

Brianna Bellows, Rachel McConnell, Kate Huter, Joy Okeke
ISA 401 - Dr. Fadel Megahed
Project 2
9 May 2017

Process Book

Overview and Motivation

About The World Happiness Report

The World Happiness Report is a revolutionary survey depicting the state of global happiness. This report has been published three times in the past five years: 2012, 2013, and in 2015. The 2016 update of The World Happiness Report ranks countries by their happiness level as primer experts across fields such as “economics, psychology, survey analysis, national statistics, health, public policy and more to describe how measurements of well-being can be used effectively to assess the progress of nations”. How this report works is that the report looks over the current state of happiness around the world and then “shows how the new science of happiness explains personal and national variations in happiness”. (*Kaggle, World Happiness Report*)

The data in the report is collected from the Gallup World Poll. The scores are derived “based on answers to the main life evaluation question asked in the poll” where they rate their current lives on a scale of 0-10, 0 meaning you live a terrible life and 10 meaning you live the most amazing life imaginable.

The World Happiness Report Purpose

The purpose of the World Happiness Report is to distinguish which factors contribute the most to happiness, and if countries experience an increase or decrease in their happiness levels over the years and why. The goal we are trying to accomplish through analyzing the World Happiness Report data is to distinguish the key factors that do have an effect on happiness by region in the world.

Related Work

There has been some research previously on world happiness throughout many years, many countries and including many variables. Since we are focusing mainly on the most current years 2015, 2016 and 2017, there are many different results. Research has already looked at a variety of different variables including, GDP, income, life expectancy, child mortality, freedom, education and many more. There are many correlations that already match according to each of these variables, being both negative and positive. There has also been research between happiness and not only countries but more specific like regions, publics and cities.

Looking at specific research that has been done, in 2014 there was a poll that went out that correlated GDP per capita versus life satisfaction and results were shown in a visual. Countries like USA, France, Japan were ranked highest on this category with a positive correlation. We plan to take these variables and look more in depth than what has already been done, and look into the most recent years. We want to look at variables that affect world happiness the most, and see if these variables vary among the different regions. We want to make graphics and visuals to show how the countries or regions have rated their happiness, and break down what really goes into each regions happiness.

Questions

The main question we want to answer is what is the best predictor of happiness? And does that predictor change by region of the world? These questions will shape the way we will look at these factors as well as how these factors influence regions of the world. We hope to gain knowledge about what regions value which predictors more, the same, or less than other regions of the world.

We looked at three economic metrics to determine how they compare to a country's happiness level:

1. GDP Per Capita

We want to know if the economic predictor, GDP, was a good indicator in relation to a country's happiness level. We want to determine if a country has a high GDP if their happiness level will also be high.

2. Unemployment Rate

We want to know if the unemployment rate is a significant factor for determining happiness score. We want to determine if people who live in countries with low unemployment rates will have a higher happiness score.

3. Inflation Rate

We want to know if inflation rate is a significant factor for determining happiness. We want to know if generosity is a significant factor for determining happiness. We want determine if a country with a low inflation rate will have a higher happiness score.

Data

Factors in The World Happiness Report

The Gallup World Poll data generated the World Happiness Report based on the scores of six deciding factors:

- **Economic:** The economic status of each country in relation to their happiness score on a scale of 0-10. We believe this will reveal if a country values their economy more than other factors when determining happiness.

- **Family:** If the size of one's family in relation to the happiness score. We believe this will reveal if a country values the size of their family more than other factors when determining happiness.
- **Life Expectancy:** How long a person will live in relation to their happiness score. We believe this will reveal if people live longer they will value life expectancy more than other factors for determining happiness.
- **Freedom:** If the freedom status of one's country in relation to their happiness score. We believe that this will reveal if a country is happier depending on how high or low their freedom score is and value that more or less when determining happiness.
- **Absence of Corruption:** If the people's trust of government has a relation to their happiness score. We believe that this will reveal the presence or lack of corruption impacts one's happiness level and affects the value in relation to the other factors for determining happiness.
- **Generosity:** If people's generosity is in relation to their happiness score. We believe this will reveal if people value generosity and if it does have an affect on their happiness level.

