CPSC 446/546
Assignment 4
Due 11/8/2021, 11:59 pm

Upload to Canvas as a zip file named *yourfirstname_yourlastname*_4.zip.

This assignment requires you to develop visualizations using D3. Do your own coding using code provided with the assignment and examples given in the Scott Murray textbook. **Do not use any code from the internet that you may find that creates visualizations similar to those required in problems.** If we find that code you use for a solution is taken from an internet source, you will receive a zero for the entire assignment.

Be sure to reference d3.js in the same directory, i.e. use this in your html:

```
<script type="text/javascript" src="d3.js"></script>
```

As in previous assignments you may use
https://developer.mozilla.org/enUS/docs/Web/JavaScript/Reference or https://javascript.info/
to do tutorials and look up syntax.

Note that some parts of the questions are for all students and some are additional work for **CPSC 546** only.

1. Radial Paths (25 pts)

(CPSC 446 and CPSC 546) Chapter 11 illustrates how a "path" in D3 can be used to generate a rectilinear line plot for time series data. Paths can also plot the same data in a radial layout by interpreting the data as an angle and the average as a radius. By using the relationships $x=r\cos\theta$, and $y=r\sin\theta$, x,y coordinates can be computed for the radial plot.

You can find the data file *mauna_loa_co2_monthly_averages.csv* in the Chapter 11 folder in the updated code for the Murray textbook available on Canvas. If we consider the Mauna Loa data as one cycle we get one radial plot, and if we consider each year as a cycle we get a different plot.

a.) Write code *MLsingle.html* to produce the plot with a single cycle with annotations showing the years, the center of the plot, and the radial scale used for averages.

b.) Write code *MLyear.html* to produce the plot with a cycle for each year with similar annotations.

c.) Using the data in womens_enrollment.csv write code *womens_table.html* to generate a curve with annotations similar to the spiral layout used on the Women's Table illustrating the number of women enrolled at Yale from 1871 to 1992.

2. Plotting Flow (25 pts)

(CPSC 446 and CPSC 546) Using an svg "polygon" we can define arrow shapes. By placing arrows, rotating them and scaling them according to vector values we can visualize flows. Write code *flow.html* that shows the vector **direction** and **magnitude** at points sampled every 0.5 units in x and y on a grid that runs from -5. to 5. in both the x and y directions. The vector at each point in the field is given by:
(-y, xy). That is, at x=0, y=0 the vector is (0, 0), and at x=5, y=5 the vector is (-5,25).

(CPSC 546 ONLY) Create the same plot as above, but use jittering. Instead of placing the vector on a regular grid, jitter the location by a small random distance in the x and y directions.

3. Selections and Filtering (25 pts):

(CPSC 446 and CPSC 546) Using D3 create a visualization *auto.html* of the data in the file auto-mpg.csv Create a scatter plot where horizontal position is horsepower, the vertical position is mpg, size is weight. Create a slider that selects an acceleration range, and highlights the data points within that range in red with the rest of the points in black.

In your visualization include a list of the names of the cars in a column on the right. The car names in the selected acceleration range should be shown in red, with the rest of the names in black.

4. Force Layouts (25 pts):

(CPSC 446 and CPSC 546) Create a JSON file from the data file SupremeCourt_net .txt
This file lists cases, judges and how judges voted on each case. Make a force layout *court.html* with judges and cases as nodes (color code nodes by whether they are judges or cases) and create a link between a judge and a case for the instances where they voted yes. In your visualization the name of the judge or case should appear when the user clicks on a node.

(CPSC 546 ONLY) Find another network data set and create a force layout