Levels & Confidence Intervals

- What is the Z-score associated with the 95% confidence level? What is the Z-score associated with the 99% confidence level?

- Assuming we're working with a sample, and not a population, what is the formula for calculating the confidence interval for any confidence level (e.g. is it $\mu \pm \sigma$?)?
- Using our knowledge of Z-scores, and the formula above which assumes we're working with a sample, how would you calculate the confidence interval for the 95% confidence level (e.g. what is the specific equation)?
- Using a 95% confidence level, calculate the confidence interval for the hand length (`Wr.Hnd`) variable.
- Using words, explain the 95% confidence interval for the hand length (`Wr.Hnd`) variable (e.g. how confident are you that the true population mean (μ) falls in that range?).

Z-Scores with Estimates (not CI/CL)

- Calculate the Z-score for a person with a hand length (`Wr.Hnd`) of 20.2 cm.
- Using words, describe the placement of this person's hand length, relative to others'.

Extra Credit: Working with Data

- Assume you have the following data on the number of social networking apps a person has on their smartphone, from 10 people: [0, 1, 5, 2, 12, 8, 6, 3, 7, 4]
- Using assignment operators in combination with 1) reading in a CSV of the data (`read.csv()`), or 2) concatenating a list of the data (`c()`) and creating a data frame (`data.frame()`), calculate the mean ($\bar{X}$), the standard deviation (SD), the standard error ($\sigma_{\bar{X}}$), and the 95% confidence interval for the mean of the data.
- Interpret the 95% confidence interval.