VISUALISATION PROJECT

A d3- based visualization project of the relationship of life-expectancy, GDP per capita and population

Abstract

By visualizing the data from 1800 to 2014, this project briefly demonstrates the relationship among each variable and allow the user to explore by themselves

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1. Introduction

Generally, we would make an assumption that the richer the people are, the happier and healthier they would be. However, recent reports showed that rising GDP per capita might lead to the opposite way. (Guo, 2016). Actually, a lot of poor countries perform better on some health indicators compared to the relatively developed country. (GDP per capita) is not the only indicator of health. (Biciunaite, 2014) Socialists and economists are still keen on the what is the key indicator of life expectancy or GDP.

This visualization project was based on the life expectancy, GDP per capita and population of 213 countries from 1800 to 2014. There were over 50 thousand records after wrangling. The data I used was from the database from United Nations (Nations, 2017)

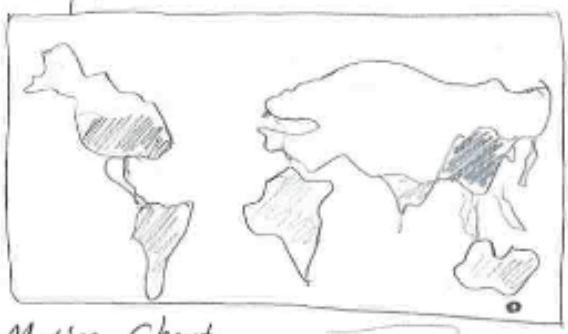
The intended audience for my project might be a sociologist who studies the life-expectancy across different countries, an economist who studies the relationship with income per person and population, location or a medical student who prepares for an essay of health condition. In summary, my audience were the researchers.

I have visualized a motion chart, a line chart, and two donut charts. The motion chart demonstrated the change of population, life-expectancy, and income from 1800 to 2014, which made the researchers easier to find out the pattern and relationship among them. Line chart provided a deeper look on a specific variable on a country in a certain period of time. Two donut charts showed the proportion of a certain variable all over the world.

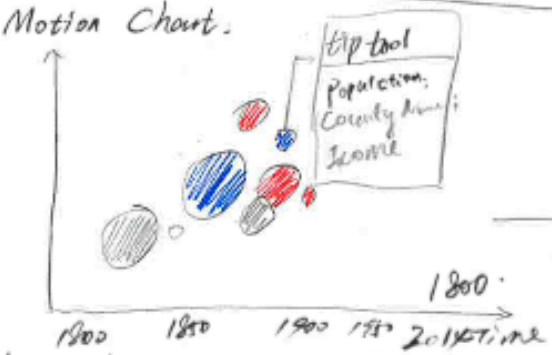
2. Design(Five Sheets)

1. Ideas

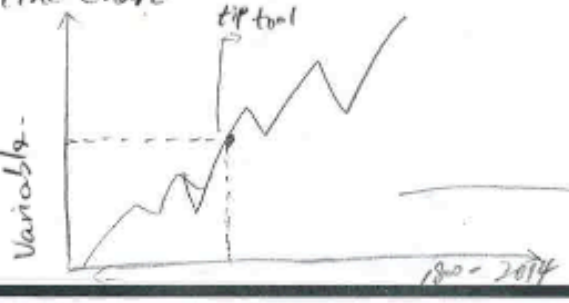
Map:



Motion Chart.



line Chart



2. Filter

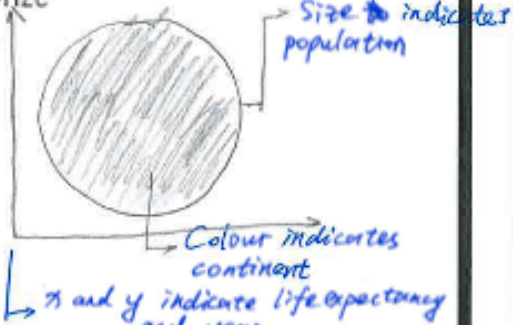
As we have six attributes for each record.
They are.

1. Country Name
2. Continent
3. Average Income
4. Life expectancy
5. population
6. year

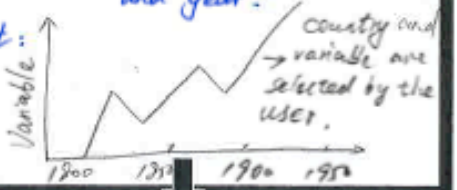
I would like to choose
Continent to filter for Motionchart
Country name for line chart
Set "year" to be customized by user

