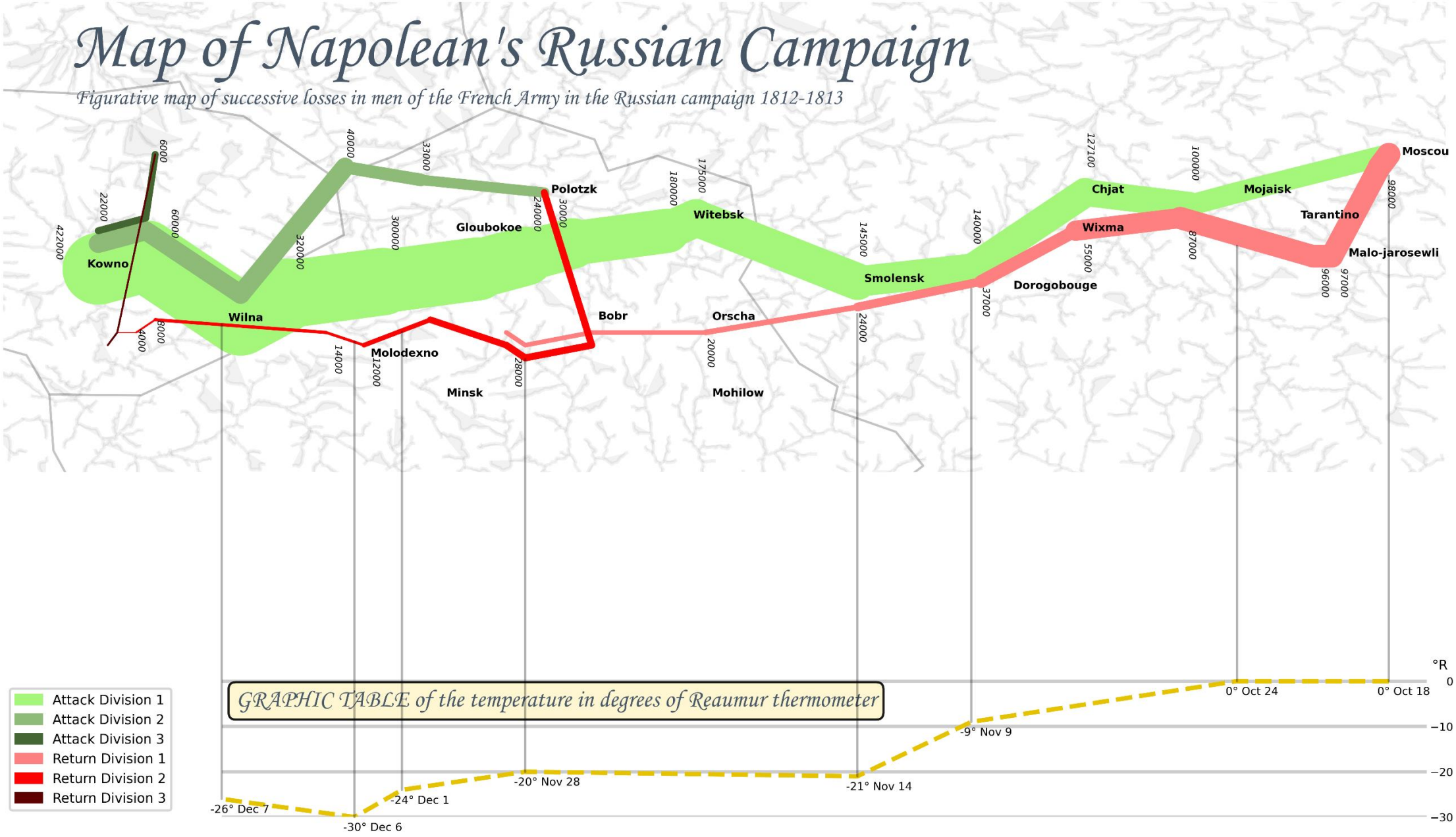
DECLARATION: I understand that this is an **individual** assessment and that collaboration is not permitted. I have read and I understand the plagiarism provisions in the General Regulations of the University Calendar for the current year, found at http://www.tcd.ie/calendar. I understand that by returning this declaration with my work, I am agreeing with the above statement.

