

Final Writeup

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Description

Our final interactive visualization application is a map of the Washington state with population of each county depicted using different colors on a scale. The size of the population of many cities were also shown using the size of circles at the correct location of those cities. There is a slider that goes from 1990 to 2014 to show the change in population over the years.

Changes between storyboard and final implementation

The first change between the storyboard and the final implementation is the inclusion of the population of several cities in the map, which is done by having circles where the radius is determined by the population of the city. We did this so that we can have cities in Washington displayed on the map, and also make use of some of the city population data we had.

Another change we made is to the colors we used in the visualization to represent the population in each county. Originally, we had thought of using a gradient of colors from white to black, with darker shades representing higher population in approximately 5 bins. However, after we implemented the visualization, we found that the change in the counties over the years was difficult to see. As shown in Figure 1, we tried full-spectral color progression, but we were worried about issues with people who are color blind, so we tried different setups to see which would be better.

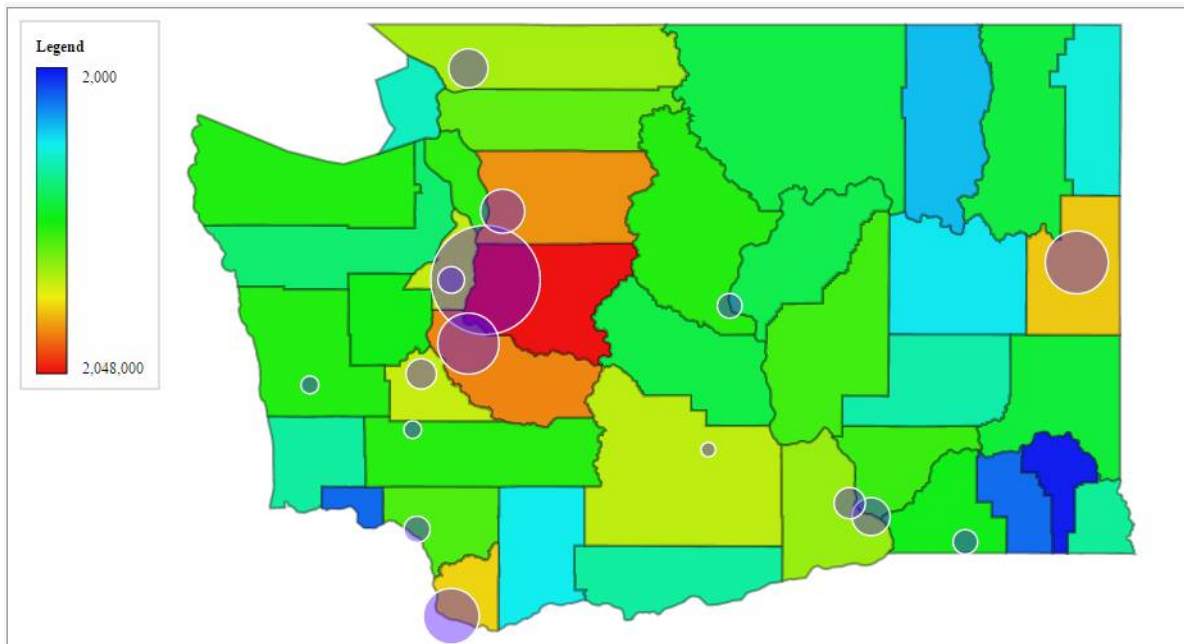


Figure 1: Original design with full-spectral color progression

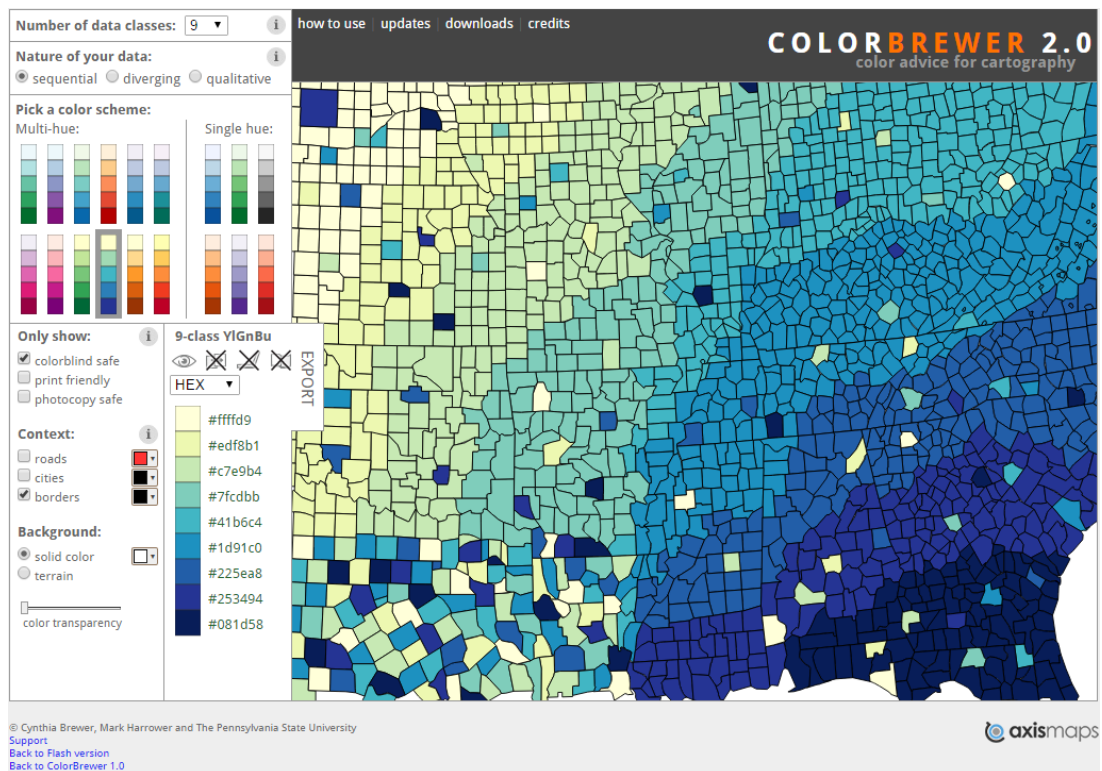


Figure 2: Choosing the correct color palette

The development process

In order to develop our visualization, we first looked the various examples online of using D3 to create choropleth maps. We stumbled upon a great library created by Minnesota Post called Simple Map D3 [\[1\]](#), which allowed us to create a simple choropleth map of Washington state. There wasn't a huge change in population based on bins we created so we decided to make a gradient log scale to depict the change in population better. This meant we had to start modifying the Simple Map D3 library that we found.

We used the documentation on Quantitative Scales [\[2\]](#) to learn about how to get the interpolation of two colors. We also used documentation about transitions [\[3\]](#) when we realized that the colors interpolated between our selected ones were not ideal. After getting the actual map to show the gradient scale it also took some time to create the legend to show the colors representing what population. It took some time to decide which colors we wanted to use. We decided against it when we realized that color blind people would not be able to tell the difference from really small populations and really large populations. We ended up using ColorBrewer [\[4\]](#) to get a good color palette as shown in Figure 2.

From here we decided that colors weren't enough to show the change in population so we wanted to add city marks and labels to the map. We followed the "Let's Make a Map" [\[5\]](#) example by Mike Bostock on making maps and adding marks for populated locations. Mike also had a great example for making choropleth maps [\[6\]](#) and county maps [\[7\]](#) which were helpful.