3. Categorize

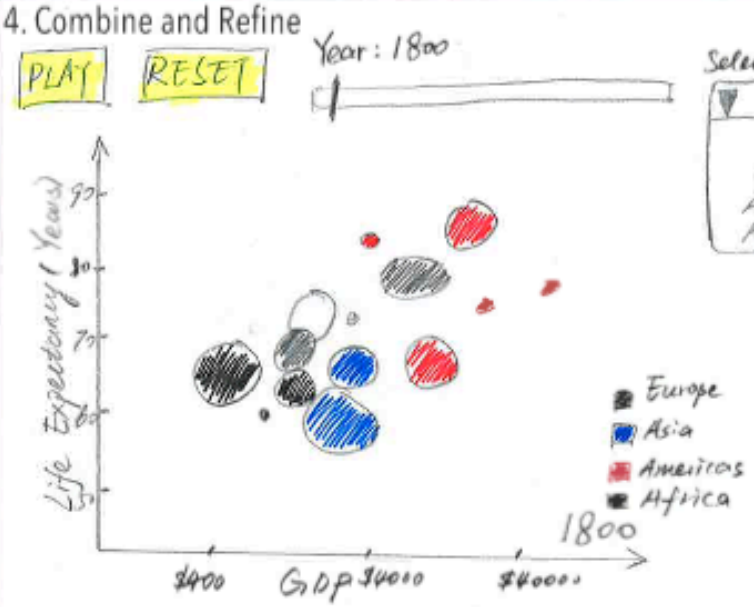
Motion:



Line Chart:



4. Combine and Refine

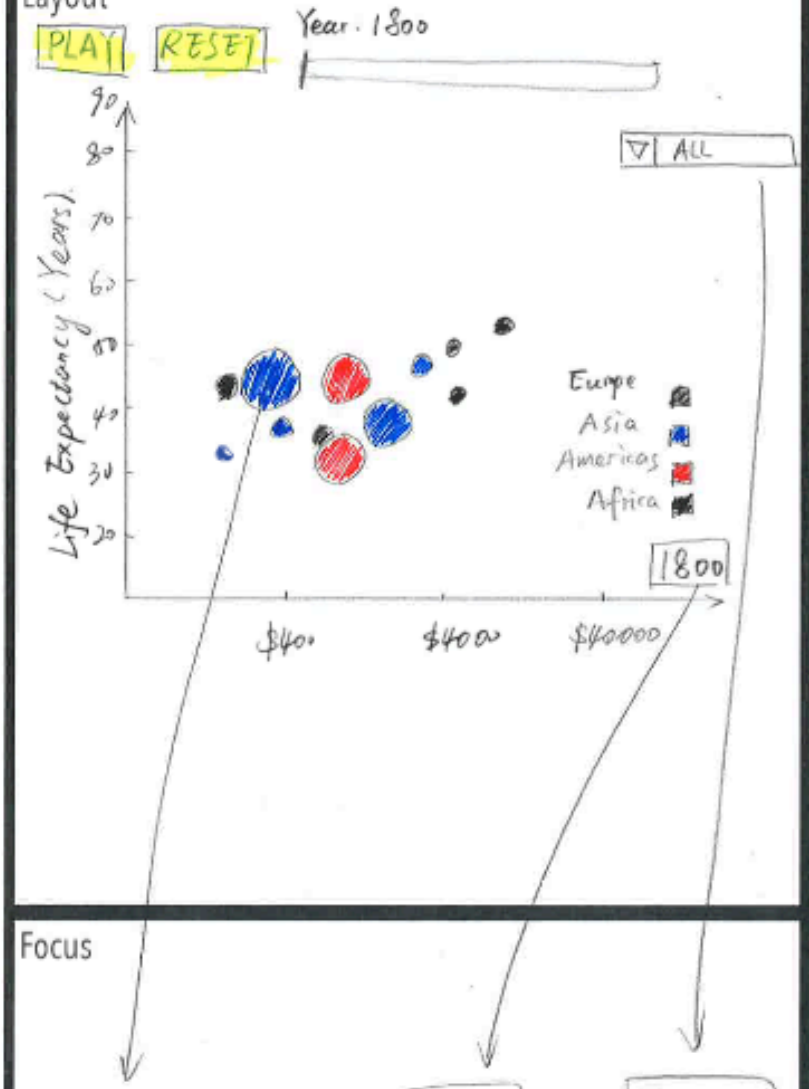


5. Question

1. How to change the Variable with the chart at the same time?
2. How to change the x,y scale, while we change the variable?

Title: Motion Chart
Auther: Jiahao Liu
Date: 31/MAY/2018
Sheet: 2
Task: Visulization Project of the Life expectancy, population and GDP over the world

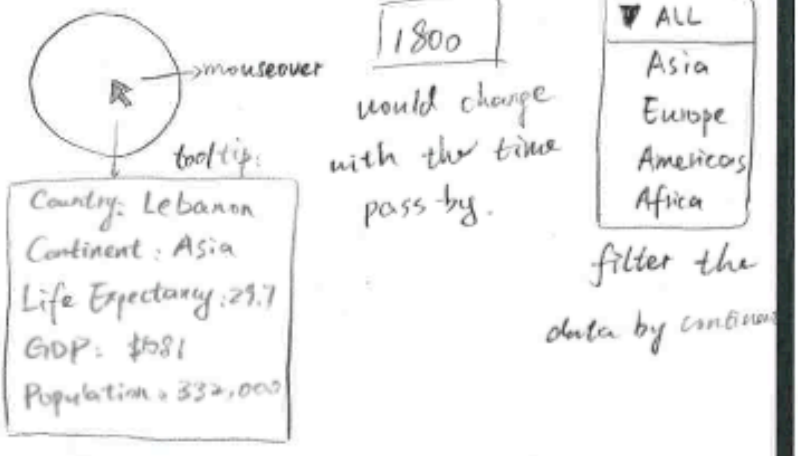
Layout



Operations

- User can click PLAY, and the motion chart will play the data from 1800 to 2014 and repeat until the user click PAUSE.
- User can select continents on the drop down List to select which continents to show up.
- Hover on the circles, the tooltips about the information of the country would come up.

