

## **Data Visualization Individual Coursework**

### **The Happiest Countries in the World**

#### **Objectives**

This Coursework has two main objectives:

1. Make an exploratory analysis of the 2017 World Happiness Report.
2. Explain the commonalities of the happiest 10 countries ranked in the report.

#### **Motivation**

I have a genuine curiosity to explore literature and findings about happiness. Although my perspective is that the determinant variable of happiness is the personality of individuals, this project aims to explore if living in a specific country has an effect in the happiness of individuals.

#### **Context**

The World Happiness Report is an annual publication of the United Nations Sustainable Development Solutions Network which contains rankings of national happiness and analysis of the data from different perspectives.<sup>1</sup>

In the report, experts in different fields including economics, psychology, survey analysis, and national statistics, describe how measurements of well-being can be used effectively to assess the progress of nations, and other topics.<sup>2</sup>

The variables columns following the happiness score estimate the extent to which each of six factors – economic production, social support, life expectancy, freedom, absence of corruption, and generosity – contribute to making life evaluations higher in each country than they are in Dystopia, a hypothetical country that has values equal to the world's lowest national averages for each of the six factors.<sup>3</sup>

The rankings are composed on the answers of basic questions asked in a poll. The respondents are asked to respond in a cantril ladder fashion: respondents are requested to think of a ladder, with the best possible answer for them being a 10, and the worst possible

---

<sup>1</sup> <http://worldhappiness.report/>

<sup>2</sup> <https://www.newsday.com/news/world/world-happiness-report-2018-1.17466485>

<sup>3</sup> <http://worldhappiness.report/faq/>

answer being a 0. Roughly 3000 surveys in each of the 155 countries were filled according to the World Happiness Report staff.<sup>4</sup>

## **Criticism**

The main critics for this report are centred in the fact that happiness is a subjective matter and it is and hard to quantify.

There is a possibility that this report attempts to manipulate state policy as a form of soft power according to different intellectuals. In the 2017 report, the happiest countries had similar profiles: very educated, rich and highly developed, this has been subject of criticism. In this sense, they claim that they want to influence policy making but that can be interpreted as a lack of scientific rigor.

Due to the fact that this report relies on surveys, it has been said that responses may be different to same questions on happiness if phrasing and placement of questions vary. Also, there are cultural differences in expressing feelings towards happiness that make it extremely hard or impossible to quantify the degree of happiness of different countries.

Finally, this report has received critics for not considering two variables: inequality and unemployment. Nevertheless, UN staff have argued that although inequality and unemployment may have an impact on personal happiness, there is unreliable and incomplete information for the whole 155 country sample.

## **The Dataset**

The main dataset used (“df” in the Jupyter Notebook) has a 155 x 15 shape. The original World Happiness Report of 2017 dataset is available in Kaggle in a 155 x 13 shape, but I added 2 columns (“Nordic Countries”, “Rank”) which take dummy values that I will use in order to explore the commonalities of the top 10 countries. It is important to state that the original dataset has no null values, therefore, so there was no need to do any transformations of the in that sense.

For the correlation analysis I made a reduced form of my main dataset “df” called “corrdf”. This reduced dataset was build with the loc function. It takes into account all the countries (or rows), but only 7 variables: 'Happiness Score', 'Economy', 'Family', 'Health', "Freedom", "Generosity", and "Trust". The reduced dataset shape is 155 x 7 as opposed to 155 x 15.

The average of the happiness score that a country received is around 5.37, the highest was 7.58, and the lowest score received was 2.69. This visual gives us an appealing overview of the happiness score in the report.

---

<sup>4</sup> <http://worldhappiness.report/faq/>

count	155.000000
mean	5.354019
std	1.131230
min	2.693000
25%	4.505500
50%	5.279000
75%	6.101500
max	7.537000

These are the variables that will be explored:

**Country:** The country evaluated.

**Region:** The region that the country belongs to.

**Economy:** GDP per capita of the country.

**Family:** quality of family life, nuclear and joint family.

**Health:** ranking healthcare availability and average life expectancy in the country.

**Freedom:** how much an individual is able to conduct them self based on their free will.

**Trust:** in the government to not be corrupt.

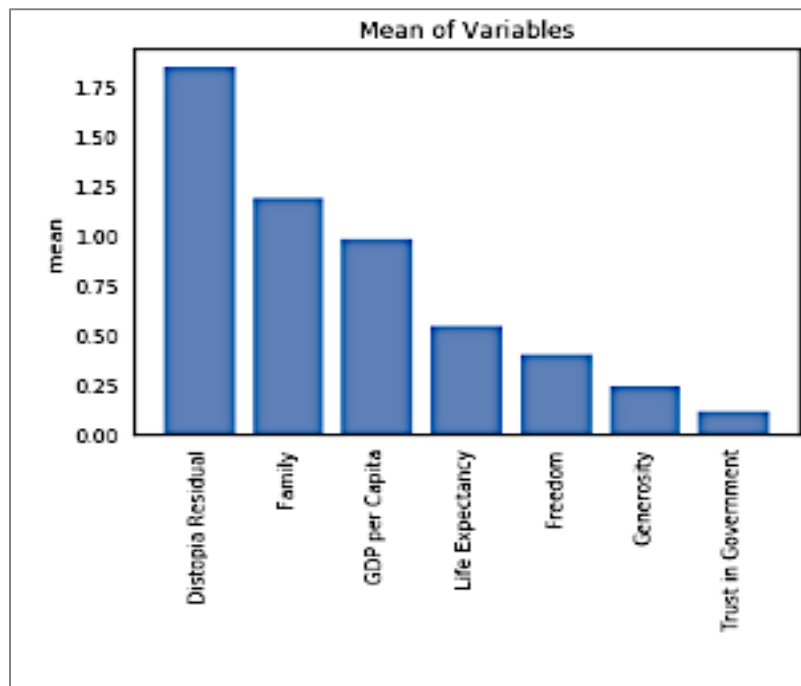
**Generosity:** how much their country is involved in peacekeeping and global aid.