The data also contains a variable called "Dystopia", a hypothetical country whose values are equal to the world's lowest averages for each country based on those six factors.

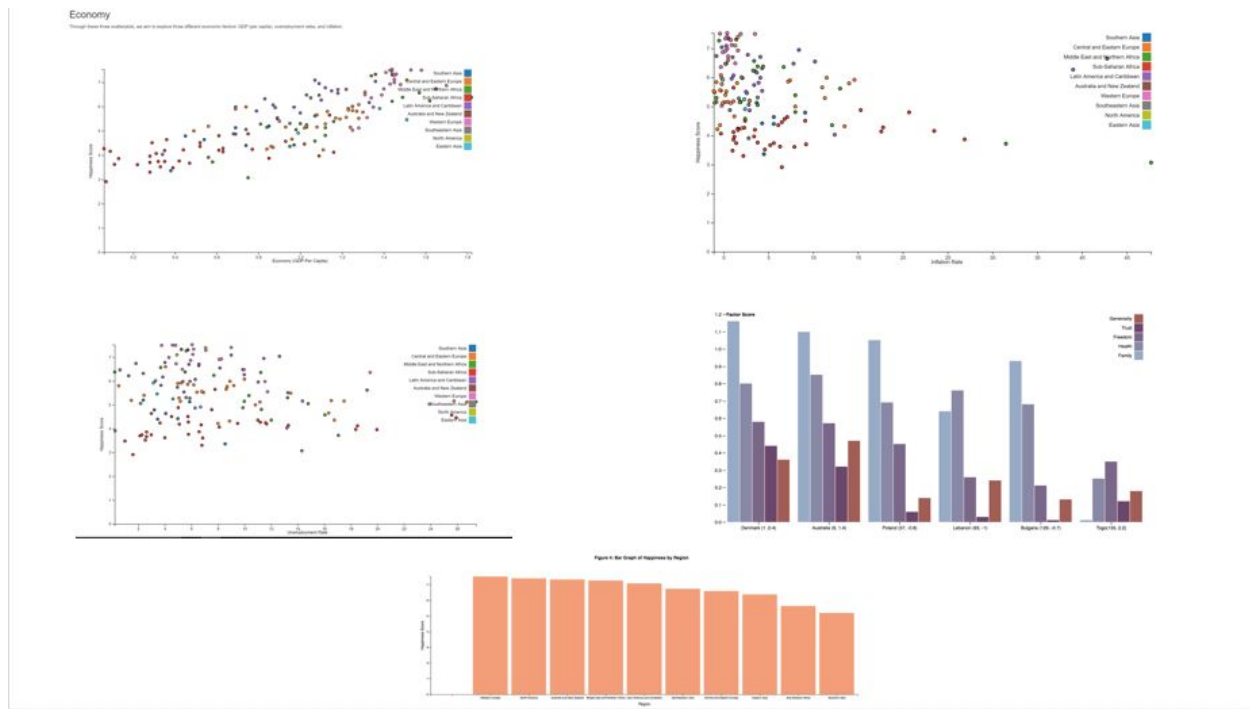
Scripts

There are 158 countries that are in our dataset making up 158 observations from the six factors. We created a script that will reveal important factors we found when doing our first analysis through a few different graphs. You will find the economic factors of inflation rate, GDP, and unemployment throughout tabs as we analyze each region of the world with those factors. The script for our dashboard is called "boo.html" and we have uploaded it in this submission.

Exploratory Data Analysis

From the beginning, we wanted to determine which factors were the best predictors of happiness around the world by region, therefore we wanted simple graphs to compare and identify these factors. We believed that generating two different graph types to start the analysis would provide some great initial insight. From Figure 1, you can see the three scatter plots and how these three different factors correlate with happiness. From the bar chart, you can see how the regions as a whole differ when it comes to happiness. As predicted, health and freedom have a positive correlation with happiness score, indicating that both variables are good predictors of happiness. Generosity, however, does not have much correlation with happiness score, as shown in the picture below, indicating that it is not a strong predictor of happiness. From the bar graph, we notice that regions containing more developed countries, like Western Europe, North America, Australia and New Zealand, are happier. As expected, regions containing more developing countries, are less happy like Sub-Saharan Africa and Southern Asia.