How did I implement the visualization?

For this visualization I used python as the tool. I first started with loading the data and splitting the data into various datasets to be used later. I used geopandas to exploit the longitude and latitude columns in the data. I created 2 subplots, one for the line graph, the other for the temperature plot. I used two datasets for the background, the country boundaries, and the rivers and its flow in the background. I then used line collection to create segments of lines for each division and direction of attack/return. This took time since I was playing around the linewidth to find the one that suited my graph. I then plotted the annotations which were the cities and survivors, I manually plotted each value to make sure the graph looked visually appealing. Later I used collectionPath to draw lines between the subplot. I knew the longitude but to figure out the latitude was trial and error. I then plotted the temperature and tidied up the axes overall. Furthermore, I picked a classy font and color to go along with the theme and I finally added a custom legend to the graph using patches in python.


Map of Napolean's Russian Campaign
Figurative map of successive losses in men of the French Army in the Russian campaign 1812-1813
Kowno
Wilna
Gloubokoe
Polotzk
Witebsk
Smolensk
Chjat
Mojaisk
Moscou
Wixma
Tarantino
Malo-jarosewli
Dorogobouge
Molodexno
Minsk
Bobr
Orscha
Mohilow
422000
22000
6000
60000
8000
4000
320000
40000
33000
300000
14000
12000
240000
30000
28000
180000
175000
20000
145000
24000
140000
37000
127100
55000
100000
87000
98000
96000
97000
Attack Division 1
Attack Division 2
Attack Division 3
Return Division 1
Return Division 2
Return Division 3
GRAPHIC TABLE of the temperature in degrees of Reaumur thermometer
°R
0
−10
−20
−30
-26° Dec 7
-30° Dec 6
-24° Dec 1
-20° Nov 28
-21° Nov 14
-9° Nov 9
0° Oct 24
0° Oct 18