**Dystopia Residual:** Dystopia happiness score (1.85) i.e. the score of a hypothetical country that has a lower rank than the lowest ranking country on the report, plus the residual value of each country.

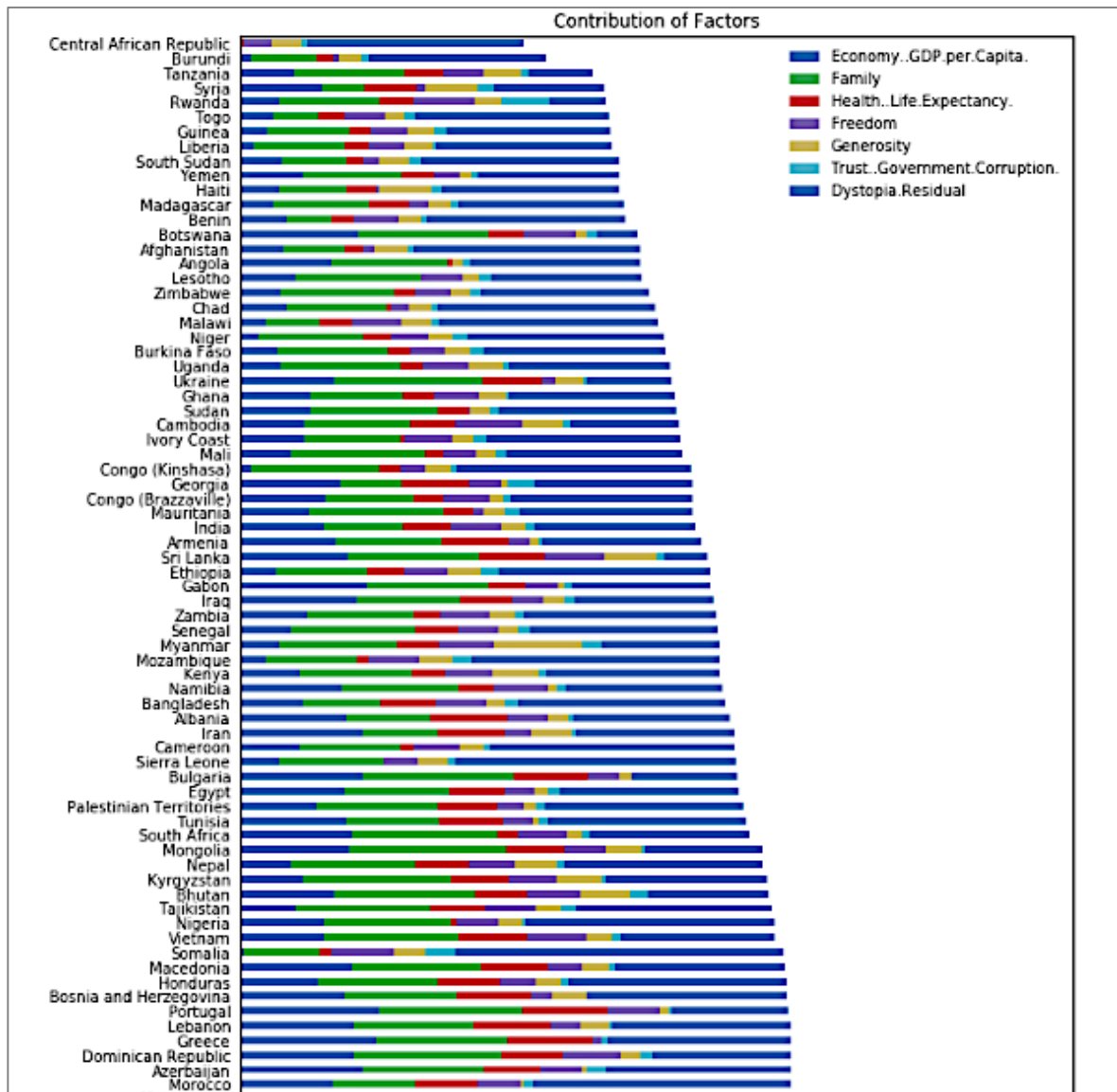
**Personal Note:** I found the dystopia residual variable unclear while researching, I understood that it is used primarily for methodological matters, so it is not going to be analysed much in this project. The main idea is that it is useful to compare a country's happiness score against a hypothetical unhappiest country.

