Analyzing Happiness on a Global Scale

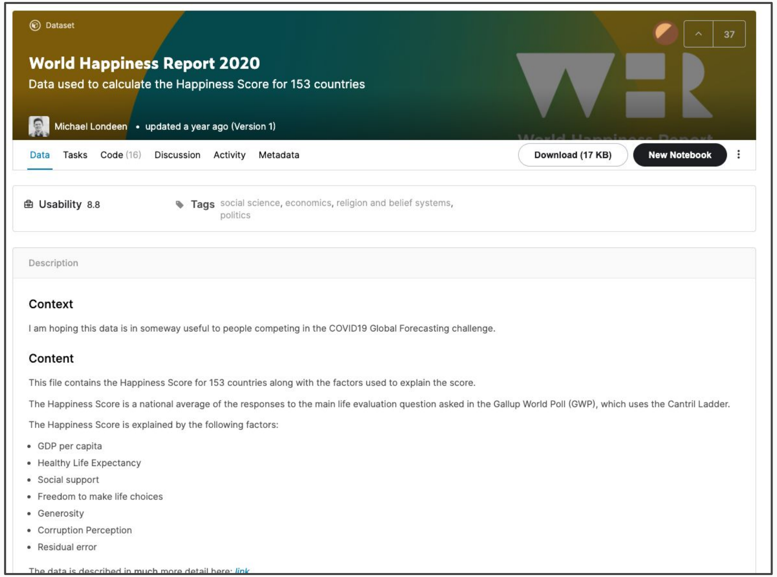
By Valerie Andrade

Motivation & Summary

- Personally speaking, I’m very curious about anything social science-related and therefore was searching for datasets in this area
    - I’m a big fan of the concept of trying to measure different aspects of human development and seeing data compared against other countries, regions, indicators, etc.
- My goal was to come as close as possible to finding and analyzing datasets that measured some kind of human development data against other specific criteria such as country statistics/figures

Dataset #1 - World Happiness Report

- Gallup is a global analytics and research firm that since 2005 has produced a “World Happiness Report” using data from a survey called the Gallup World Poll
- This dataset contains a “Happiness Score” for 153 countries and uses data collected from 2017-2019. It was released Feb. 2020
- The Happiness Score is a national average of the responses to the main life evaluation question asked in the Gallup World Poll (GWP), which uses the Cantril Ladder Scale.
- Source: https://www.kaggle.com/londeen/world-happiness-report-2020?select=WHR20_DataForFigure2.1.csv



World Happiness Report 2020

Data used to calculate the Happiness Score for 153 countries

Michael Londeen • updated a year ago (Version 1)

Usability 8.8

Tags social science, economics, religion and belief systems, politics

Description

Context

I am hoping this data is in someway useful to people competing in the COVID19 Global Forecasting challenge.

Content

This file contains the Happiness Score for 153 countries along with the factors used to explain the score.

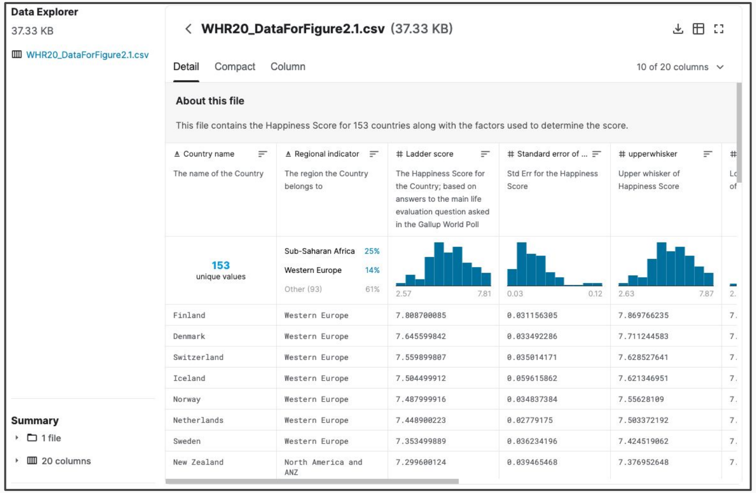
The Happiness Score is a national average of the responses to the main life evaluation question asked in the Gallup World Poll (GWP), which uses the Cantril Ladder.

The Happiness Score is explained by the following factors:

- GDP per capita
- Healthy Life Expectancy
- Social support
- Freedom to make life choices
- Generosity
- Corruption Perception
- Residual error

The data is described in much more detail here: *link*

Dataset #1 - World Happiness Report



Data Explorer

37.33 KB

WHR20_DataForFigure2.1.csv

WHR20_DataForFigure2.1.csv (37.33 KB)

Detail Compact Column

10 of 20 columns

About this file

This file contains the Happiness Score for 153 countries along with the factors used to determine the score.