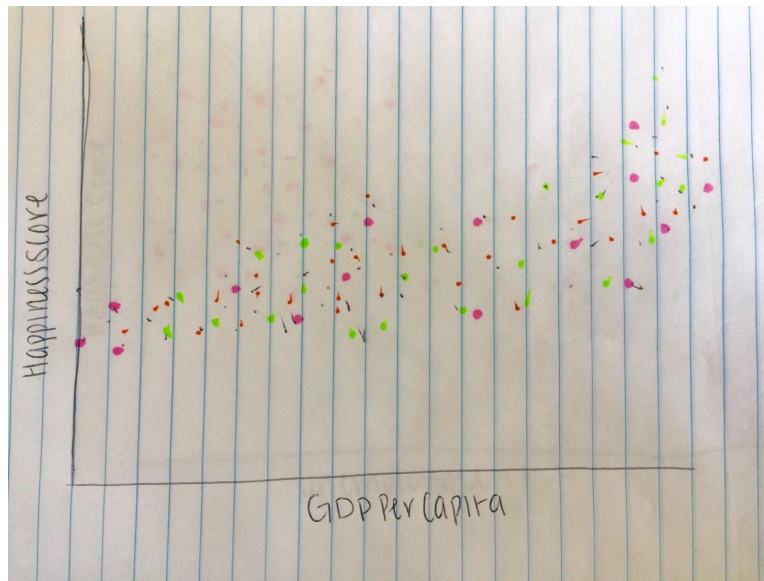
Figure 1



Design Evolution

The World Happiness Report dataset provided us a clear idea of what type of visualizations we wanted to implement. We wanted to produce a few simple graphs to provide a depiction of country and regions happiness scores in relation to those three economic metrics. One of the initial sketches was creating scatter plot of the region's happiness scores against their GDP per Capita, which is displayed below in Figure 2. We have ordered it by region which is also color coded to provide insight on possible trends that occur when relating happiness to GDP.

Figure 2

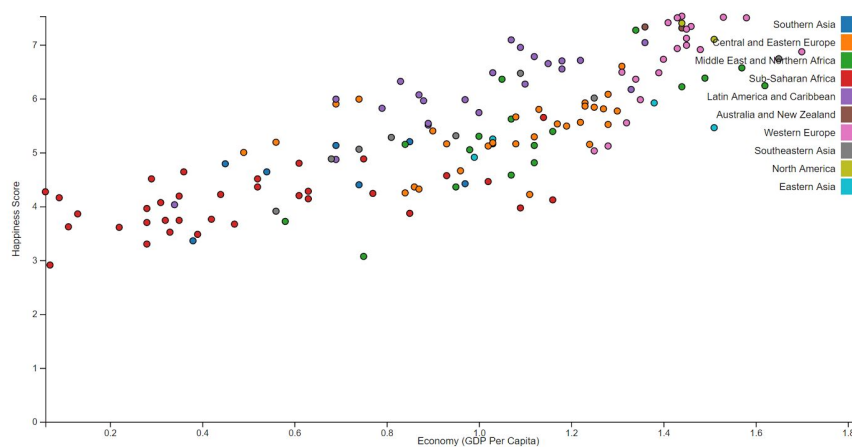


Below is our findings from conducting this graph, with Happiness Score on the y axis, and GDP on the x axis. From Figure 3, we can see that, overall, there is a somewhat positive correlation between GDP and happiness. One can also make the conclusion that happiness score in regards to GDP does depend somewhat on which region of the world the person is in and how their economy is doing along with whether or not the factor of GDP effects that country's happiness. For example, Western European countries cluster around the right, upper side of the scatterplot indicating their happiness score is high as well as their GDP level. Just the opposite is seen with Sub-Saharan African countries. Their GDP scores were all ranked low as well as their happiness scores in relation to their GDP. These countries can be found on the lower tip of the scatter plot.