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A) Charts 1-3

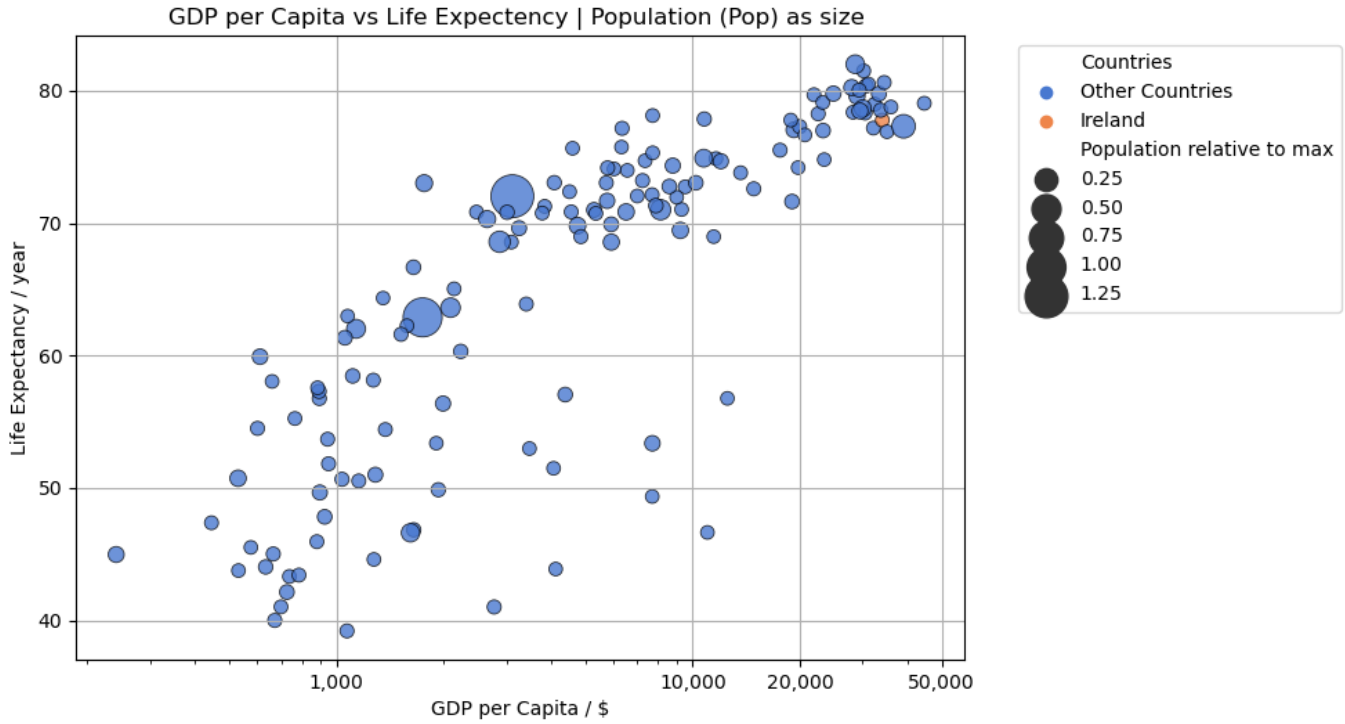


Figure 1:Chart 1

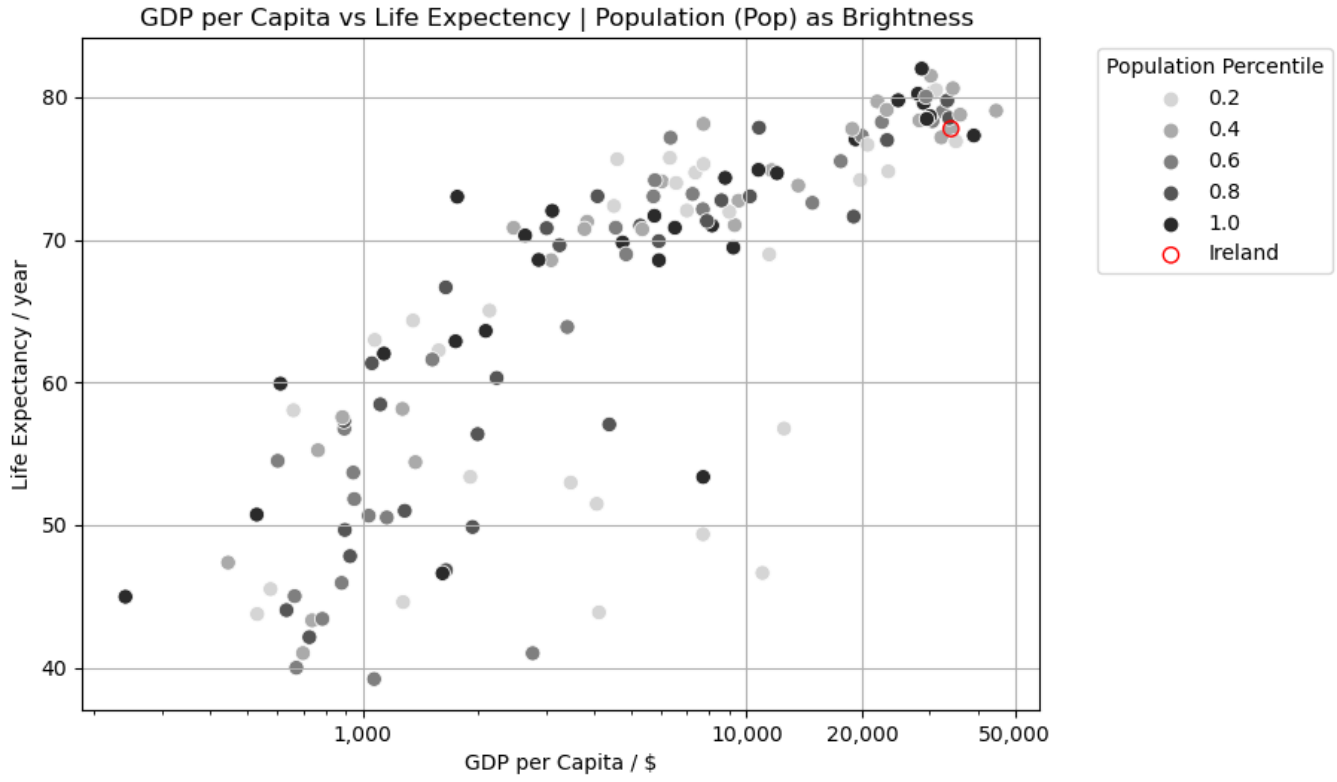


Figure 2:Chart 2

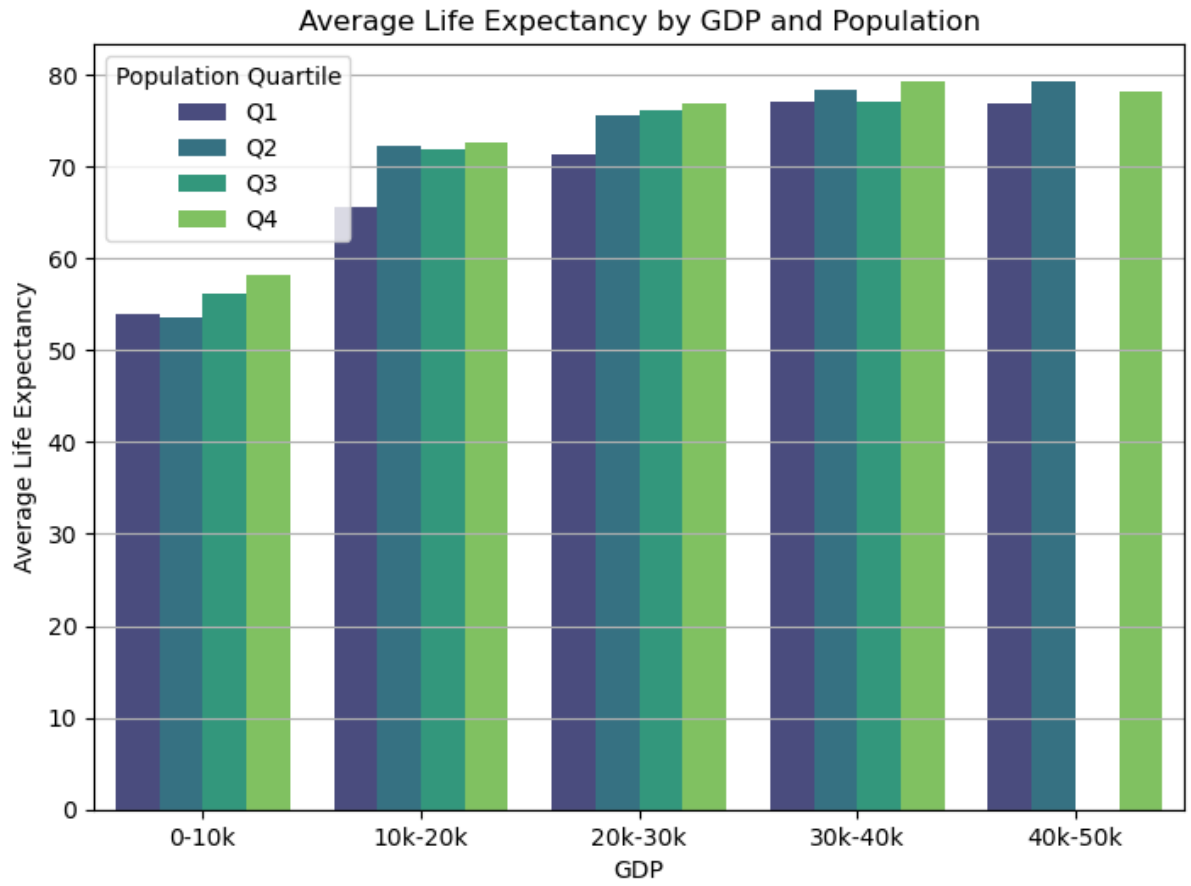


Figure 3: Chart 3

Figure 1 and 2 uses GDP per capita as its x-axis and life expectancy as its y-axis. It uses the population data to encode more information. Except figure 1, due to the skewness in the population I used its quartile throughout so that we can visualize data points properly with smaller populations. Figure 1 uses size to encode the population data, and a logarithmic scale was used on the x axis to spread out the graph. And so it is clear that the larger circles have more population. Figure 2 uses brightness to encode population data, the darker the data point gets the more densely populated the country is, since it belongs to its respective quartiles. We can see a smooth gradient as the population increases. In both figure 1 and 2 Ireland is highlighted separately with the respective marker in the graph. Figure 3 shows the GDP per capita group's average life expectancy across the population. An easy way to interpret is by looking at the 4th quartile. Even though there are countries with GDP per capita less than $10k, it has a higher life expectancy than those from countries with less population.