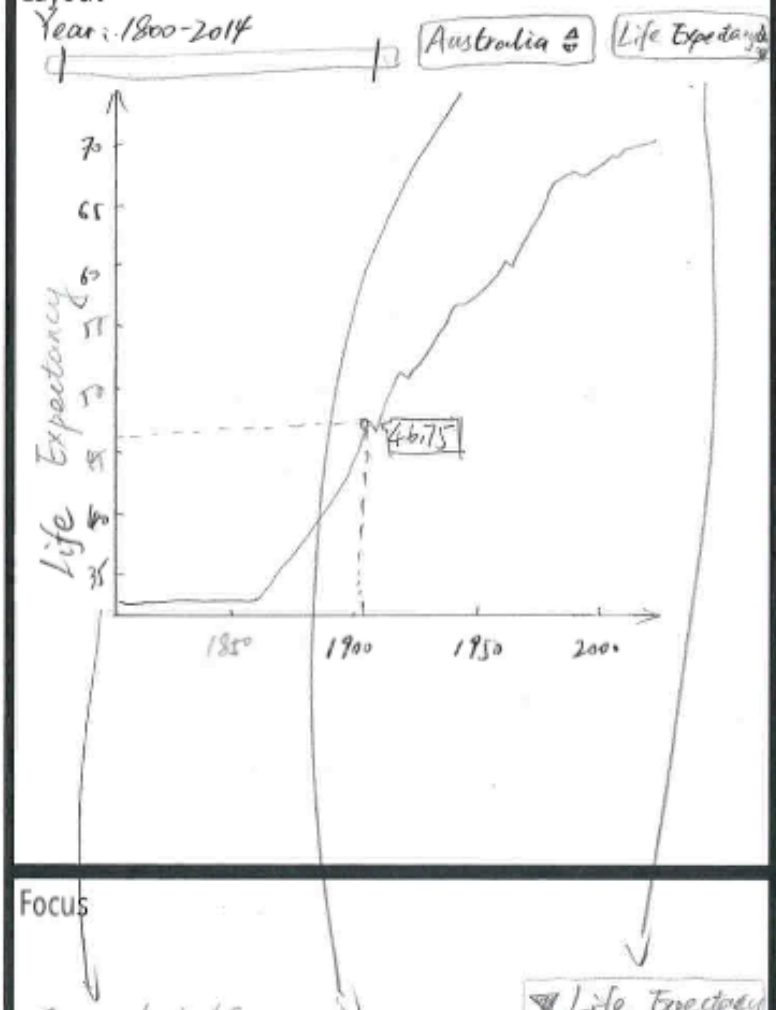
Focus



Discussion

- Should we select country by the drop down list?
  — No, there are over 200 countries in the dataset, it is too much for dropdown List.
- Can we build a map to select?
  — Yes we can, but it is too hard, as the data is start from 1800, there were many countries disappeare afterward.

Layout



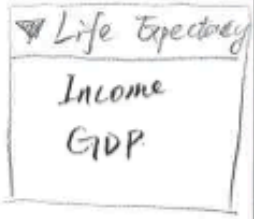
Title: Line Chart
Auther: Jiahao Liu
Date: 21/JUN/2018
Sheet: 3
Task: Visualization Project of the life-expectancy, population and GDP over the world

Operations

- User can select countries by the dropdown list, to have a deeper look on specific country.
- User can select one of three variables of the country selected, and the scale will be changed to fit to the variable.
- Hovering on the chart there will have two intersect dotted lines indicate the x and y value of that point.

Focus

The y labels name and scales will be changed as the time scale and variable changed.



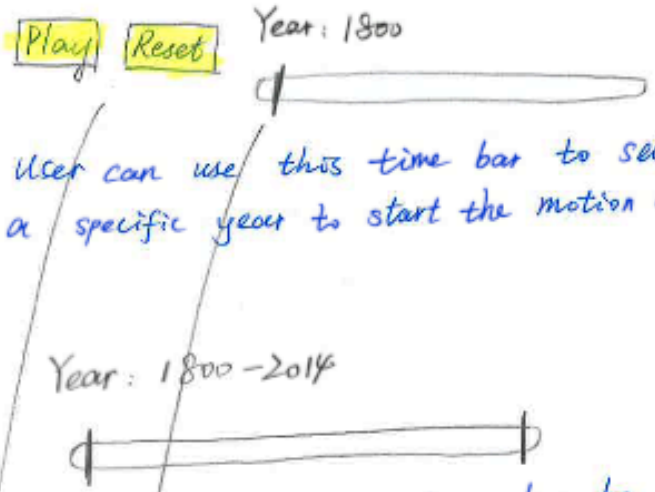
Dropdown Lists provide variable for user to select

Discussion

- Should we put all of the country in the dropdown List?
  — No, too much countries in the data, unconvinient for dropdown list.
- We should change the scale of y-axis as well, cause the life-expectancy could be a number under 100, whereas the population could be million or billion.