Figure 3

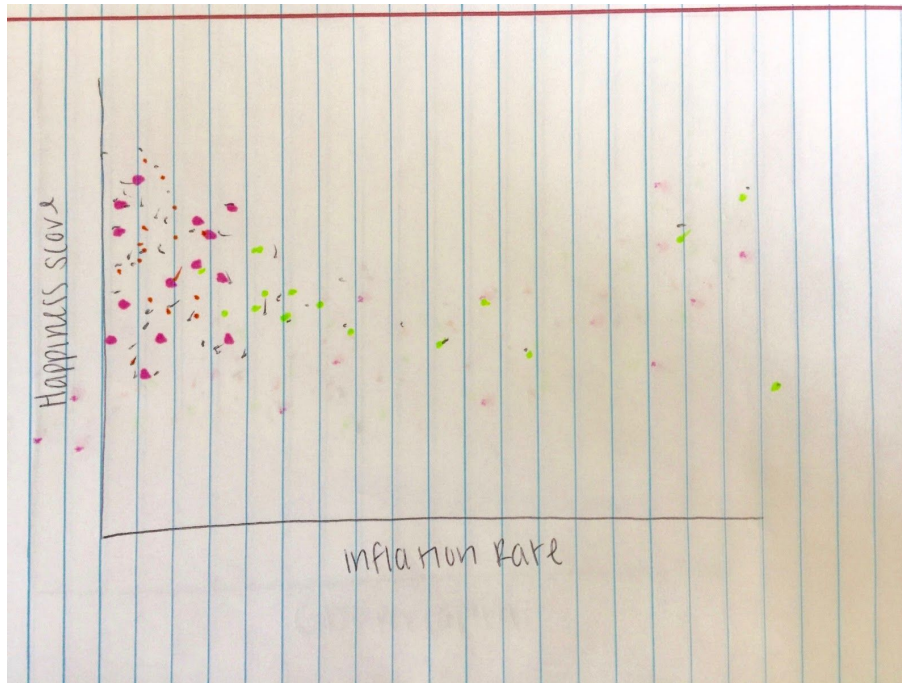
Economy

Through these three scatterplots, we aim to explore three different economic factors: GDP (per capita), unemployment rates, and inflation.



We were also interested in seeing how inflation rate related to Happiness Scores varied by region. Figure 4 shows a rough draft of what we would hope to see when making a scatterplot graph of this data. Regions would vary by color, however overall we would expect to see the colors all clustering around together. This will allow us to see if inflation rate plays a significant role in whether or not the country has a high happiness rating.