Country name	Regional indicator	Ladder score	Standard error of ...	upperwhisker	#
The name of the Country	The region the Country belongs to	The Happiness Score for the Country; based on answers to the main life evaluation question asked in the Gallup World Poll	Std Err for the Happiness Score	Upper whisker of Happiness Score	Lo of
153 unique values	Sub-Saharan Africa 25% Western Europe 14% Other (93) 61%	2.57 7.81	0.03 0.12	2.63 7.87	2.
Finland	Western Europe	7.808700085	0.031156305	7.869766235	7.
Denmark	Western Europe	7.645599842	0.033492286	7.711244583	7.
Switzerland	Western Europe	7.559899807	0.035014171	7.628527641	7.
Iceland	Western Europe	7.504499912	0.059615862	7.621346951	7.
Norway	Western Europe	7.487999916	0.034837384	7.55628109	7.
Netherlands	Western Europe	7.448900223	0.02779175	7.503372192	7.
Sweden	Western Europe	7.353499889	0.036234196	7.424519062	7.
New Zealand	North America and ANZ	7.299600124	0.039465468	7.376952648	7.

Summary

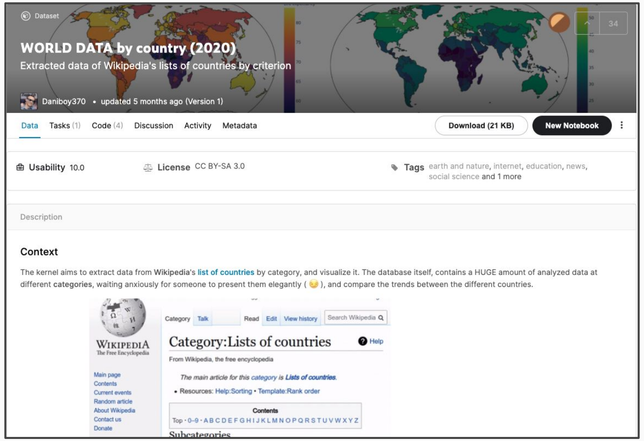
- 1 file
- 20 columns

- The Happiness Score is explained by the following factors:
  - GDP per capita
  - Healthy Life Expectancy
  - Social support
  - Freedom to make life choices
  - Generosity
  - Corruption Perception
  - Residual error

- Their survey included questions for life evaluations including the Cantril Ladder. Example:
  - **“Are you satisfied or dissatisfied with your freedom to choose what you do with your life?** Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?"

Dataset #2 - World Data by Country

- This dataset includes extracted global data from Wikipedia by 9 different categories. For this project I used the following:
  - **Fertility Rate in 2018 for 202 countries (via World Bank)**
    - “The fertility rate is the expected number of children born per woman in her child-bearing years.”
  - **Median Age in 2018 for 224 countries (via CIA World Factbook)**
    - “Median age is the age that divides a population into two numerically equally sized groups - that is, half the people are younger than this age and half are older.”
  - **Urbanization population rate in 2019 for 213 countries (via World Bank)**
    - “Urban population describes the percentage of the total population living in urban areas, as defined by the country.”
  - **Population Growth Rate from 2015 - 2020 for 208 countries (via UN)**



WORLD DATA by country (2020)

Extracted data of Wikipedia's lists of countries by criterion

Daniboy370 • updated 5 months ago (Version 1)

Usability 10.0

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Tags earth and nature, internet, education, news, social science and 1 more

Description

Context

The kernel aims to extract data from **Wikipedia's** list of countries by category, and visualize it. The database itself, contains a HUGE amount of analyzed data at different **categories**, waiting anxiously for someone to present them elegantly (😏), and compare the trends between the different countries.

Category:Lists of countries

From Wikipedia, the free encyclopedia

*The main article for this category is **Lists of countries**.*

- Resources: Help:Sorting • Template:Rank order

Contents

Top · 0–9 · A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Subcategories

Questions

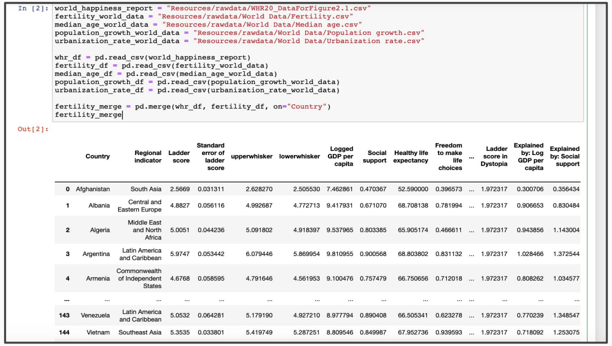
- Question 1:
  - Are any of the following 4 variables (Fertility Rate, Median Age, Urbanization Rate and Population Growth Rate) correlated to a country’s Happiness Score (from per Gallup World Poll)?
- Question 1a:
  - For each variable, how strong, moderate or weak is the correlation?