B) Charts 4-6

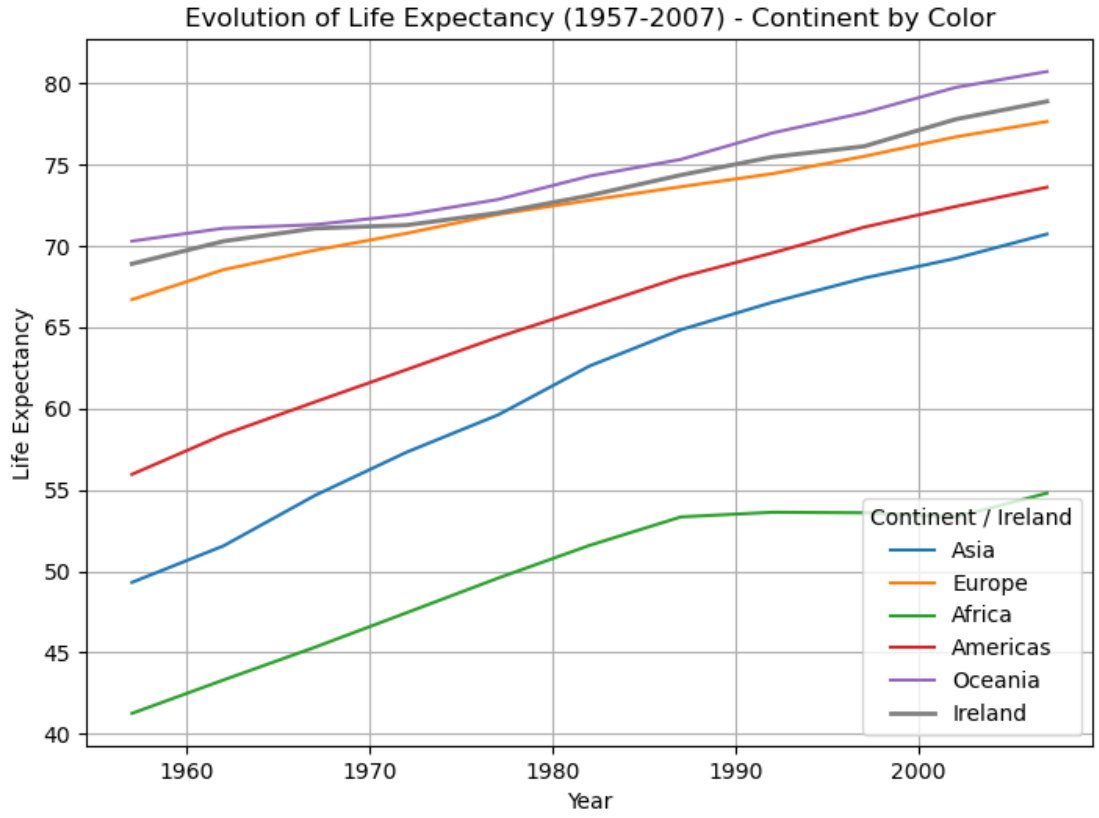


Figure 4:Chart 4