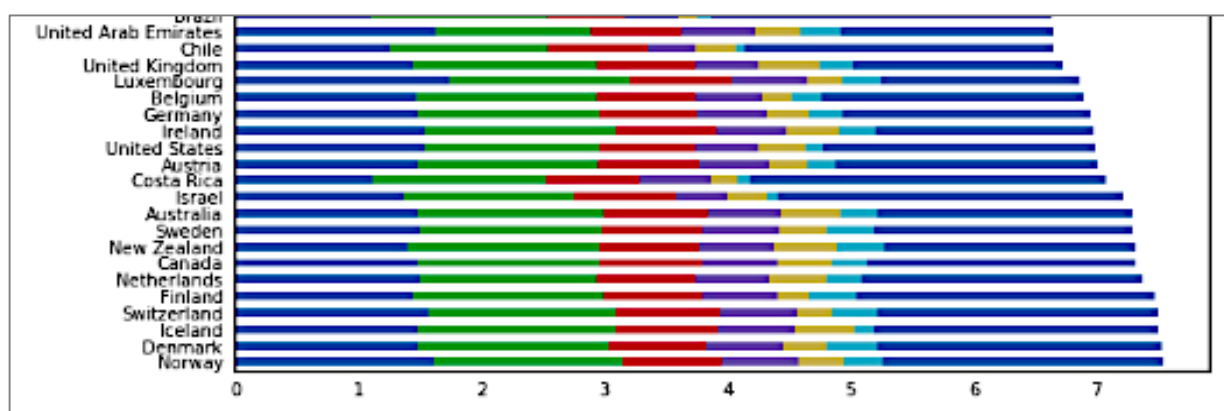
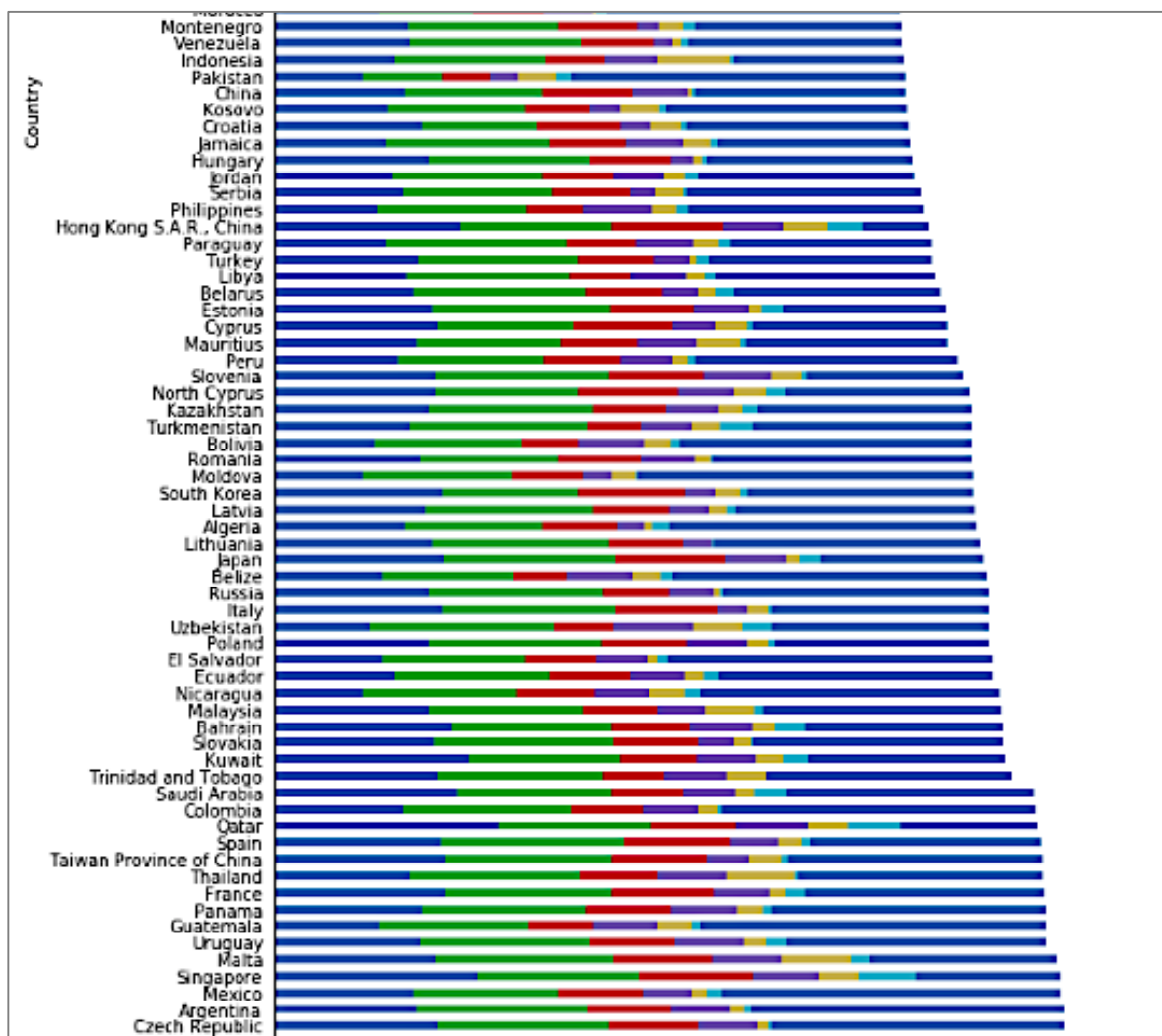
## Weight of variables

This graphs shows the average value of each of the variables that sum the happiness score. As it is shown the variable with the most weight is the dystopia, followed by family, and the last, and with the least weight is trust in government.



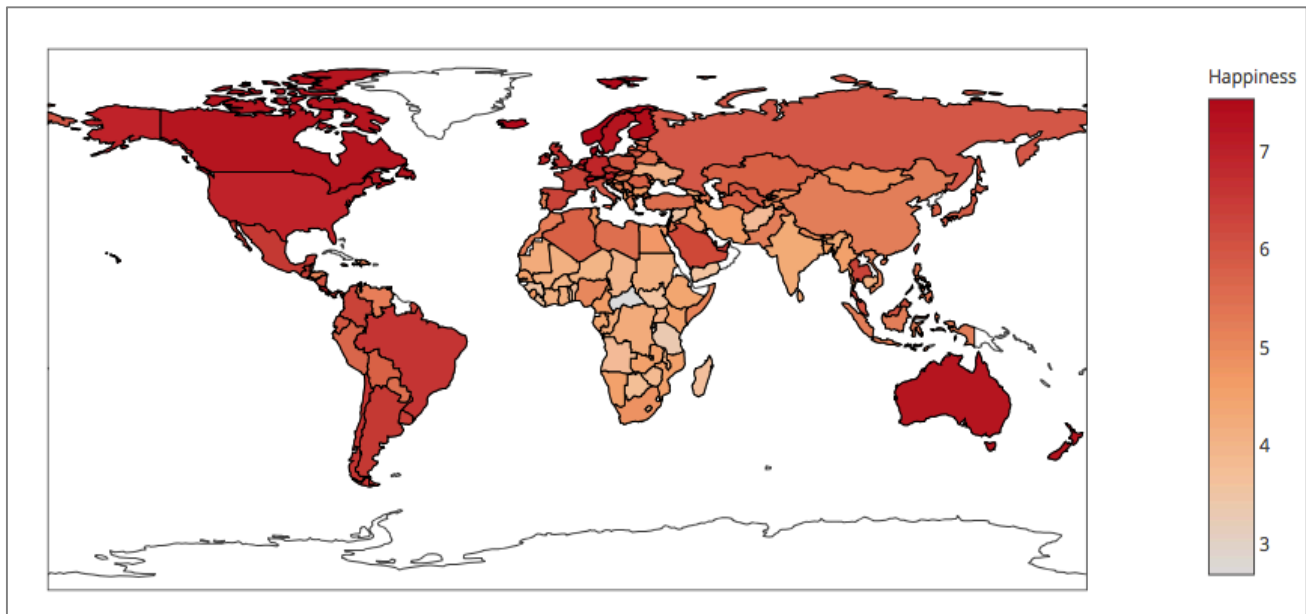
The next three graphs show the contribution of factors to the total score of happiness of each country evaluated. The first graph starts with the Central African Republic on top which is the unhappiest country, and the third and last graph finishes with Norway, the happiest country.