Data Cleanup & Exploration

- Merged 5 datasets into 1 main dataframe
- Removed unrelated columns from Happiness Score dataset
- Resolved duplicate country issue that created multiple rows
- Had to go through the CSVs to resolve country names that were inconsistent with another and reimported
- Renamed columns
- Confirmed no missing values
- Grouped countries by region indicators (groupby)
- Noticed about 79 countries from World Data dataset were dropped as Happiness Score dataset only measured 153 countries

Data Cleanup & Exploration - Examples

Merged 5 datasets into 1 main dataframe



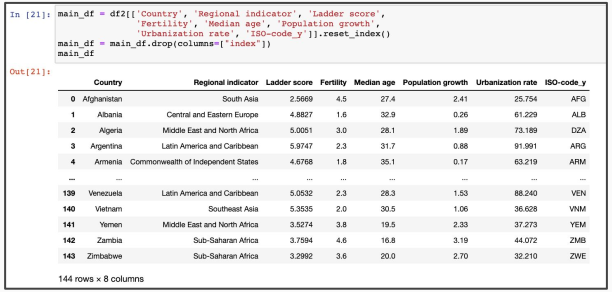
In [2]:

```
world_happiness_report = "Resources/rawdata/WHR20_DataForFigure2.1.csv"
fertility_world_data = "Resources/rawdata/World Data/Fertility.csv"
median_age_world_data = "Resources/rawdata/World Data/Median age.csv"
population_growth_world_data = "Resources/rawdata/World Data/Population growth.csv"
urbanization_rate_world_data = "Resources/rawdata/World Data/Urbanization rate.csv"

whr_df = pd.read_csv(world_happiness_report)
fertility_df = pd.read_csv(fertility_world_data)
median_age_df = pd.read_csv(median_age_world_data)
population_growth_df = pd.read_csv(population_growth_world_data)
urbanization_rate_df = pd.read_csv(urbanization_rate_world_data)

fertility_merge = pd.merge(whr_df, fertility_df, on="Country")
fertility_merge
```

Out[2]:

	Country	Regional indicator	Ladder score	Standard error of ladder score	upperwhisker	lowerwhisker	Logged GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices	...	Ladder score in Dystopia	Explained by: Log GDP per capita	Explained by: Social support
0	Afghanistan	South Asia	2.5669	0.031311	2.628270	2.505530	7.462861	0.470367	52.590000	0.396573	...	1.972317	0.300706	0.356434
1	Albania	Central and Eastern Europe	4.8827	0.056116	4.992687	4.772713	9.417931	0.671070	68.708138	0.781994	...	1.972317	0.906653	0.830484
2	Algeria	Middle East and North Africa	5.0051	0.044236	5.091802	4.918397	9.537965	0.803385	65.905174	0.466611	...	1.972317	0.943856	1.143004
3	Argentina	Latin America and Caribbean	5.9747	0.053442	6.079446	5.869954	9.810955	0.900568	68.803802	0.831132	...	1.972317	1.028466	1.372544
4	Armenia	Commonwealth of Independent States	4.6768	0.058595	4.791646	4.561953	9.100476	0.757479	66.750656	0.712018	...	1.972317	0.808262	1.034577
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
143	Venezuela	Latin America and Caribbean	5.0532	0.064281	5.179190	4.927210	8.977794	0.890408	66.505341	0.623278	...	1.972317	0.770239	1.348547
144	Vietnam	Southeast Asia	5.3535	0.033801	5.419749	5.287251	8.809546	0.849987	67.952736	0.939593	...	1.972317	0.718092	1.253075

Made new DF containing relevant columns



In [21]:

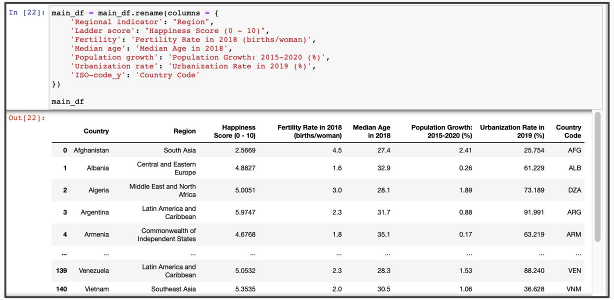
```
main_df = df2[['Country', 'Regional indicator', 'Ladder score',
               'Fertility', 'Median age', 'Population growth',
               'Urbanization rate', 'ISO-code_y']].reset_index()
main_df = main_df.drop(columns=["index"])
main_df
```

