

# Cheat Sheet for Statistical Analysis in Python

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This is a summary of the libraries and functions we used in the course.

- 1. Descriptive Statistics
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### **Descriptive Statistics**

Here is a quick review of some popular functions:

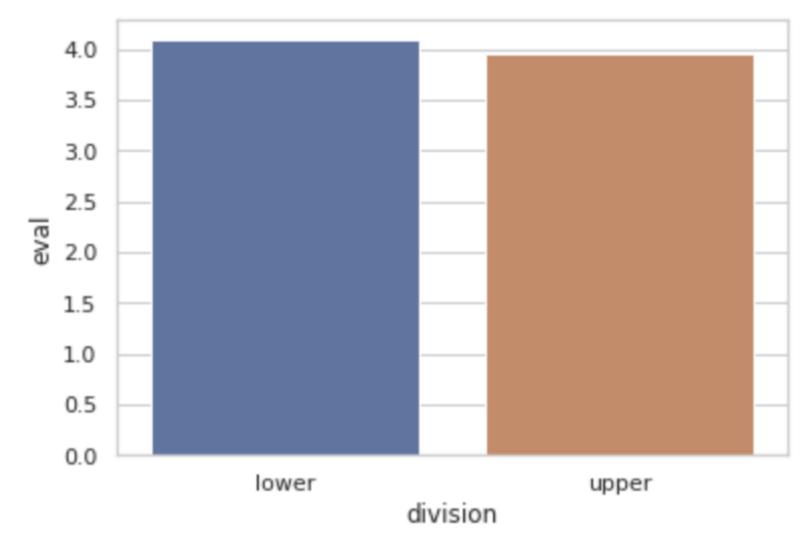
- To find the average of the data, we use the mean() function
- To find the median of the data, we use the median() function
- To find the mode of the data, we use the mode() function
- To find the variance of the data, we use the variance() function
- To find the standard deviation of the data, we use the stdev() function
- To get the unique values in a dataset, we use the unique(). unique() prints out the values and nunique() prints out the number of unique values.

#### **Data Visualization**

One of the most popular visualization tools is the seaborn library. It is a Python Data visualization library that is based on matplotlib. You can learn more <a href="here">here</a>. To get access to functions in the seaborn library or any library, you must first import the library. To import the seaborn library: import seaborn.

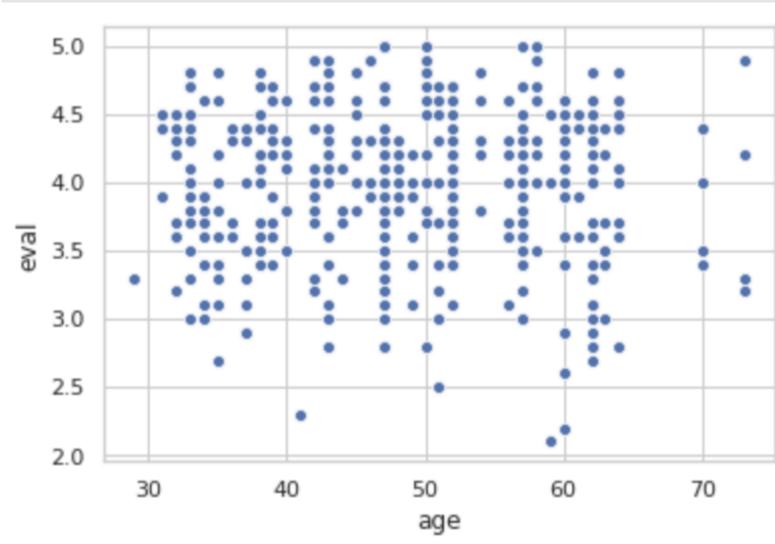
Here is a quick summary for creating graphs and plots:

• Barplots: A barplot shows the relationship between a numeric and a categorical variable by plotting the categorical variables as bars in correspondence to the numerical variable. In the seaborn library, barplots are created by using the barplot() function. The following code ax = seaborn.barplot(x="division", y="eval", data=division\_eval) will return a barplot that shows the average evaluation scores for the lower-division and upper-division.