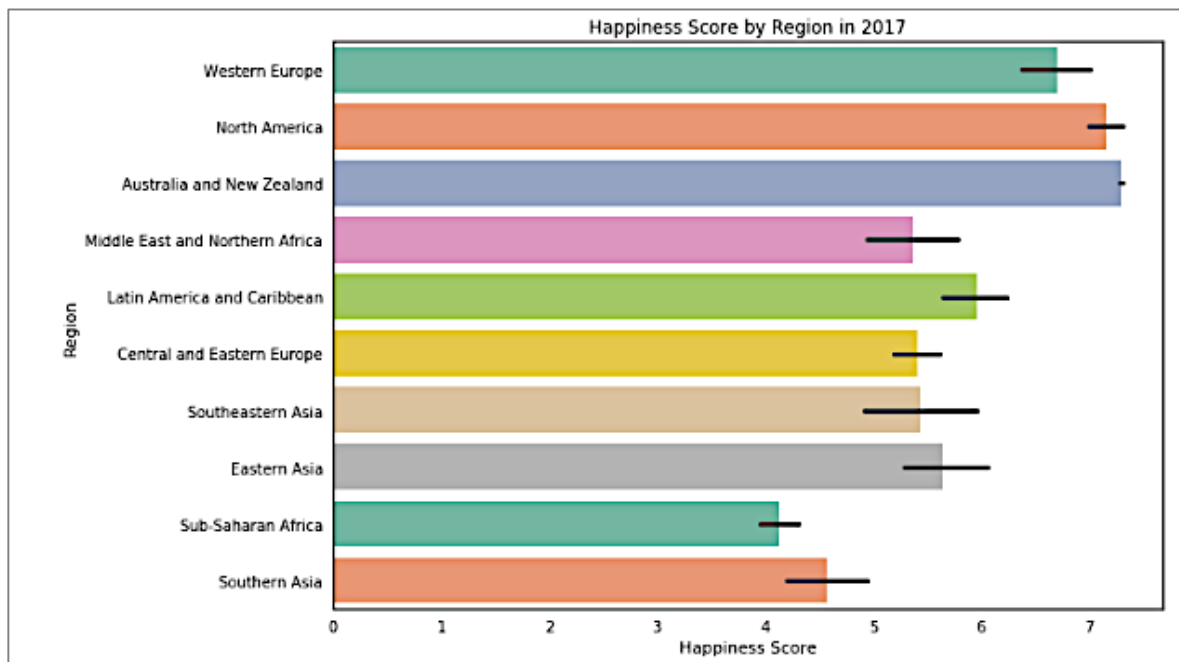
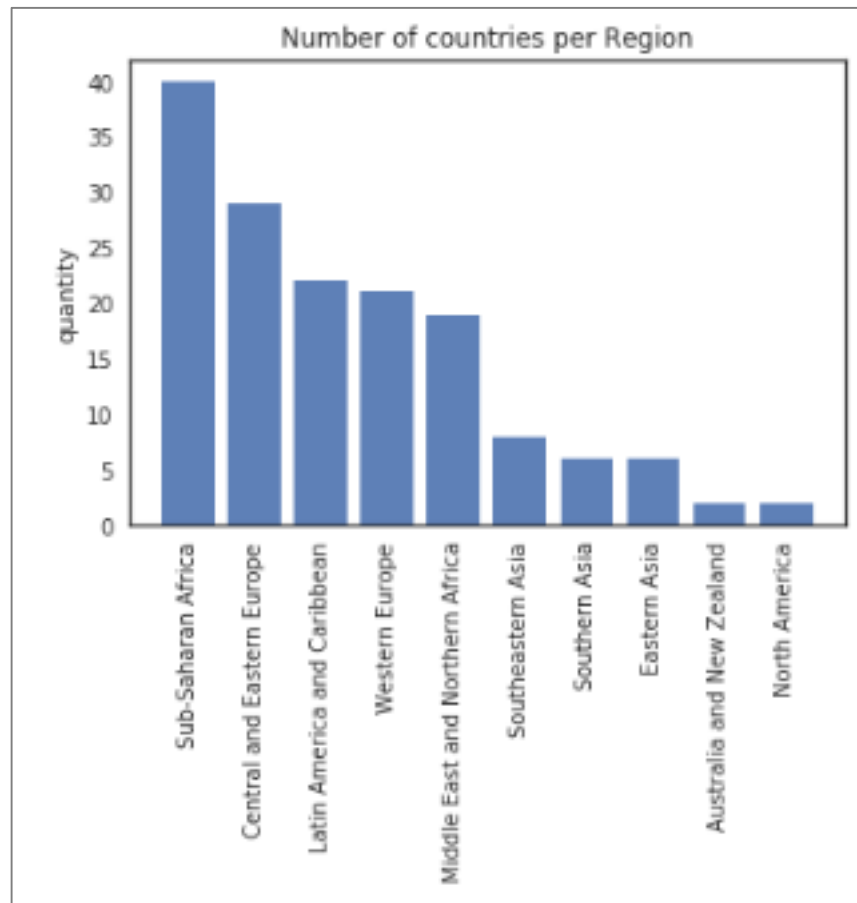
## Happiness Scores Across the World

In this map, the darker colour countries (grey—dark red) have the highest score on the report, and are the happiest, while the light colour countries have a lower score.