Layout

There are two kinds of time bar in my project:



Title: Time Bar
Auther: Jiakao Liu
Date: 2/JUN/2018
Sheet: 4
Task: Visualization Project of the life expectancy, population and GDP over the world

Operations

- User can press buttom play to play the motion chart from 1800 or select a specific year to start the motion chart.
- User can press "Restart" at any time to reset the cursor to year 1800.

Focus

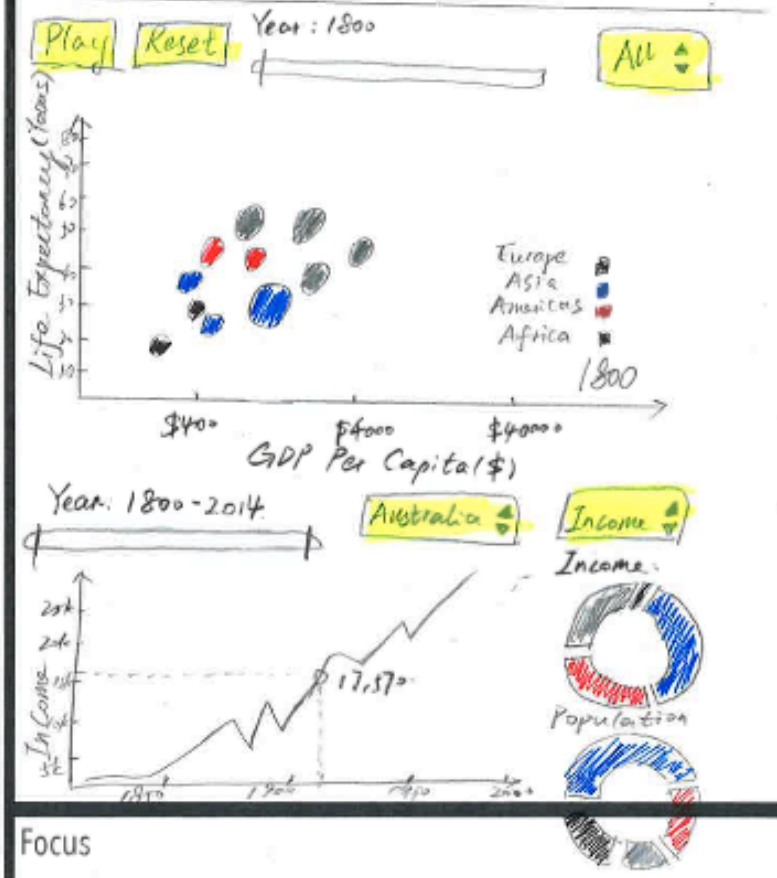
As the cursor move, the text will be changed as well.

When the user click play, the text of the buttom will become "parse"

Discussion

As the user select a range of year, the scale of x-axis will adjust to new range of year as well.

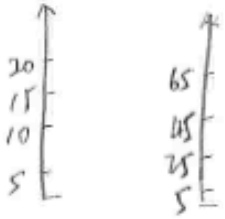
Layout



Focus

A tool tip of the information of a circle (country name, GDP, population, life expectancy etc)

Tool Tip will come up when the cursor hover on the area of line chart.



The y-axis and x-axis both will adjust to the range of value to fit the screen.

Title: Final Visalization
Auther: Jiahao Liu
Date: 21 JUN 2018
Sheet: 5
Task: Visualization Project of the life expectancy, population and GDP over the world.

Operations

- Users can press 'play', 'reset' to control the motion chart.
- Users can use three dropdown list to select specific data shown in the charts.
- Users can select year range to modify the range of x-axis.
- Hovering on the circles or the lines there will come up with tooltips and contains more information.

Detail

There are 3 types, 4 charts of my project:

One motionchart: It indicates the relationship between the population, GDP, life expectancy and year.

One linechart: indicates the income or life expectancy or GDP changing by time.

Two donuts chart indicate the portion of selected item in the world.

3. Implementation

3.1 Libraries used

I have used D3 to implement my project, main scripts used are as follows:

1. bootstrap:

   <link rel="stylesheet" href="css/bootstrap.min.css">
   <script src="js/bootstrap.min.js"></script>
   I used bootstrap to format my main page.

2. JQuery:

   <link rel="stylesheet" href="css/jquery-ui.min.css">
   <link rel="stylesheet" href="css/jquery-ui.structure.min.css">
   <link rel="stylesheet" href="css/jquery-ui.theme.min.css">
   <script src="js/jquery.min.js"></script>
   <script src="js/jquery-ui.min.js"></script>

   Those stylesheets provided the basic jQuery UI, javascripts provided basic interface

3. D3

   <script src="js/d3.min.js"></script>
   Also, the main script of d3, provide basic svg

3.2 Reasons for the implementations

I have implemented a motion chart, a line chart and two donut charts for my project.