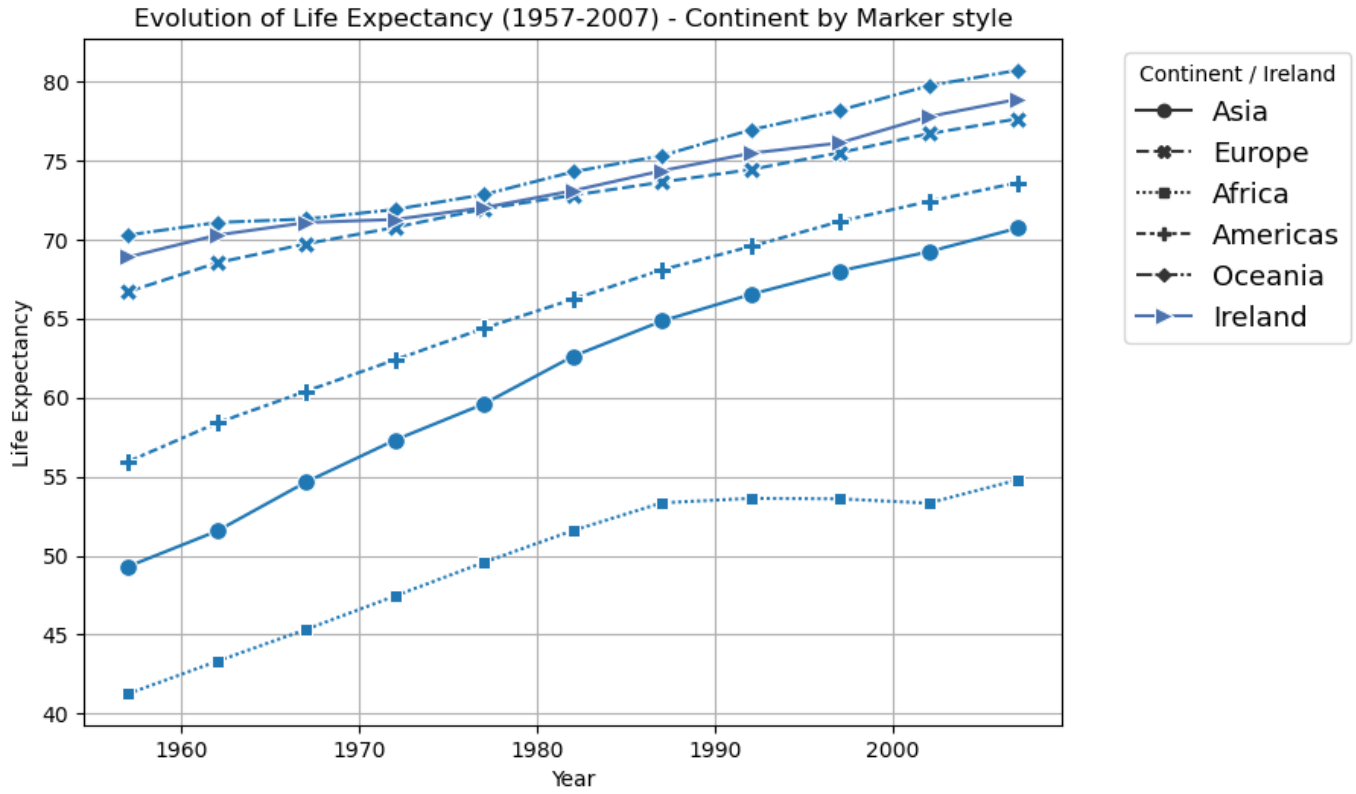


Figure 5:Chart 5