## Region analysis

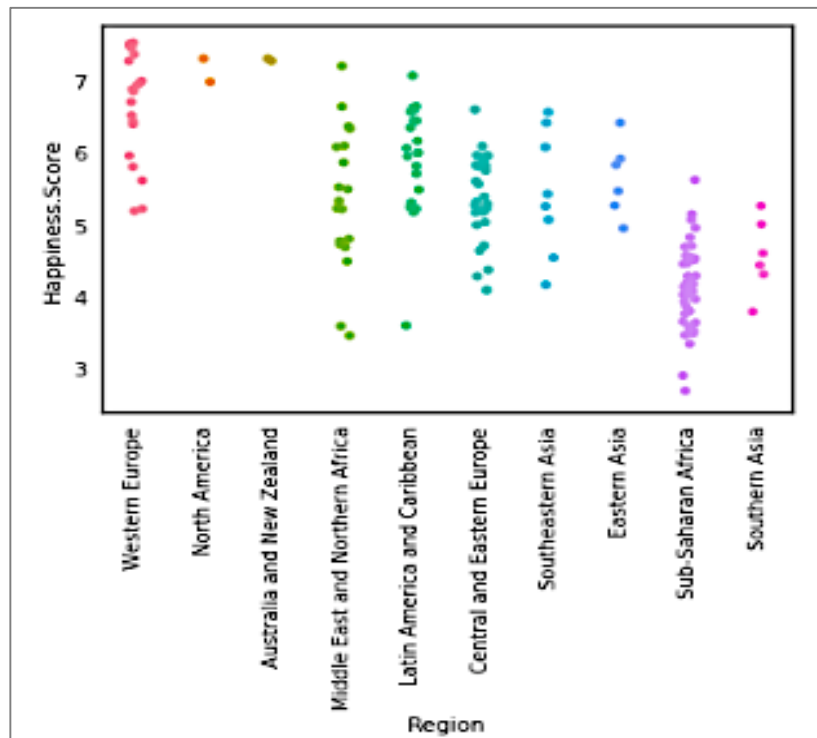
Before speaking about which regions are happier. It is useful to speak about quantity, dispersion and average scores. The following two visuals show the total countries per region taken in the report and the average score of each one of them.





As it is illustrated, there are 10 regions with different amount of countries: Sub-Saharan Africa, Central and Eastern Europe, Latin America and Caribbean, Western Europe, Middle East and Northern Africa, Southeast Asia, Southern Asia, Eastern Asia, Australia and New Zealand, North America.

The scatter plot below shows that regions can differ much in dispersion and scores as well as in number of countries. In terms of dispersion the Middle East and Northern Africa looks like has a big variance, while Latin America has very concentrated values, but it has two outliers in both extremes: Costa Rica (12th) and Haiti (145th).



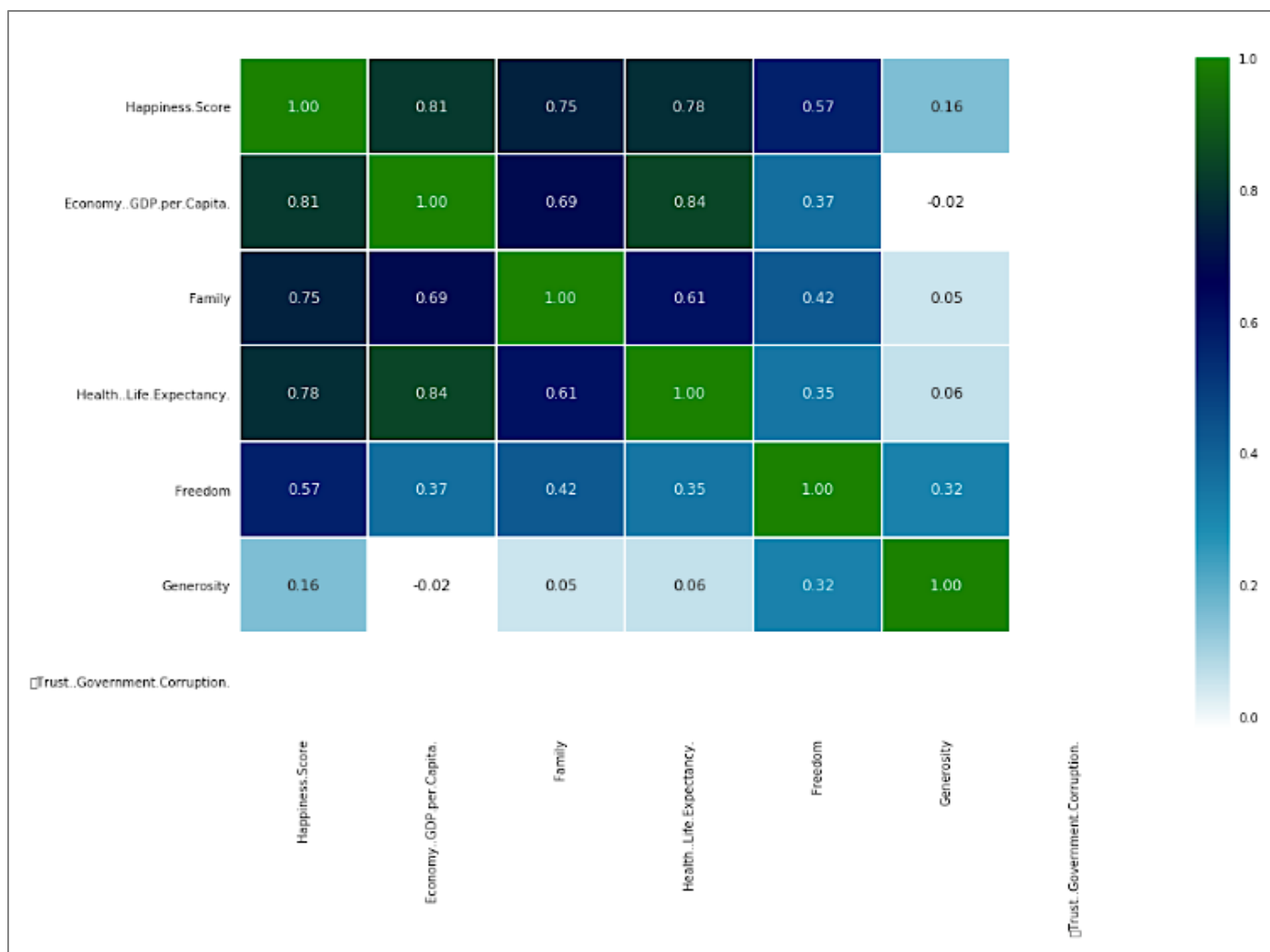
There are two regions that look very compact, but coincidentally they have very few countries. These regions are North America with two countries and the region of Australia and New Zealand. Note that these regions have a very high score and they are composed of highly developed countries, this will be explained in advance.