Out[21]:

	Country	Regional indicator	Ladder score	Fertility	Median age	Population growth	Urbanization rate	ISO-code_y
0	Afghanistan	South Asia	2.5669	4.5	27.4	2.41	25.754	AFG
1	Albania	Central and Eastern Europe	4.8827	1.6	32.9	0.26	61.229	ALB
2	Algeria	Middle East and North Africa	5.0051	3.0	28.1	1.89	73.189	DZA
3	Argentina	Latin America and Caribbean	5.9747	2.3	31.7	0.88	91.991	ARG
4	Armenia	Commonwealth of Independent States	4.6768	1.8	35.1	0.17	63.219	ARM
...	...	...	...	...	...	...	...	...
139	Venezuela	Latin America and Caribbean	5.0532	2.3	28.3	1.53	88.240	VEN
140	Vietnam	Southeast Asia	5.3535	2.0	30.5	1.06	36.628	VNM
141	Yemen	Middle East and North Africa	3.5274	3.8	19.5	2.33	37.273	YEM
142	Zambia	Sub-Saharan Africa	3.7594	4.6	16.8	3.19	44.072	ZMB
143	Zimbabwe	Sub-Saharan Africa	3.2992	3.6	20.0	2.70	32.210	ZWE

144 rows × 8 columns

Renamed column names and reordered them



In [22]:

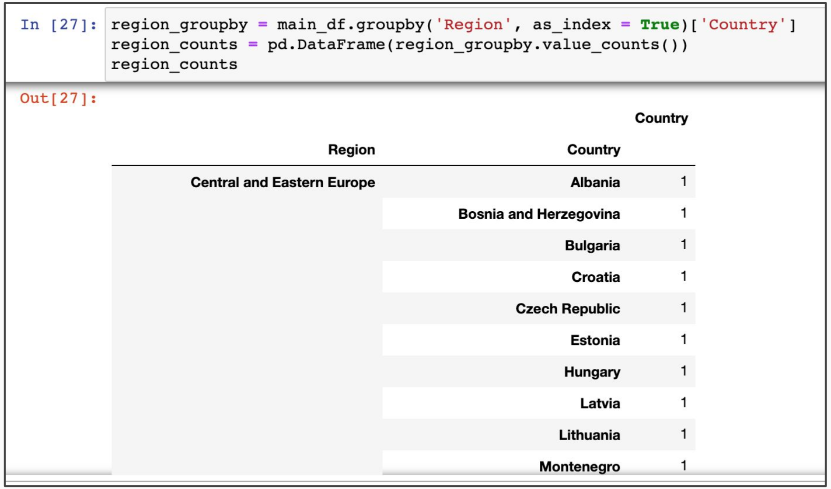
```
main_df = main_df.rename(columns = {
    'Regional indicator': "Region",
    'Ladder score': "Happiness Score (0 - 10)",
    'Fertility': 'Fertility Rate in 2018 (births/woman)',
    'Median age': 'Median Age in 2018',
    'Population growth': 'Population Growth: 2015-2020 (%)',
    'Urbanization rate': 'Urbanization Rate in 2019 (%)',
    'ISO-code_y': 'Country Code'
})

main_df
```

Out[22]:

	Country	Region	Happiness Score (0 - 10)	Fertility Rate in 2018 (births/woman)	Median Age in 2018	Population Growth: 2015-2020 (%)	Urbanization Rate in 2019 (%)	Country Code
0	Afghanistan	South Asia	2.5669	4.5	27.4	2.41	25.754	AFG
1	Albania	Central and Eastern Europe	4.8827	1.6	32.9	0.26	61.229	ALB
2	Algeria	Middle East and North Africa	5.0051	3.0	28.1	1.89	73.189	DZA
3	Argentina	Latin America and Caribbean	5.9747	2.3	31.7	0.88	91.991	ARG
4	Armenia	Commonwealth of Independent States	4.6768	1.8	35.1	0.17	63.219	ARM
...	...	...	...	...	...	...	...	...
139	Venezuela	Latin America and Caribbean	5.0532	2.3	28.3	1.53	88.240	VEN
140	Vietnam	Southeast Asia	5.3535	2.0	30.5	1.06	36.628	VNM

