**Description:**

Student chooses 1 of the 2 (Pyber or Pymaceuticals Inc) programming challenges that utilizes Matplotlib. Both solutions should run without error, producing plots of the selected problems. The source code should also be deployed to Github or Gitlab, use Jupyter Notebook and Pandas.

|  |
| --- |
| **Grading Rubric for Pyber:**  If program runs and *all* challenges were executed *correctly*:  **A+:**   * A work, plus consideration of aesthetics, use of documentation, and clarity   **A:**   * Use Matplotlib and Seaborn * Bubble Plot * Pie Plot (3) * Labels (Axis, Legend) * Use Pandas * Use Jupyter Notebook * Include an exported markdown version of your Notebook called README.md * In GitHub   **B:** Program runs but *some (not all)* challenges were executed *correctly*.  **C:** Program does not run.  **D or F:** No idea, can't test  **I:** Empty Repository |

*Assignment:*

Your objective is to build a [Bubble Plot](https://en.wikipedia.org/wiki/Bubble_chart) that showcases the relationship between four key variables:

* Average Fare ($) Per City
* Total Number of Rides Per City
* Total Number of Drivers Per City
* City Type (Urban, Suburban, Rural)

In addition, you will be expected to produce the following three pie charts:

* % of Total Fares by City Type
* % of Total Rides by City Type
* % of Total Drivers by City Type

As final considerations:

* You must use the Pandas Library and the Jupyter Notebook.
* You must use the Matplotlib and Seaborn libraries.
* You must include a written description of three observable trends based on the data.
* You must use proper labeling of your plots, including aspects like: Plot Titles, Axes Labels, Legend Labels, Wedge Percentages, and Wedge Labels.
* Remember when making your plots to consider aesthetics!
  + You must stick to the Pyber color scheme (Gold, Light Sky Blue, and Light Coral) in producing your plot and pie charts.
  + When making your Bubble Plot, experiment with effects like alpha, edgecolor, and linewidths.
  + When making your Pie Chart, experiment with effects like shadow, startangle, and explosion.
* You must include an exported markdown version of your Notebook called README.md in your GitHub repository.
* See [Example Solution](https://github.com/coding-boot-camp/DataViz-Lesson-Plans/blob/master/02-Homework/05-Matplotlib/Instructions/Pyber/Pyber_Example.pdf) for a reference on expected format.

|  |
| --- |
| **Grading Rubric for Pymaceuticals Inc:**  If program runs and *all* challenges were executed *correctly*:  **A+:**   * A work, plus consideration of aesthetics, use of documentation, and clarity   **A:**   * Use Matplotlib and Seaborn * Scatter Plot (3) including error bars * Bar Plot * Labels (Axis, Legend) * Use Pandas * Use Jupyter Notebook * Include an exported markdown version of your Notebook called README.md * In GitHub   **B:** Program runs but *some (not all)* challenges were executed *correctly*.  **C:** Program does not run.  **D or F:** No idea, can't test  **I:** Empty Repository |

Assignment:

To do this you are tasked with:

* Creating a scatter plot that shows how the tumor volume changes over time for each treatment.
* Creating a scatter plot that shows how the number of [metastatic](https://en.wikipedia.org/wiki/Metastasis) (cancer spreading) sites changes over time for each treatment.
* Creating a scatter plot that shows the number of mice still alive through the course of treatment (Survival Rate)
* Creating a bar graph that compares the total % tumor volume change for each drug across the full 45 days.

As final considerations:

* You must use the Pandas Library and the Jupyter Notebook.
* You must use the Matplotlib and Seaborn libraries.
* You must include a written description of three observable trends based on the data.
* You must use proper labeling of your plots, including aspects like: Plot Titles, Axes Labels, Legend Labels, X and Y Axis Limits, etc.
* Your scatter plots must include [error bars](https://en.wikipedia.org/wiki/Error_bar). This will allow the company to account for variability between mice. You may want to look into [pandas.DataFrame.sem](http://pandas.pydata.org/pandas-docs/stable/generated/pandas.DataFrame.sem.html) for ideas on how to calculate this.
* Remember when making your plots to consider aesthetics!
  + Your legends should not be overlaid on top of any data.
  + Your bar graph should indicate tumor growth as red and tumor reduction as green. It should also include a label with the percentage change for each bar. You may want to consult this [tutorial](http://composition.al/blog/2015/11/29/a-better-way-to-add-labels-to-bar-charts-with-matplotlib/) for relevant code snippets.
* You must include an exported markdown version of your Notebook called README.md in your GitHub repository.
* See [Example Solution](https://github.com/coding-boot-camp/DataViz-Lesson-Plans/blob/master/02-Homework/05-Matplotlib/Instructions/Pymaceuticals/Pymaceuticals_Example.pdf) for a reference on expected format. (Note: For this example, you are not required to match the tables or data frames included. Your only goal is to build the scatter plots and bar graphs. Consider the tables to be potential clues, but feel free to approach this problem, however, you like.)