



Data Modeling for Systems Development

CSCE 411/811

Programming Assignment 4

Fall 2021

Build Web-based Interactive Visualization Data Models using D3

Basic Info

The programming code will be graded on **both implementation and correctness.**

Assignment Goals

This assignment is intended to build the following skills:

- Building web-based interactive visualization data models using D3

Score Distribution

Part A: 411& 811: 40 pts

Part B: 411& 811: 15 pts

Part C: 411& 811: 25 pts

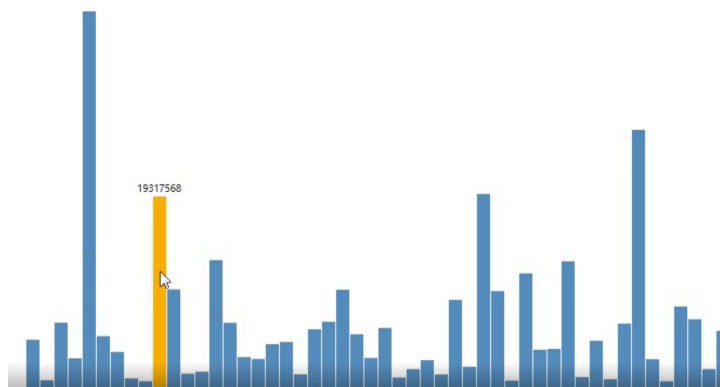
Total: 411 & 811 (80 pts)

Part A (411: 10 & 811: 40 pts)

Dataset: Use the following file containing GDP and population numbers of the U.S. states: *state_population_gdp.tsv*

1. Using HTML elements, display the population of the states as vertical bars. Then, using vanilla JavaScript, display the population number on the top of a bar. [10 pts]
2. Using D3, Display the bar chart of the population numbers of the states. You need to display the bars vertically. [10 pts]
3. Since the population number is rather long, the image would be busy if we display all of them. Thus, you need to implement tooltips in this case: only display the population number on the top of a bar if a user moves the mouse over the bar. The number disappears if the mouse is moved out of the bar. [10 pts]
4. In the implementation of the tooltips, you may have already tried to “get” the attributes or styles of the bar. Now try to “set” some attributes or styles of the bar. Please change the color of the bar to orange when the mouse is over the bar. Reset to the original color when mouse is moved out. [10 pts]

The visualization would look like this:



Part B (411 & 811: 15 pts)

5. Use the same visualization to display the GDP numbers. [5 pts]

6. Modify your program to enable user to sort the bars in the ascending order. For example, after the bar chart is displayed a user could sort those by clicking the mouse pointer on a bar.

[10 pts]

Part C (411 & 811: 25 pts)

More insights of the data may be obtained if we can display the population and GDP together. In this step, implement a **scatter plot** of the data: the horizontal axis represents the population, the vertical axis represents the GDP, and each state is represented as a dot in this space.

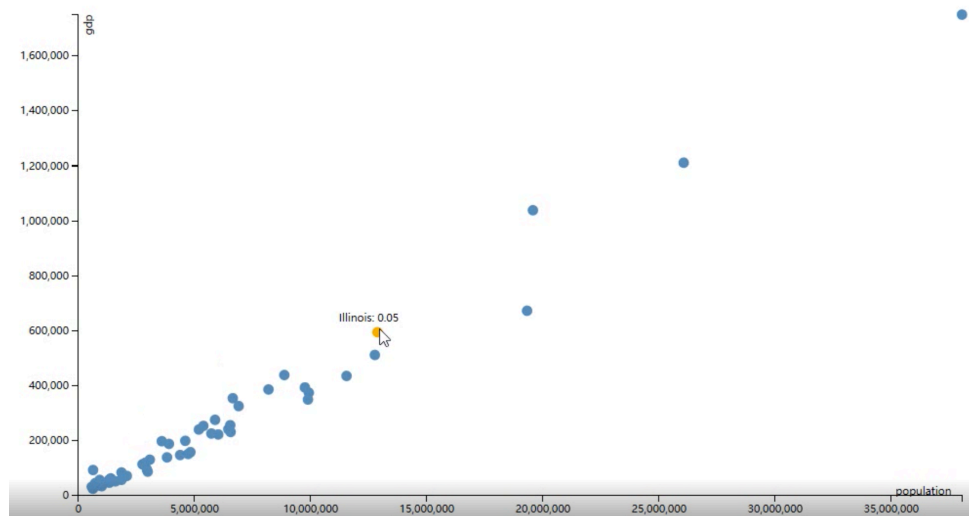
7. Use a circle to represent each state. A circle can be created in a way similar to a rectangle, where you can specify the center of the circle through the attributes “cx” and “cy”, and the radius through the attribute “r”. You may find some examples here (<https://www.dashingd3js.com/>).
8. When you move the mouse over a circle, instead of the original numbers, you can show some **derived number**. In this step, please show the state name and the per-capita GDP. Also change the circle color during the mouse over event.
9. Displaying the axes can make the visualization more meaningful. Please add the two axes. You may refer to this tutorial (<http://bost.ocks.org/mike/bar/3/>).

[10 pts]

[10 pts]

[5 pts]

The visualization would look like this:



Some useful articles and examples:

- <https://github.com/d3/d3/blob/master/API.md#requests-d3-request>
- <https://observablehq.com/@d3/lets-make-a-bar-chart>
- <http://mbostock.github.io/d3/talk/20111116/iris-splom.html>
- <https://bost.ocks.org/mike/join/>
- <https://bost.ocks.org/mike/selection/>

Submission Guideline:

- Create following directories corresponding to Part A, B, and C: *partA*, *partB*, and *partC*.
- Put the data, html, JavaScript, and CSS files of each step in its directory so that we can open the webpage to see the result.
- A brief report should include screen capture of your web browser showing the image of the result of each step.

Compress everything into a file (such as zip, tar.gz, etc.) and turn in the compressed file via Webhandin.