If we see the scatter plot we can clearly notice that the Sub-Saharan Africa region reaches the lowest values of all. Besides been the region with the highest number of countries with total of 40, most of their countries rank below average.

Western Europe, is the region where the United Kingdom according to the report. This region is quite disperse: as the graph shows, it reaches the highest values of all, but there is a couple of values that are really close to the middle. In a nutshell, Western Europe is spread, but it is highly concentrated in the happiest half of the ranking.

The other European region is the Central and Eastern Europe region. It has clearly lower values in average than Western Europe. As oppose to Western Europe, part of its countries in the lower half of the ranking.

## Relationship among variables



As shown in the visual above, economy, health and family have the highest correlation with happiness scores in that exact order. Freedom has a positive but not strong correlation, while generosity has little correlation with happiness scores.

It is interesting to see that there is no clear inverse relation between any of the variables, while some variables that show a null correlation among them.

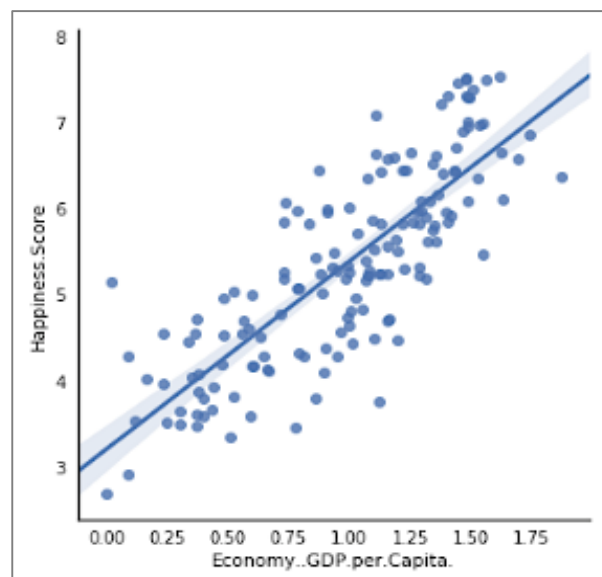
There are two relations outside the ones mentioned that stand out for taking extreme correlation values. The first one is the correlation between health and GDP per capita and the second one is the null correlation between generosity and GDP.

There cannot be a generalization that every rich country or with a high GDP per Capita has an efficient health system. Our sample takes into consideration 155 countries and it is likely that there are outliers, but it can be said that there is a tendency that high GDP per capita countries have high life expectancy.

The correlation between generosity and all the other variables is always close to zero. But it is particularly interesting to see that it has a null correlation (-0.02) with economic power (GDP per Capita) and generosity. There can be different explanations to this fact that exceed the objectives of this project. In Mexico, the country where I am from, since there are many social problems such as poverty, generosity is a strong cultural trait among the lowest economic groups, but no generalization should be made.

## Explaining Money

If we consider the whole 155 countries sample, there is clearly a direct relation between economic power and happiness score. According to the data of this report, having a high GDP per Capita is a requisite to become a top ten country: the happiest ten countries belong to the highest economic quartile.



	Country	Region	Happiness.Rank	Happiness.Score
0	Norway	Western Europe	1	7.537
1	Denmark	Western Europe	2	7.522
2	Iceland	Western Europe	3	7.504
3	Switzerland	Western Europe	4	7.494
4	Finland	Western Europe	5	7.469
5	Netherlands	Western Europe	6	7.377
6	Canada	North America	7	7.316
7	New Zealand	Australia and New Zealand	8	7.314
8	Sweden	Western Europe	9	7.284
9	Australia	Australia and New Zealand	10	7.284

The unhappiest 10 counties, have the same relation between economic power and happiness, the lowest happiness scores belong to extremely poor countries.

However, the money variable can be counterintuitive. Norway rose to the top of the rankings despite declines in oil prices, while the United States, had increases in income and unemployment falling to historic lows, and Americans dropped positions in the 2017 report.