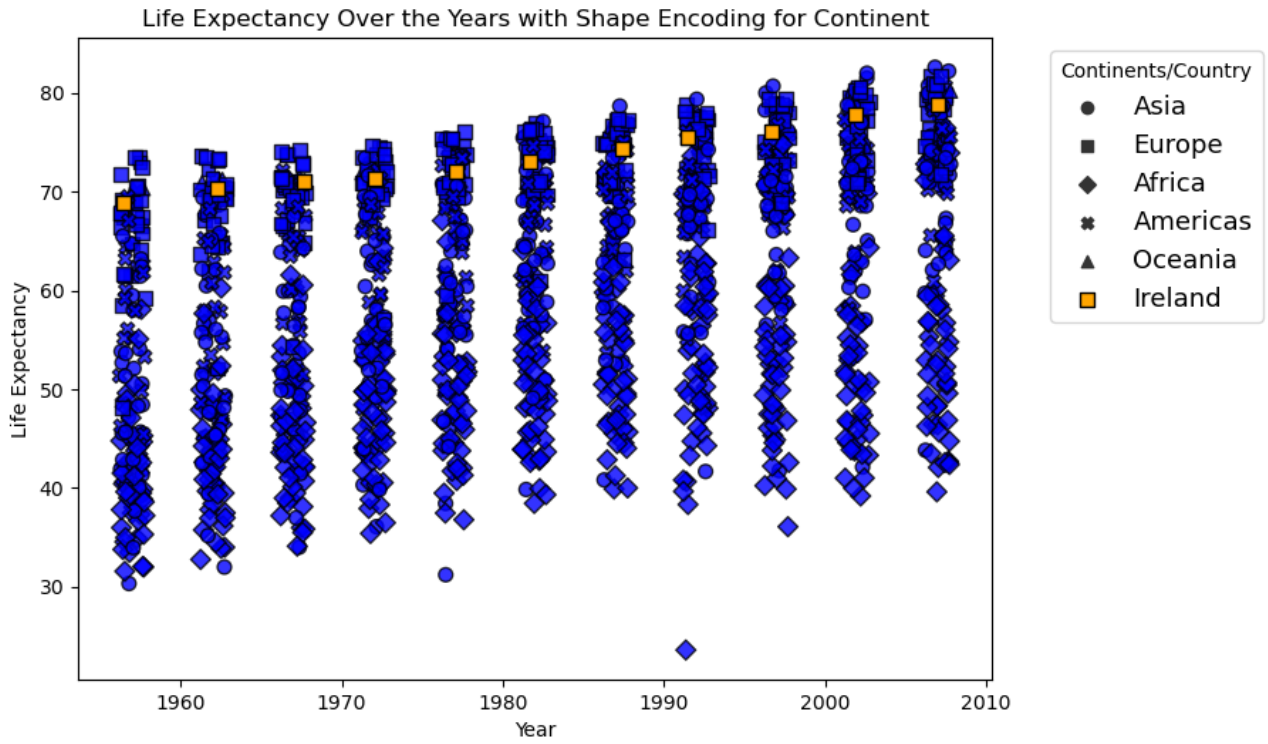
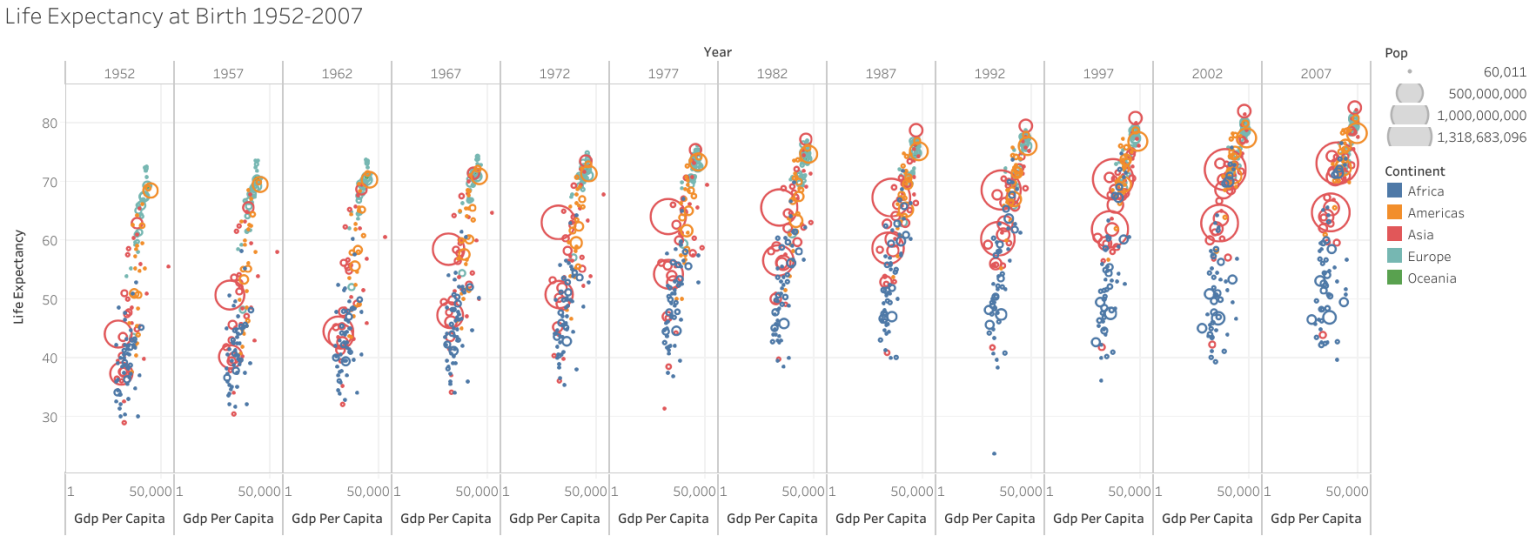