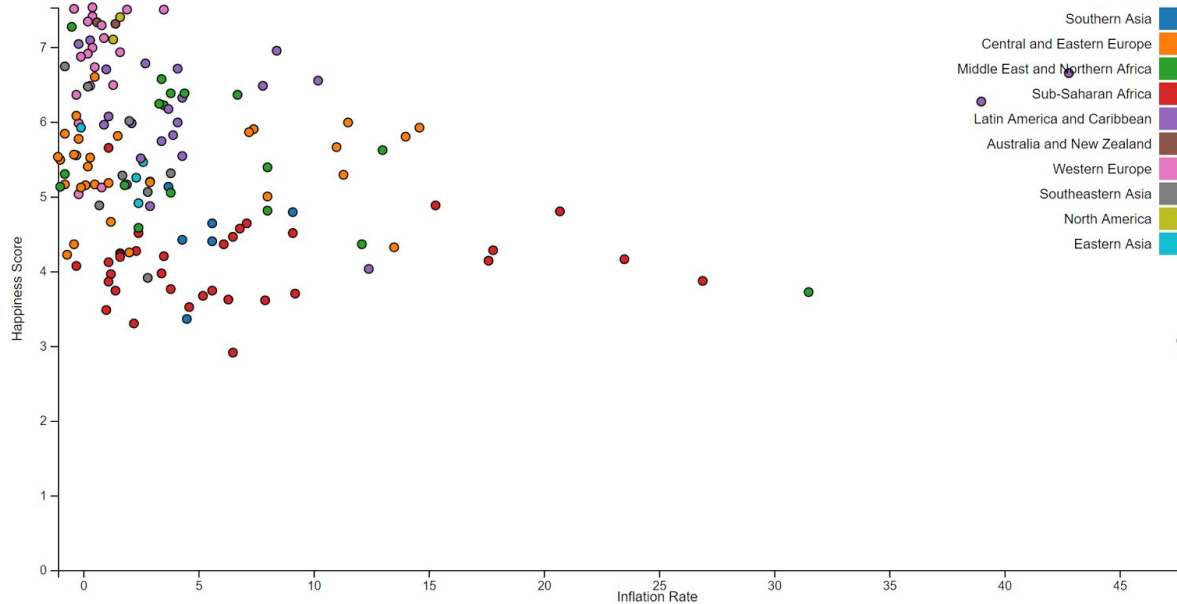
Figure 4



Below on Figure 5, is our findings from conducting the graph on inflation rate (x axis) in relation to happiness score(y axis). Overall, one can see how there is not much of a correlation within this graph, however more of a general conclusion. This graph gives the illusion that countries are happier when their inflation rates are much lower. From our knowledge, we agree with the illusion of this graph, however did notice two outliers where this illusion did not make sense. When looking at Argentina and Suriname, they had high inflation rates yet their happiness levels were also high. When diving deeper into these two outlier points, we found interesting background knowledge that plays a factor into why these countries are still so happy when their inflation rates are so high. Argentina has very low government corruption as well as a decently long life span. We believe from those aspects of Argentinians life is why that their happiness level is so high despite having a high inflation rate. Suriname also has interesting cultural aspects which allows them to remain very happy as a country. Suriname was under Dutch rule up until 1975. Denmark, for the past few years, has been ranked as the happiest country in the entire world. Based on that data, we believe that Suriname has strong cultural ties still to Denmark, and those cultural influences would allow the people in Suriname to remain very happy despite having a high inflation rate. From these findings, we can see a general conclusion that inflation rates that are low generally leaves countries happier, however there are

exceptions to this like Argentina and Suriname where other factors are considered more important therefore leaving them with high happiness scores.

Figure 5



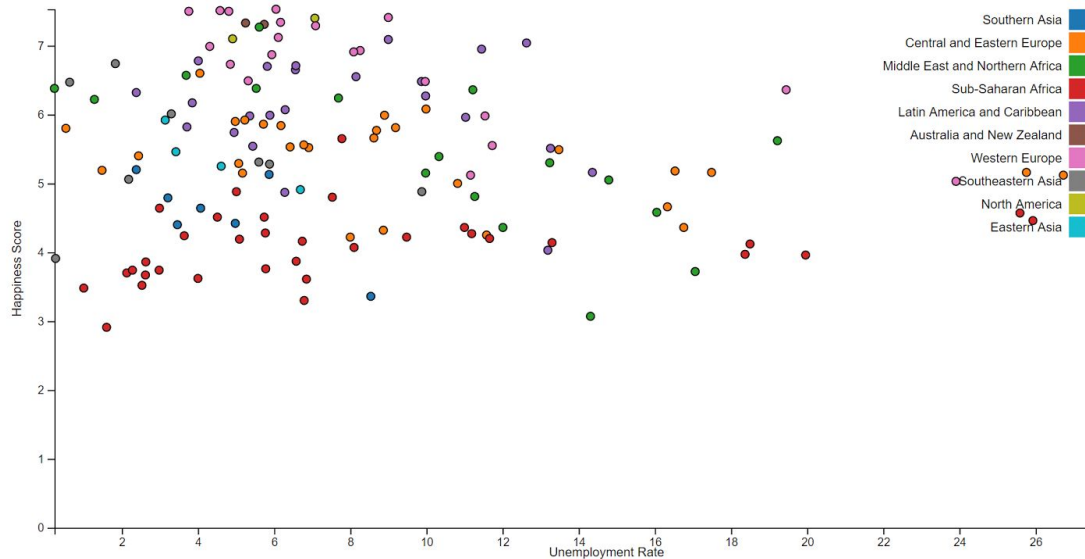
Another scatterplot graph, shown in Figure 6, is to determine if the factor unemployment rate has a relation to happiness score. Our hope is that we can see a significant relationship between countries happiness scores in relation to unemployment rate. Regions are split up by color, therefore we will be able to determine a trend of unemployment rate in relation to parts of the world.