When it comes to the multivariate dataset, Motion chart is always provided an efficient and interactive way for us to explore the data. So I implemented a motion chart to demonstrate the relationship of life-expectancy, GDP, and population.

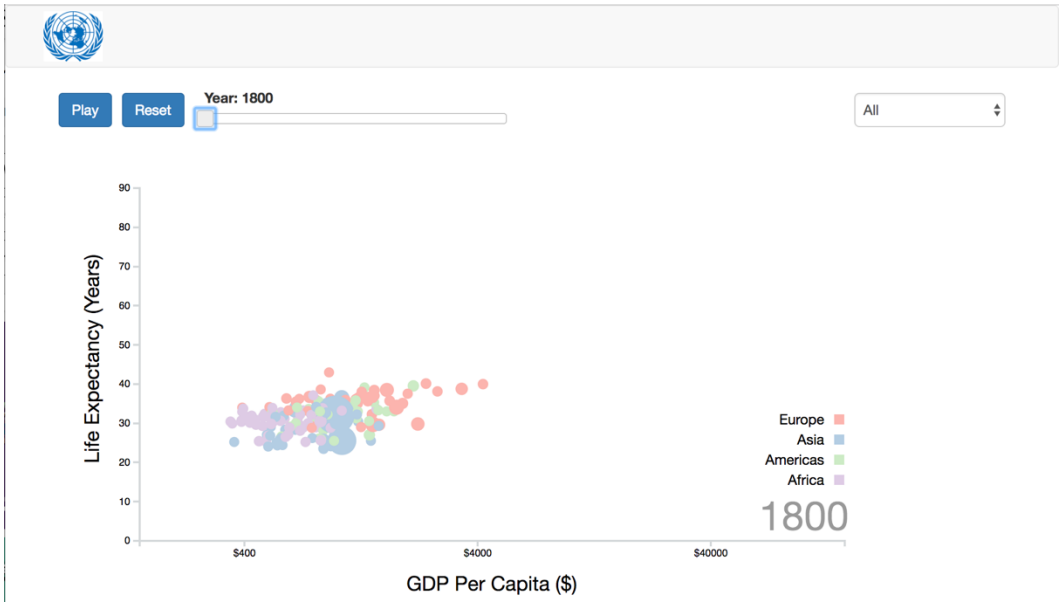
As I would like to display the data among time series, line chart always has the first priority to be chosen, moreover, I added some interface to my line chart, which made the user can easily explore any variable of a certain country in a certain period of time.

In order to demonstrate the proportion of data in quantity, we generally use a pie chart. However, reports showed that human is better in judging linear distances rather than judging area. Compared to pie charts, donut charts are hollowed out, we are likely to treat the donut chart as a curly stacked bar graph (Robertson, 2017), which makes us easier to judging the graph. So, I implemented two donut charts.