Figure 6:Chart 6

Figure 4, 5,6 has years on the x-axis, and life expectancy on the y-axis. Figures 4 and 5 are a line chart with different encodings for continent. Figure 4 uses colour to differentiate between continents, whereas figure 6 uses different shapes of markers and line style to differentiate between continents. In both the graph a separate line is plotted for Ireland matching the style of the plot. Moving on, figure 6 is a jittered plot which shows that figures 4 and 5 portray an estimate mean of the life expectancy. The jittering was done by adding random noise on the x-axis, and each continent is portrayed using a different marker. Nevertheless, Ireland uses the same marker since it is in Europe but a different colour to stand out. I would change the hue on top of having different markers, but I tried keeping other variables consistent throughout the report. All the graphs from 1-6 were made using matplotlib and seaborn on python. The last part of the report was done on tableau.

C)



For the last part of the assignment I tried replicating the graph on the slide on tableau. Again we have years on the x-axis, and life expectancy on the y-axis. We also have 2 graphical encodings, the hue relates to the continent the point is from , and the size of the point relates to the population of the country. For each year there is an individual axes, GDP per capita. And so, with this graph all the 5 features were covered. An easy way to interpret this graph would be to look at Asian countries in 1952, shown using a red circle. As the years progressed, the size of the circle increases, and it climbs up the axis showing how the inhabitant's life expectancy is increasing as well.