Once we had the populated areas marked and labeled, we saw that cities that were close together would have their labels overlap, which was undesirable. Therefore, we decided that we would like to only have the name for the city show up when the viewer hovers over a city, so we looked into how to create tooltips. We found a great guide [\[8\]](#) on how to create tooltips, and also took the opportunity to have the marks for the cities have varying radius based on population count.

Our last step was to add all other cities in Washington that weren't in the original dataset we found. Using basic linear interpolation we found the scale that mapped latitude and longitude coordinates to the actual coordinates that we had in our dataset. From there we had to find a source that returned us back the latitude and longitude coordinates of each city. We ended up using Google Maps API [\[9\]](#) to get these coordinate. We wrote a python script that looped through all the cities we had populations for and pulled coordinates of them from the google api and converted them to the correct coordinates of our visualization. These cities were then added to our map so that the visualization was more complete. This step probably took the most time just because we had to do a lot of googling to find a way of getting the location of the city.

One last modification we had was that some cities belonged in two or three counties. Our data returned them back as two cities where the name of the city had "(part)" at the end of it. We wrote a small script that added up populations of these cities together and concatenated the counties together.

During the initial stages of the project, we worked together to figure out how we would write code for the visualization and did research on the various examples available. After that, we were able to split some of the work by functionality.

Adrian was the one that got the storyboard put together after we agreed on what we wanted verbally. Adrian also worked on getting the city mark and labels on the map, then modified it to display tooltips with city name instead. He had to combine and filter data so that the correct cities for Washington state could be displayed with the correct labels and in the right location. He also added the slider for the web page which allows the map the change to show the difference in population over different years.

Lindsey modified Simple Map D3 so that the color of the counties were based on an interpolation of a log scale and worked on the legend so that it would have the correct color mapping. She also added code so that the tooltips appeared next to the pointer, which provides a better user experience. She modified the marks on the city to become a circle with varying radius based on the population of the city.

Since our original data set for the location of cities did not have all the cities in Washington, Lindsey wrote two Python script that parsed the other cities and combined cities that belonged in two counties into one.

We estimate that we spent at least 60 man hours on this project. Since we were both new to this language, trying to express what we wanted to do in code was the most difficult part of the project. Also, we were using some libraries available online to create choropleth maps, however, since it did not have all the functionality we wanted, we had to go through the code and modify it ourselves.

References

1. <http://code.minnpost.com/simple-map-d3/>
2. <https://github.com/mbostock/d3/wiki/Quantitative-Scales>
3. <https://github.com/mbostock/d3/wiki/Transitions>
4. <http://colorbrewer2.org/>
5. <http://bost.ocks.org/mike/map/>
6. <http://bl.ocks.org/mbostock/4060606>
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