To sum, as shown in the correlation graph, economic power has a strong relation with happiness scores. In this report results, wealth is a requisite to be belong to the happiest countries, but changes from year to year in this variable do not have a strong effect on the happiness rank at least for the highest ranking half.

## Crisis and underdevelopment: a recipe for unhappiness

According to the report, people in Central African Republic are unhappiest with their lives, followed by Burundi (154), Tanzania (153), and Syria (152). Out of the 10 unhappiest countries, 8 of them belong to the Africa.

	Country	Region	Happiness.Rank	Happiness.Score
145	Yemen	Middle East and Northern Africa	146	3.593
146	South Sudan	Sub-Saharan Africa	147	3.591
147	Liberia	Sub-Saharan Africa	148	3.533
148	Guinea	Sub-Saharan Africa	149	3.507
149	Togo	Sub-Saharan Africa	150	3.495
150	Rwanda	Sub-Saharan Africa	151	3.471
151	Syria	Middle East and Northern Africa	152	3.462
152	Tanzania	Sub-Saharan Africa	153	3.349
153	Burundi	Sub-Saharan Africa	154	2.905
154	Central African Republic	Sub-Saharan Africa	155	2.693

The least happy countries are radically different from the happiest ones in terms of development and stability. The lowest ranked countries are considered hotspots of many diseases, political crisis and economic instability.<sup>5</sup>

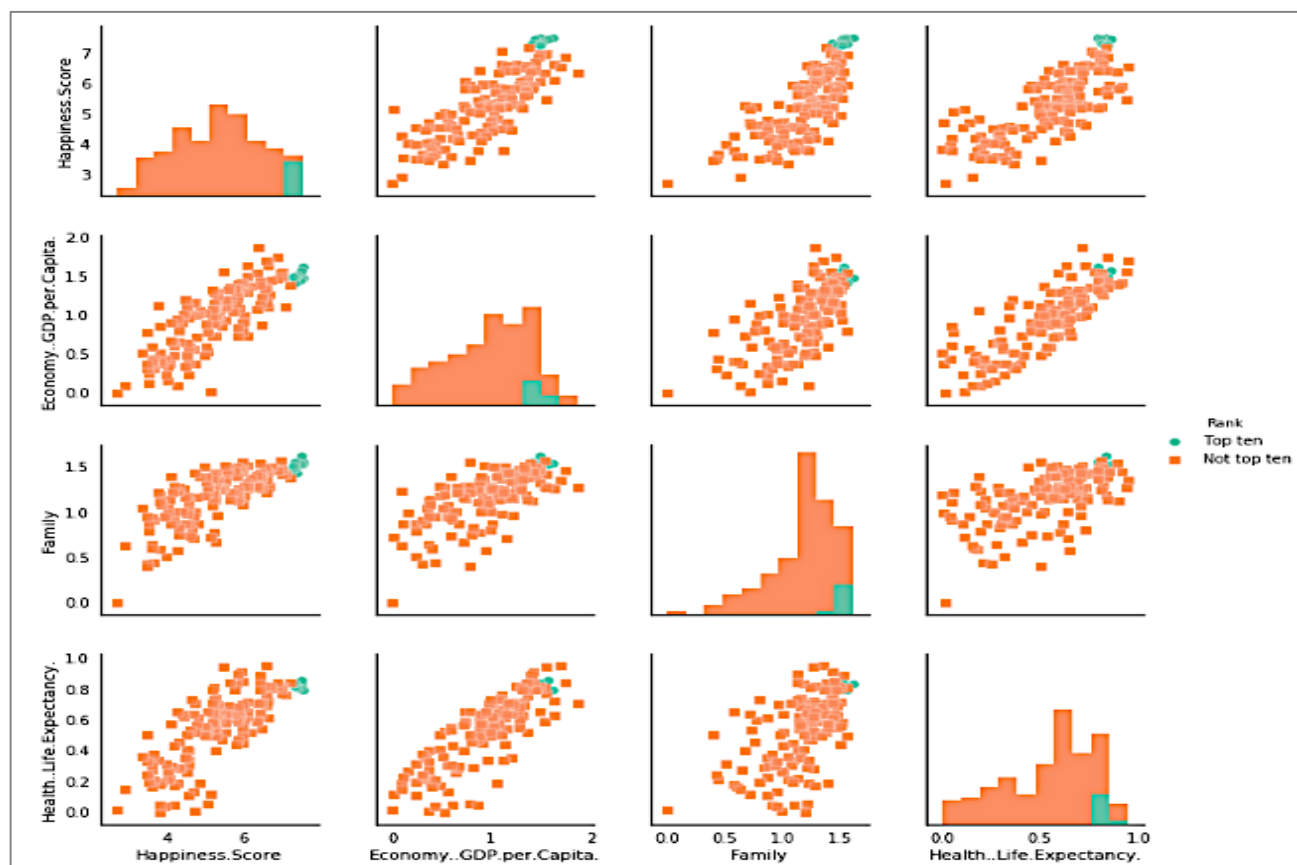
## Happiness is a mixture

By analysing the happiest countries, one can take a similar approach than with the saddest ones. The happiest countries reunite certain characteristics. In particular, they excel in the 4 categories with most weight in the final score: (1) economy, (2) family, (3) health, (4) freedom.