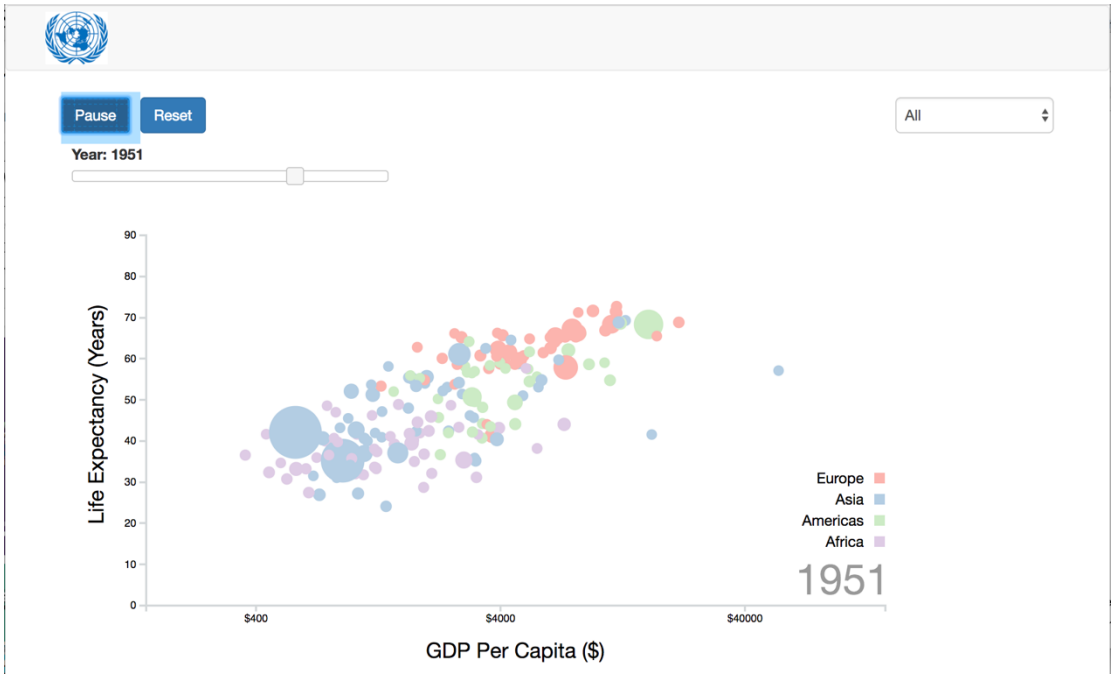
4. User Guide

4.1 Motion Chart

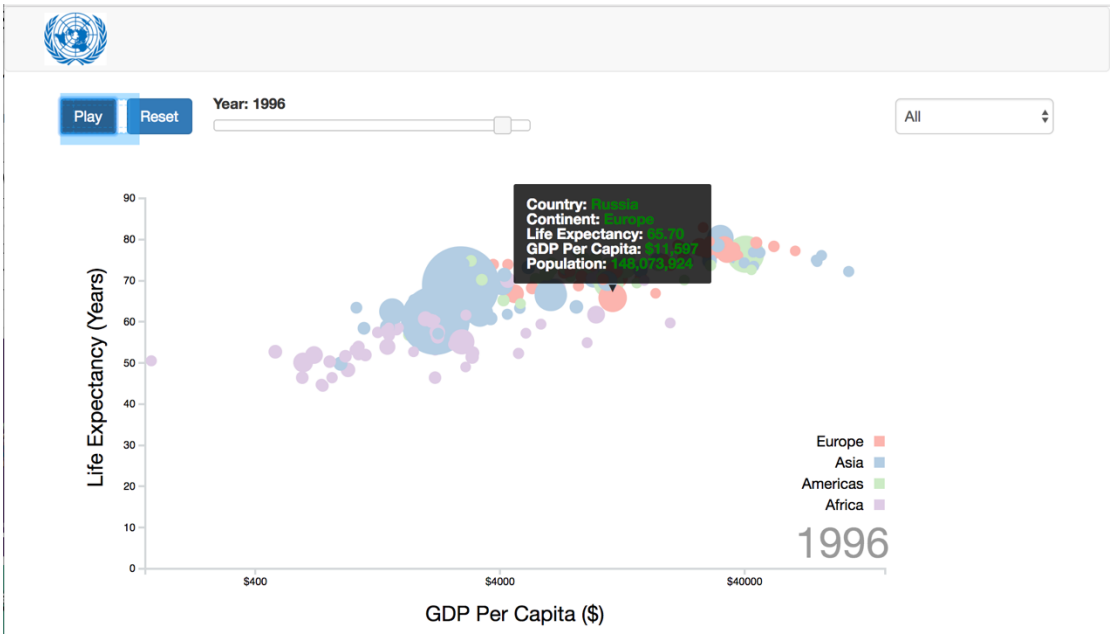
User can set the start time by moving the cursor in the time bar.



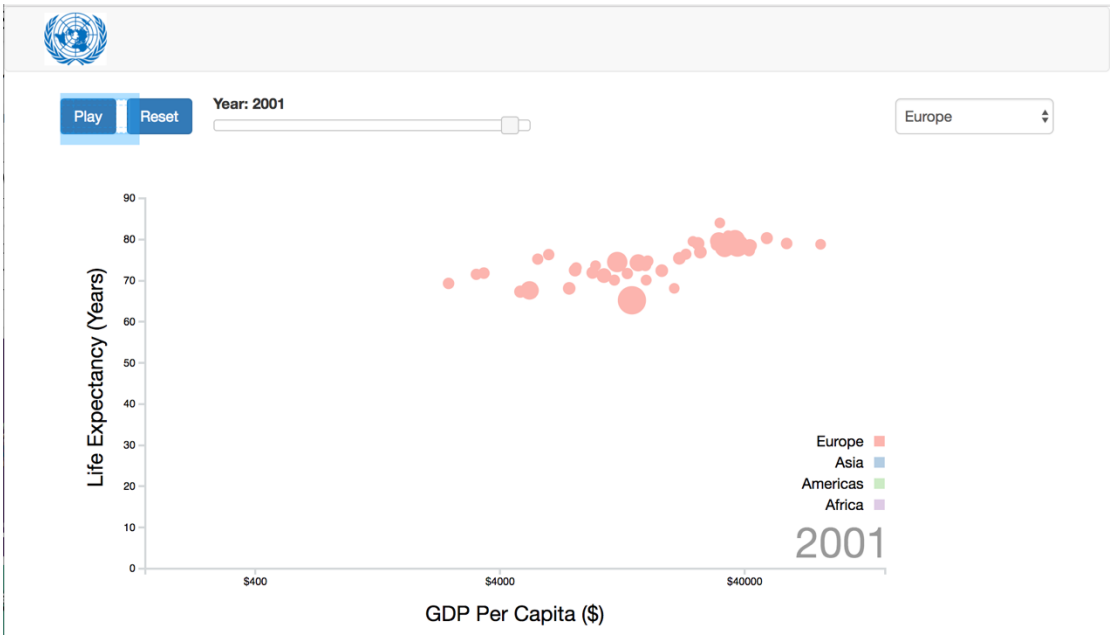
After clicking the ‘play’ button the user can press ‘pause’ to pause the process or reset to restart the motion.