Figure 6



Below shown in Figure 7, is our findings from conducting a graph of unemployment rate(x) in relation to happiness score (y). Overall, we concluded that there was not much of a correlation between happiness and unemployment rate. The results clustered around in a cloud formation within the scatter plot. In our opinion, unemployment rate is not a good predictor when determining a country's happiness score.

Figure 7



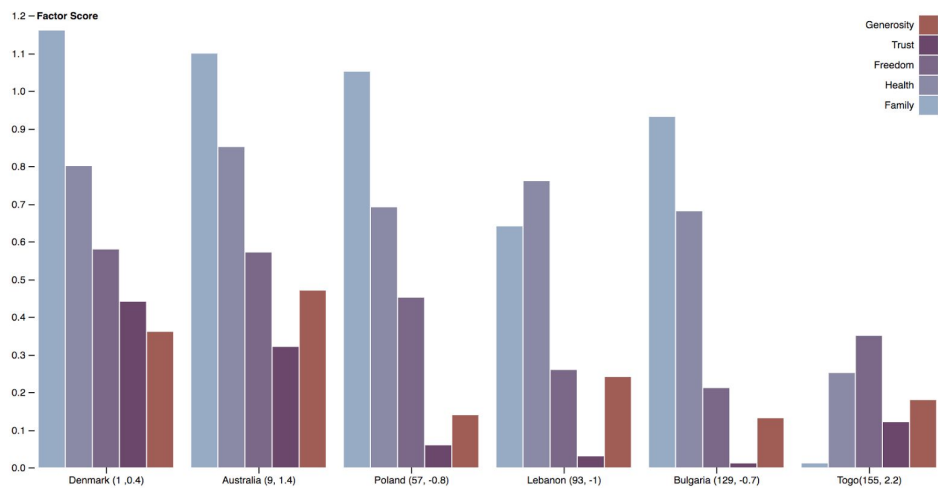
A group graph was created, shown in Figure 8, to drill down into different factors and compare them within a few countries. The countries we are picking for this graph all have an inflation rate of below 3%. Our hope is that we can see a trend between countries who have an inflation rate of below 3% with other factors. Each country will have five bars that will correlate with one of the factors to allow easy comparison.

Figure 8



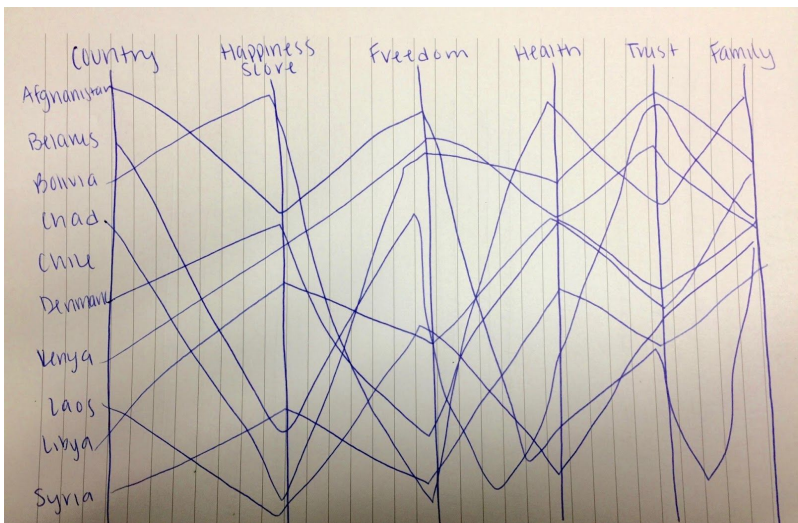
Below shown in Figure 9, is our findings from conducting a group graph generosity, trust, freedom, health, and family score(y) in relation to their country(x). When looking at this graph of countries that have inflation rates below 3%, you can they all have similar levels when comparing the other factors. We wanted to see why countries who have similar inflation rates vary by happiness score. We drilled down to see why they vary by happiness through looking at their other factors.