---

<sup>5</sup> <https://www.straitstimes.com/world/7-things-to-know-about-the-2017-world-happiness-report>

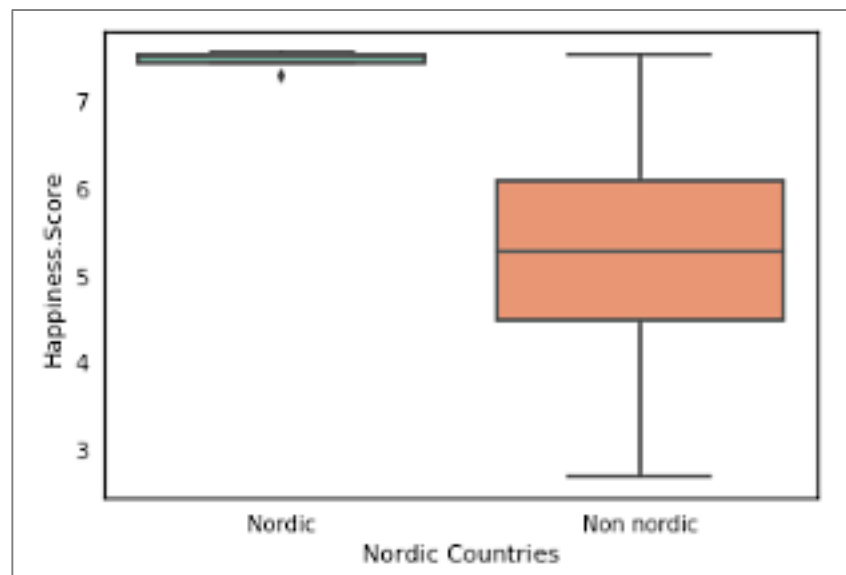
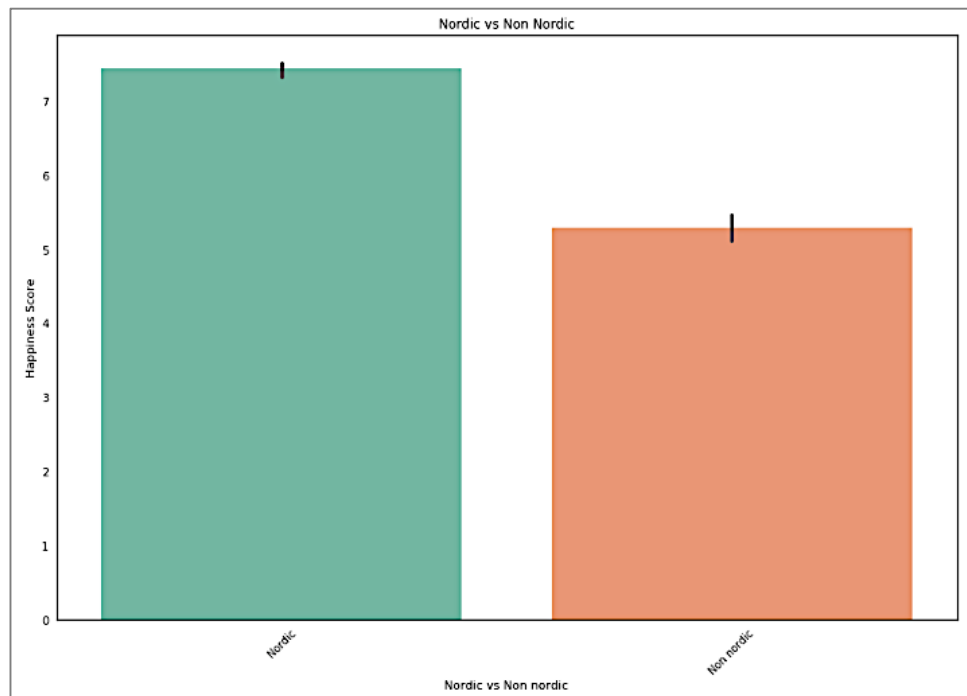
As the following graph shows, top 10 countries (illustrated as green dots) are always clustered in the top-right side of the scatter plots. As it can be appreciated, the top ten countries: (1) Norway, (2) Denmark, (3) Iceland, (4) Switzerland, (5) Finland, (6) Netherlands, (7) Canada, (8) New Zealand, (9) Sweden, and (10) Australia have extremely high values on the variables explained in the previous paragraph.



All these countries may differ much in political and economic systems as well as in their cultural traits. However, it can be said that they are highly developed countries with efficient political and economic systems if compared to the lowest ranked countries. Exploring more commonalities about the top ten countries is something beyond my objectives, but it is really interesting that the 5 Nordic Countries (1) Norway, (3) Iceland, (5) Finland, New Zealand (8), and Sweden (9) appear in the top 10, that will be explored in the following section.

## Nordic Countries

One interesting fact about the 2017 report is that Nordic Countries had very compact scores (not disperse) and notably above average scores as shown in the next graphs. Note that the Nordic countries are illustrated with green colour.



Equality and democracy are of great importance in Scandinavia. Not only that, but Scandinavia is regarded as a wealthy region while high levels of equality are reached, as oppose to Latin America (with large economies but high inequality) or Africa, which is without a doubt the poorest continent per capita in the world.

According to academics the Nordic Countries are regarded as a region with very high degree of social cohesion. Also the entire region is known for its state of well-being, high Human Development Index and quality of life.

The state of well being could not be conceived without the fact that the region can easily reach very high cent tax rates. It can be impressive that people accept such high taxes. In the Nordic countries, the state is intertwined with the society: society not only trust the government, but feels part of it and actively participates.

It can be a premature assumption that if there is a high degree of connection (which implies trust, and government efficiency to reach goals) a country can be reach really high happiness scores, but Nordic Countries fulfil this premise.

## **Final Comments**

The report chose an impossible task according to my point of view, which is to quantify happiness. Although the main goal of the United Nations was not to simply measure happiness, but to influence public policy decisions, I find it irresponsible to call this a “happiness report”.

The report is useful to study how individuals’ self evaluate their life situation in different countries with unique characteristics. The results have a clear relation between development and high scores (with only a few outliers such as Costa Rica) which is tendentious and not very solid academically speaking.

I believe this report is full of good intentions, but I do not think it to be an accurate ranking of happiness per country, because that cannot be quantified. Nordic Countries have very desirable traits that help individuals to reach a stable, with freedom of expression and healthy life, but they are not determinant to one’s happiness.