Hover on the circle, there will pop up a tool tip, with the information of the selected circle(country).

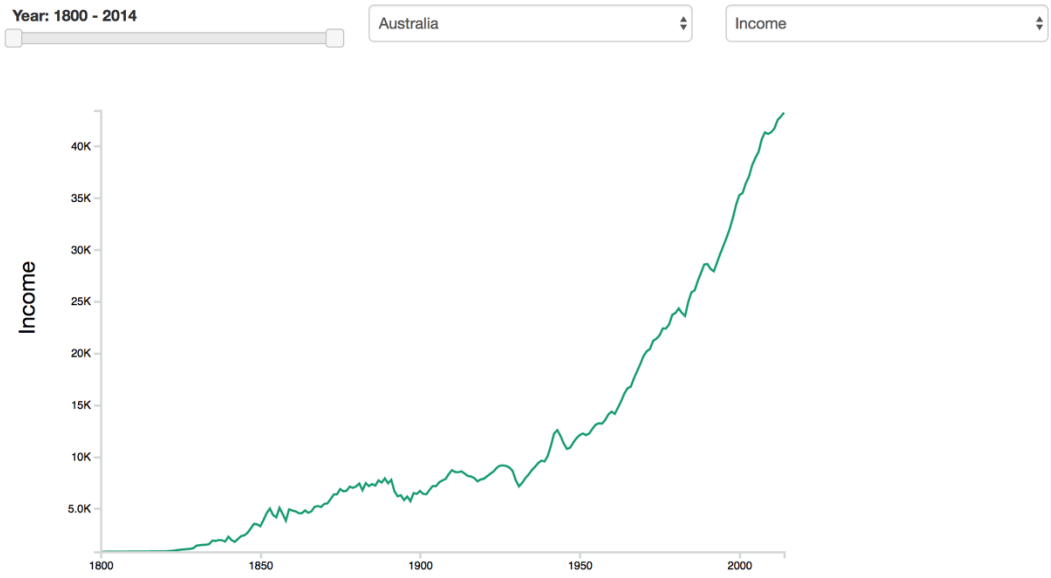


By selecting a continent in the dropdown list, the user can filter the countries by continent.