Data Cleanup & Exploration - Examples

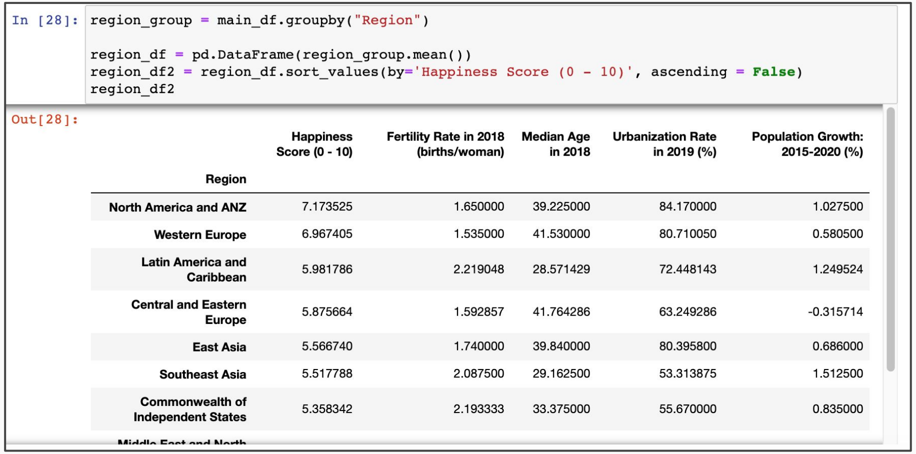
Made new DF to groupby Region & Country



```
In [27]: region_groupby = main_df.groupby('Region', as_index = True)['Country']
         region_counts = pd.DataFrame(region_groupby.value_counts())
         region_counts
Out[27]:
```

		Country
Region	**Country**	
Central and Eastern Europe	**Albania**	1
	Bosnia and Herzegovina	1
	Bulgaria	1
	Croatia	1
	Czech Republic	1
	Estonia	1
	Hungary	1
	Latvia	1
	Lithuania	1
	Montenegro	1

Made another new DF to groupby Region & get the .mean() for each column

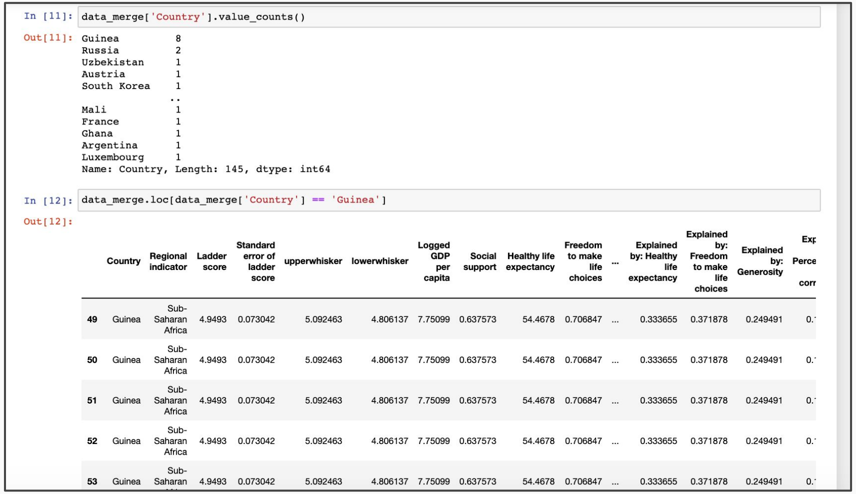


```
In [28]: region_group = main_df.groupby("Region")

         region_df = pd.DataFrame(region_group.mean())
         region_df2 = region_df.sort_values(by='Happiness Score (0 - 10)', ascending = False)
         region_df2
Out[28]:
```

	Happiness Score (0 - 10)	Fertility Rate in 2018 (births/woman)	Median Age in 2018	Urbanization Rate in 2019 (%)	Population Growth: 2015-2020 (%)
Region					
North America and ANZ	7.173525	1.650000	39.225000	84.170000	1.027500
Western Europe	6.967405	1.535000	41.530000	80.710050	0.580500
Latin America and Caribbean	5.981786	2.219048	28.571429	72.448143	1.249524
Central and Eastern Europe	5.875664	1.592857	41.764286	63.249286	-0.315714
East Asia	5.566740	1.740000	39.840000	80.395800	0.686000
Southeast Asia	5.517788	2.087500	29.162500	53.313875	1.512500
Commonwealth of Independent States	5.358342	2.193333	33.375000	55.670000	0.835000
Middle East and North					