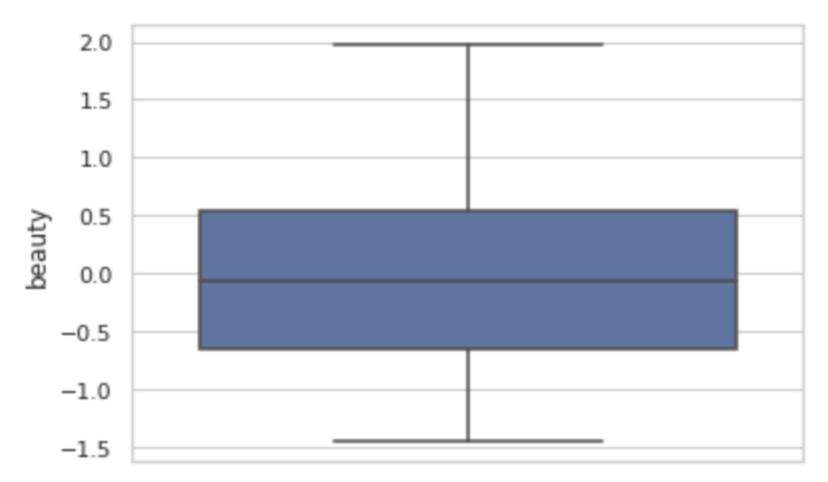


• Scatterplots: This is a two-dimensional plot that displays the relationship between two continuous data. Scatter plots are created by using the scatterplot() function in the seaborn library.

The following code:  $ax = seaborn.scatterplot(x='age', y='eval', hue='gender', data=ratings_df)$  will return a plot that shows the relationship between age and evaluation scores:



• Boxplots: A boxplot is a way of displaying the distribution of the data. It returns the minimum, first quartile, median, third quartile, and maximum values of the data. We use the boxplot() function in the seaborn library. This code ax = seaborn.boxplot(y='beauty', data=ratings\_df) will return a boxplot with the data distribution for beauty. We can make the boxplots horizontal by specifying x='beauty' in the argument.



Other useful functions include catplot() to represent the relationship between a numerical value and one or more categorical variables, distplot(), and histplot for plotting histograms.

# **Hypothesis Testing**

- Use the norm.cdf() function in the scipy.stats library to find the standardized (z-score) value. In cases where we are looking for the area to the right of the curve, we will remove the results above from 1. Remember to import scipy.stats
- Levene's test for equal variance: Levene's test is a test used to check for equality of variance among groups. We use the scipy.stats.levene() from the scipy.stats library.
- T-test for two independent samples: This test compares the means of two independent groups to determine whether there is a significant difference in means for both groups. We use the scipy.stats.ttest\_ind() from the scipy.stats library.
- One-way ANOVA: It compares the mean between two or more independent groups to determine whether there is a statistical significance between them. We use the scipy.stats.f\_oneway() from the scipy.stats library or you can use the anova\_lm() from the statsmodels library.
- Chi-square ( $\chi$ 2) test for association: Chi-square test for association tests the association between two categorical variables. To do this we must first create a crosstab of the counts in each group. We do this by using the crosstab() function in the pandas library. Then the scipy.stats.chi2\_contingency() on the contingency table it returns the  $\chi$ 2 value, p-value, degree of freedom and expected values.
- Pearson Correlation: Tests the correlation between two continuous variables. we use the scipy.stats.pearsonr() to get the correlation
  coefficient
- To run the tests using Regression analysis, you will need the OLS() from the statsmodels library. When running these tests using regression analysis, you have fit() the model, make predictions using predict() and print out the model summary using model.summary()

# Author(s)

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## Changelog

Date	Version	Changed by	Change Description
2020-10-26	1.0	Aije	Created the initial version of Statistics with python cheat sheet