Figure 9



Below is figure 10
A parallel coordinates graph was created, shown in Figure 10, to compare multiple scores of factors of each country. Our hope is that we can see a significant relationship between countries happiness scores in relation to these factors.

Figure 10



Below shown in Figure 11, is our findings from conducting a parallel coordinates graph. The countries chosen were regions that were either the happiest in our data set, or the least happy. We wanted to compare the countries within these regions to see if there were any correlation within these factors that would contribute to why the countries would be the happiest or unhappy.

Figure 11

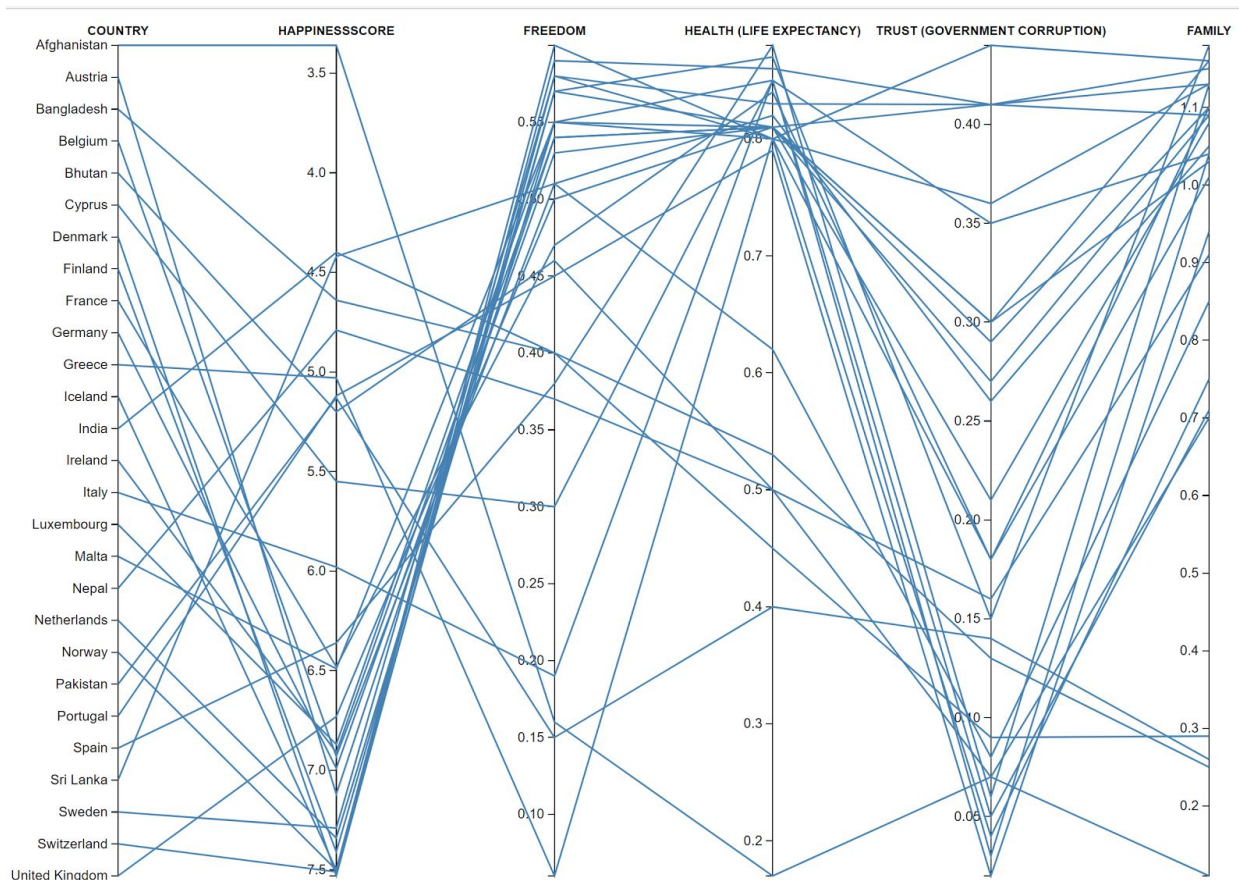


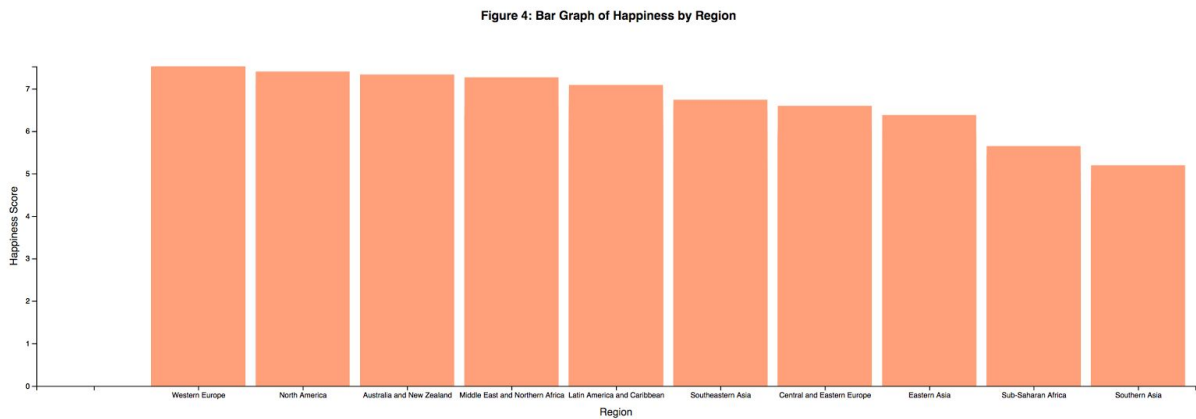
Figure 12, is a graph that we have had originally from project 1 as we believe it shows a great overview of world happiness scores. The regions are color coded to help users further see the differences of happiness scores.

Figure 12



Figure 13 shows the findings we conducted in D3 on happiness score by each region in the world. You can see that there is not much variation in score by region, however one can spot a downward trend in this bar chart as we look at Asian regions as well as the Sub-Saharan African region. These regions tend to score lower on the happiness scale.

Figure 13



Evaluation

Our original goal was to determine the best predictor of happiness and to see if that predictor changes based on what region of the world we are looking at. The graphs that we have created led us to creating three scatterplots that allowed us to drill down into three economic metrics: unemployment rate, inflation rate, and GDP. We originally believed that unemployment rate and inflation rate would be more significant predictors when distinguishing which countries would be happiest amongst the world, however this was not the case. We saw more of a trend when looking at GDP, and not much of a correlation in inflation rate and unemployment rate. However, when looking at inflation rate, we decided to look further into the certain concepts that were found within that graph. We looked at six countries that all had inflation rates below 3%, and then looked at factors such as generosity, trust, freedom, health, and family to see if there was a trend between these six countries and these extra factors. This allowed us to see why countries with similar inflation rates varied by happiness. Our last graph further went into looking at why countries varied by happiness score with a parallel coordinates graph. The parallel coordinates graph looks at the happiest and least happiest countries throughout the world and compares their factor levels against each other. Here, we are able to see the scores of one country and then look at another country's line that will show their scores.

From our initial findings, we will continue to explore other possible predictors to examine if they are significant and if any additional insight can be provided.