Information Visualisation
Channelling Hans!
Assignment Description

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1 What Is the Purpose of Your Visualisation?

(150 words)

The purpose of this visualisation is firstly to examine the geographic spread of government types across the world and secondly to animate the change in GDP of each country from 1900 to 2015 to demonstrate how different government types have performed over the years.

This is achieved by visualising a map of the world with each country coloured depending on its government type. The user can then click the play button to animate the change in GDP for each country throughout the years. This is done by positioning a circle at the centre of each country's path with the radius proportional to the associated GDP.

The user can view a clearer visual of the spread of government types across the world by hovering the mouse over the rectangle in the legend corresponding to each government type. On mouse-over of the rectangle, the path width of each country with the selected government type increases, highlighting the selection. Country labels and GDP values are also visible on mouse-over of each country and the bubble within the country's path respectively.

2 What Similar Visualisations Exist?

(150 words)

Bubble map visualisations are a relatively common visualisation technique when it comes to envisioning or representing country populations on a map. One particularly relevant visualisation is from 'Gap Minder' which visualises the growth of the population of a country over time (http://www.gapminder.org/tools/#_chart-type=map). This visualisation animates the growth of each country's population by the size of the bubble.

Bubble maps (and other map visualisations) are also popular when presenting or analysing election results and there were numerous examples across various media during the recent US presidential election. Some high profile examples can be found on the Financial Times website (https://www.ft.com/content/3685bf9e-a4cc-11e6-8b69-02899e8bd9d1) and

also a very detailed bubble map example on The New York Times website (http://www.nytimes.com/elections/results/president).

A variation on the bubble map is to use the actual bubble to represent the country and to size it according to the data being visualised. A good example of this bubble map variation is the following infographic which shows the world in terms of carbon dioxide emissions (http://www.example-infographics.com/assets/infographic-world-carbon-dioxide-emissions-by-country.png). This example relies on the fact that readers are familiar with a map of the world to communicate the pollution data.

3 Why Is Your Visualisation a Good Solution?

(150 words)

This visualisation successfully illustrates three dimensions, two of which are categorical (country and government type). The benefit of using a map as the base for the visualisation is that it allows the user to gain a geographic visual of the relationships between the government type and GDP of countries around the world. The map allows a user to readily compare the data of neighbouring countries and other more geographically remote regions with greater ease compared to the bubble plot used in Part A.

The additional detail of country labels and GDP values on mouse-over of each country and bubble respectively also enhances user-insight gained from the visualisation whilst keeping everything relatively clean and easy to read. The ability to single out each government type on mouse-over of each rectangle of the legend and the changing opacity of the bubbles on mouse-over of a particular country's bubble also enhances the readability and clarity of the visualisation and enhances the overall user experience. The ability to zoom and pan across the map is also an important contributing factor to the ease of readability, particularly for regions with numerous countries within a small area.

4 What Data Manipulation Was Required to Create Your Solution?

(150 words – it is acceptable not to have required any data manipulation)

In order to build this visualisation the latitude and longitude coordinates defining the path of each country were required. The geo.json file containing this information was downloaded from the following site:

https://gist.githubusercontent.com/phil-pedruco/10447085/raw/426fb47f0a6793776a044f17e66d17cbbf8061ad/countries.geo.json

In terms of data manipulation, the geo.json file had to be joined with the Gap Minder csv file containing all data for each country for each year. To join these two files, both were iterated through and joined by country name. Once a country name matched, that country's government type and the GDP for that

year were added to the geo.json dataset. The year was used as the key for each corresponding GDP value.

A number of country names in the geo.json file had to be adjusted to match the names in the csv file (e.g. the US was listed differently in both files). After the first visualisation of the map with countries coloured by government type some mismatched countries were identified and the names/spelling of the Country amended. However, a small number of countries remained that were not contained in both files.

Once this join was complete, the map could be constructed (done with the 'generateMap' function which appends the path for each country to the svg element). The animation of the GDP of each country for each year is accomplished by the 'generateBubbles' function which utilises the enter, update exit pattern to visualise the bubbles representing the GDP of each country.

5 What d3 Resources Did You Use to Create Your Visualisation?

(150 words)

To create the visualisation, I mainly used the practical materials and posts on the website of D3's creator Mike Bostock. This site has numerous D3 examples and the following posts from this website were particularly useful:

- https://bost.ocks.org/mike/bubble-map/
- https://bl.ocks.org/mbostock/5557726
- http://bl.ocks.org/Caged/6476579 - D3 tips
- http://bl.ocks.org/sgruhier/1d692762f8328a2c9957 - Zoom and Pan functionality

Another good resource to introduce mapping in D3 was the following presentation https://maptimeboston.github.io/d3-maptime/#/.

Zeroviscosity.com also provided excellent D3 tutorials to aid in creating various aspects e.g. the visualisation legend (http://zeroviscosity.com/d3-js-step-by-step/step-3-adding-a-legend).

I also utilised the jQuery UI API documentation for the slider functionality (http://api.jqueryui.com/slider/#method-values).