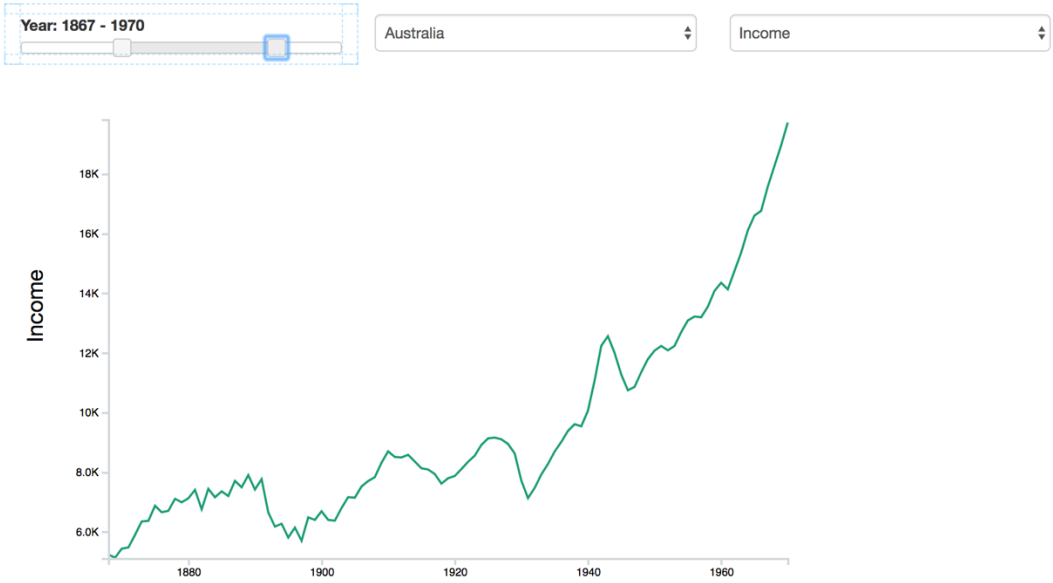


4.2 Line Chart

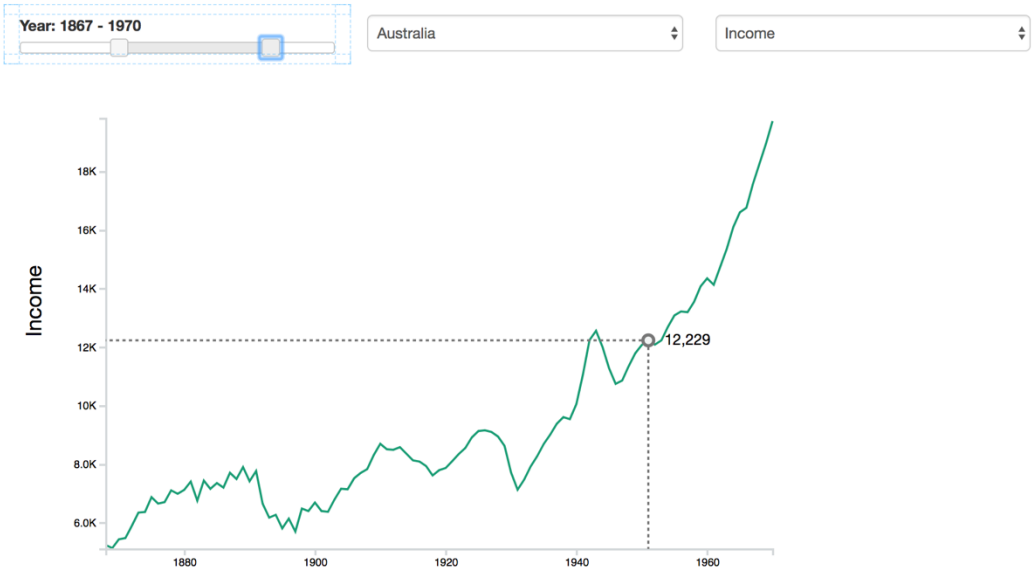
The line chart allowed the user to select a certain period of time, country and variable.



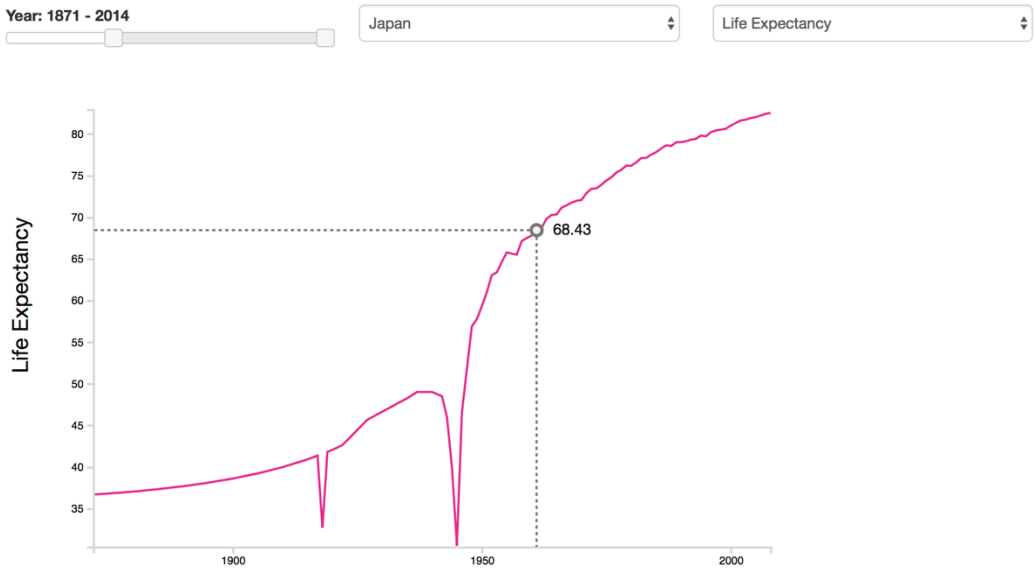
As the time range changed, the x and y scale will change as well



When the cursor hover on the line chart, tooltip will display the corresponding value from y axis.

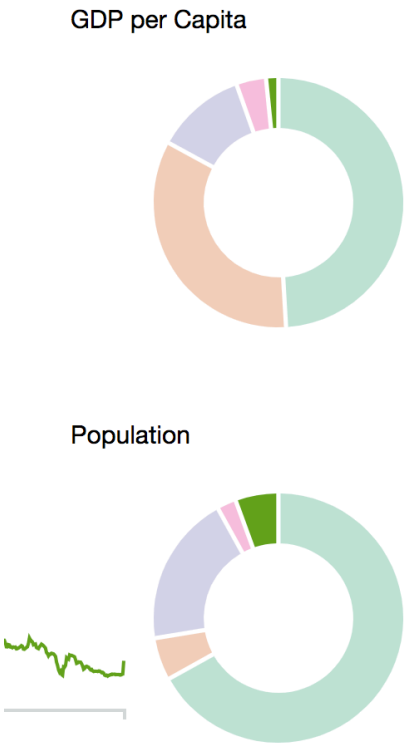


Different country will be assigned a different color



4.3 Donut Chart

Those donut charts were inspired by Git hub (mbostock, 2017), indicates the five largest countries.



5. Conclusion

Like most courses with programming, the only way to improve the coding skill is practicing with a project. In this final visualization project, I have learned a lot of technics of D3 and the concepts of visualizations in the D3 community like Kaggle.com. The most important thing I have learned by doing this project was that I have got used to the process of appropriating other people's code and figuring out to use these snippets in my projects. Moreover, I realized the importance of sharing my knowledge with others and constructing a vibrant community of D3.

Although I just have learned D3 for several weeks. I felt like there are endless possibilities the kinds of fascinating visualizations that I am now able to create.

Bibliography

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