Data Cleanup & Exploration - **Issues**

8 duplications of Guinea found



In [11]:
```
data_merge['Country'].value_counts()
```

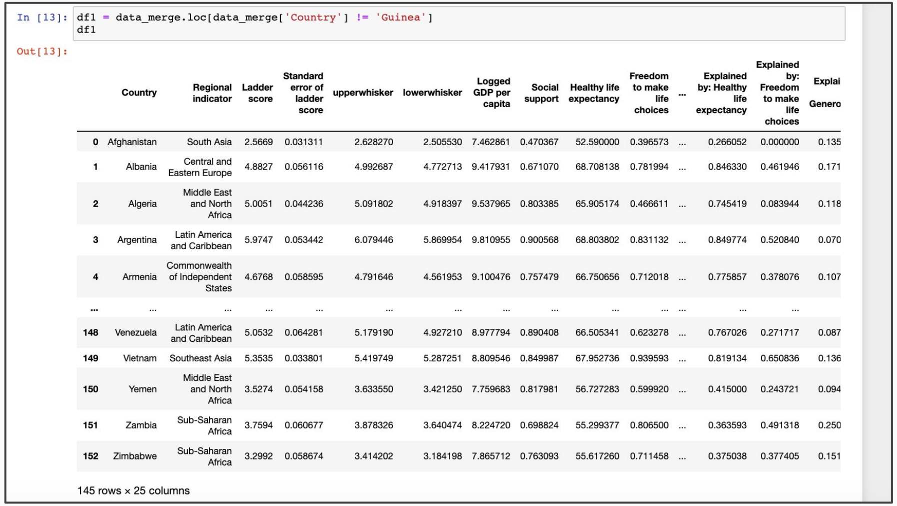
Out[11]:
```
Guinea          8
Russia          2
Uzbekistan      1
Austria         1
South Korea     1
               ..
Mali            1
France          1
Ghana           1
Argentina       1
Luxembourg      1
Name: Country, Length: 145, dtype: int64
```

In [12]:
```
data_merge.loc[data_merge['Country'] == 'Guinea']
```

Out[12]:

	Country	Regional indicator	Ladder score	Standard error of ladder score	upperwhisker	lowerwhisker	Logged GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices	...	Explained by: Healthy life expectancy	Explained by: Freedom to make life choices	Explained by: Generosity	Exp Perce corr
49	Guinea	Sub-Saharan Africa	4.9493	0.073042	5.092463	4.806137	7.75099	0.637573	54.4678	0.706847	...	0.333655	0.371878	0.249491	0.
50	Guinea	Sub-Saharan Africa	4.9493	0.073042	5.092463	4.806137	7.75099	0.637573	54.4678	0.706847	...	0.333655	0.371878	0.249491	0.
51	Guinea	Sub-Saharan Africa	4.9493	0.073042	5.092463	4.806137	7.75099	0.637573	54.4678	0.706847	...	0.333655	0.371878	0.249491	0.
52	Guinea	Sub-Saharan Africa	4.9493	0.073042	5.092463	4.806137	7.75099	0.637573	54.4678	0.706847	...	0.333655	0.371878	0.249491	0.
53	Guinea	Sub-Saharan	4.9493	0.073042	5.092463	4.806137	7.75099	0.637573	54.4678	0.706847	...	0.333655	0.371878	0.249491	0.

Resolved by making new DF & dropping Guinea



In [13]:
```
df1 = data_merge.loc[data_merge['Country'] != 'Guinea']
df1
```

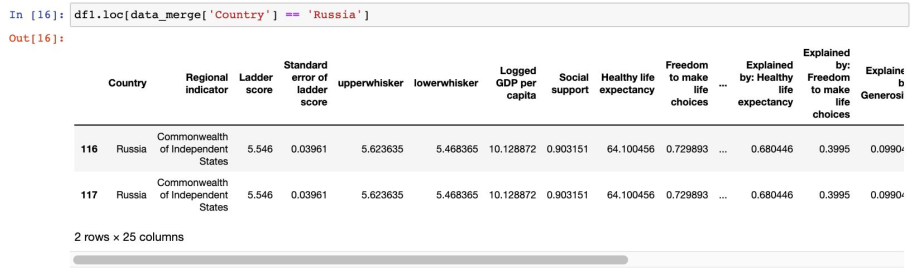
Out[13]:

	Country	Regional indicator	Ladder score	Standard error of ladder score	upperwhisker	lowerwhisker	Logged GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices	...	Explained by: Healthy life expectancy	Explained by: Freedom to make life choices	Explai Genero
0	Afghanistan	South Asia	2.5669	0.031311	2.628270	2.505530	7.462861	0.470367	52.590000	0.396573	...	0.266052	0.000000	0.135
1	Albania	Central and Eastern Europe	4.8827	0.056116	4.992687	4.772713	9.417931	0.671070	68.708138	0.781994	...	0.846330	0.461946	0.171
2	Algeria	Middle East and North Africa	5.0051	0.044236	5.091802	4.918397	9.537965	0.803385	65.905174	0.466611	...	0.745419	0.083944	0.118
3	Argentina	Latin America and Caribbean	5.9747	0.053442	6.079446	5.869954	9.810955	0.900568	68.803802	0.831132	...	0.849774	0.520840	0.070
4	Armenia	Commonwealth of Independent States	4.6768	0.058595	4.791646	4.561953	9.100476	0.757479	66.750656	0.712018	...	0.775857	0.378076	0.107
...	...	...	...	...	...	...	...	...	...	...	...	...	...	
148	Venezuela	Latin America and Caribbean	5.0532	0.064281	5.179190	4.927210	8.977794	0.890408	66.505341	0.623278	...	0.767026	0.271717	0.087
149	Vietnam	Southeast Asia	5.3535	0.033801	5.419749	5.287251	8.809546	0.849987	67.952736	0.939593	...	0.819134	0.650836	0.136
150	Yemen	Middle East and North Africa	3.5274	0.054158	3.633550	3.421250	7.759683	0.817981	56.727283	0.599920	...	0.415000	0.243721	0.094
151	Zambia	Sub-Saharan Africa	3.7594	0.060677	3.878326	3.640474	8.224720	0.698824	55.299377	0.806500	...	0.363593	0.491318	0.250
152	Zimbabwe	Sub-Saharan Africa	3.2992	0.058674	3.414202	3.184198	7.865712	0.763093	55.617260	0.711458	...	0.375038	0.377405	0.151

145 rows × 25 columns

Data Cleanup & Exploration - **Issues**

Found 2 rows of Russia with different values for Fertility Rates



```
In [16]: df1.loc[data_merge['Country'] == 'Russia']
Out[16]:
```

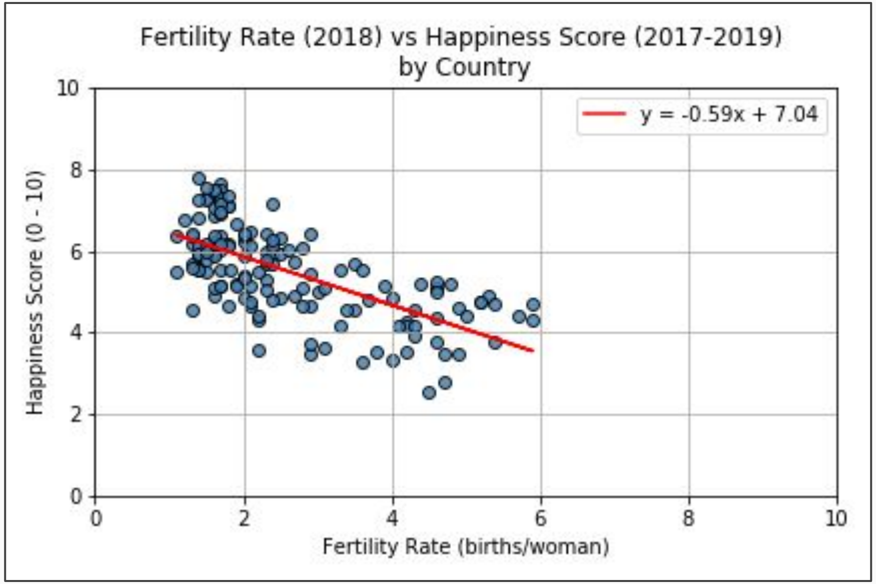
	Country	Regional indicator	Ladder score	Standard error of ladder score	upperwhisker	lowerwhisker	Logged GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices	...	Explained by: Healthy life expectancy	Explained by: Freedom to make life choices	Explaine b Generosi
116	Russia	Commonwealth of Independent States	5.546	0.03961	5.623635	5.468365	10.128872	0.903151	64.100456	0.729893	...	0.680446	0.3995	0.0990
117	Russia	Commonwealth of Independent States	5.546	0.03961	5.623635	5.468365	10.128872	0.903151	64.100456	0.729893	...	0.680446	0.3995	0.0990

2 rows × 25 columns

Resolved by dropping the lower value. Used the code below:

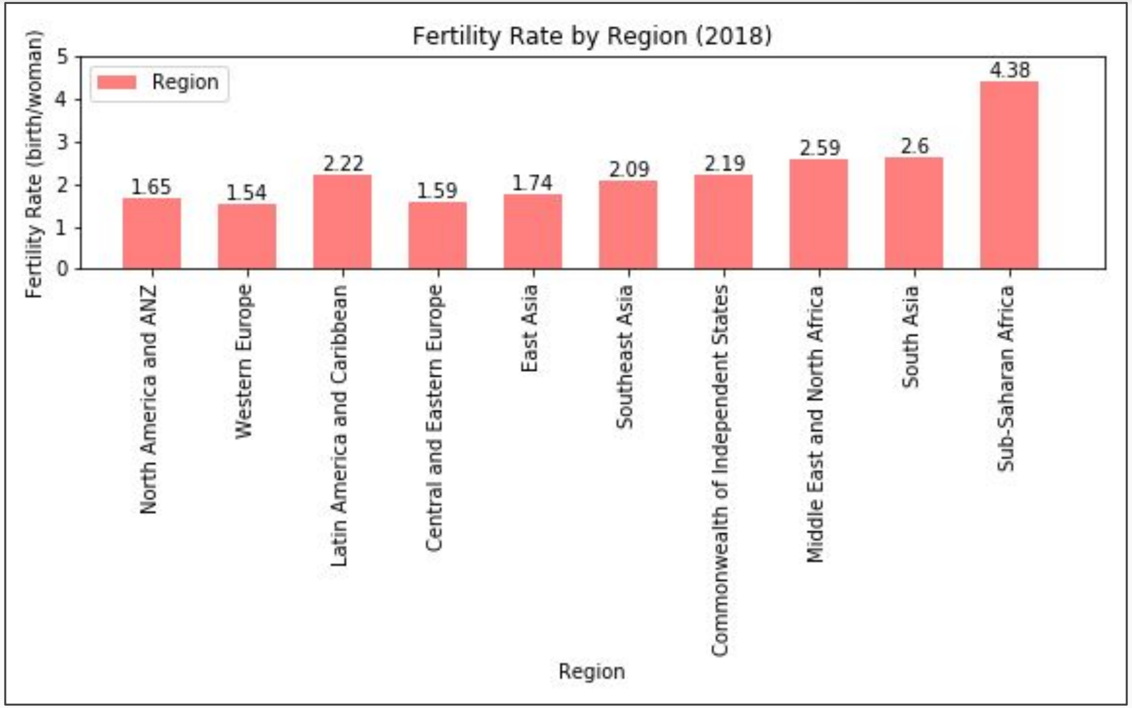
- duplicate_row = df1.loc[(df1['Country'] == "Russia") & (df1['Fertility'] == 1.60)].index
- df2 = df1.drop(duplicate_row)
- df2

Data Analysis - Fertility Rate vs Happiness Score
Scatter Plot & Linear Regression

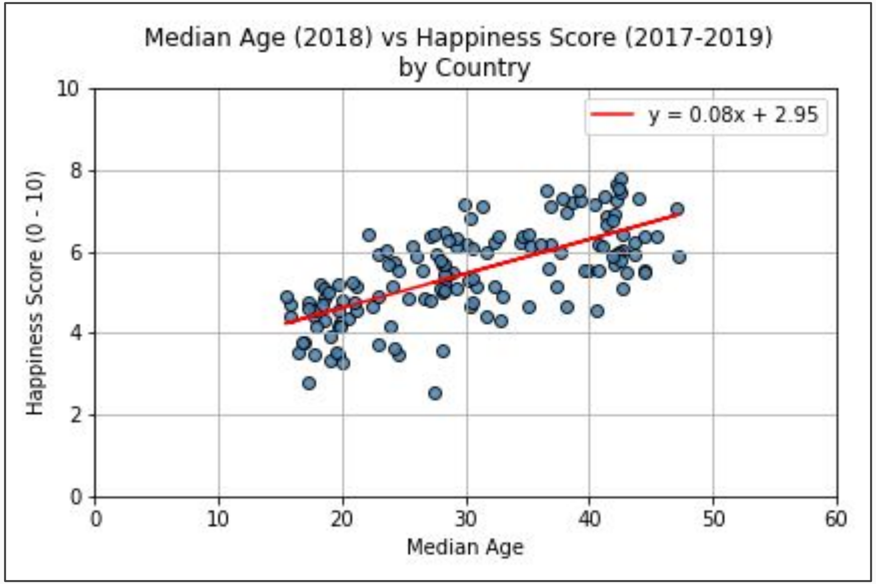


- The correlation coefficient for these two variables is R=-0.6618.
- The scatter plot indicates a moderate negative linear association between a country's Happiness Score and its average Fertility Rates.
- There appears to be a moderate relationship between the two variables.
- It's interesting to see the data show us that for many countries the Happiness Score decreases as the Fertility Rate increases.

Data Analysis - Average Fertility Rate by Region
Bar Chart

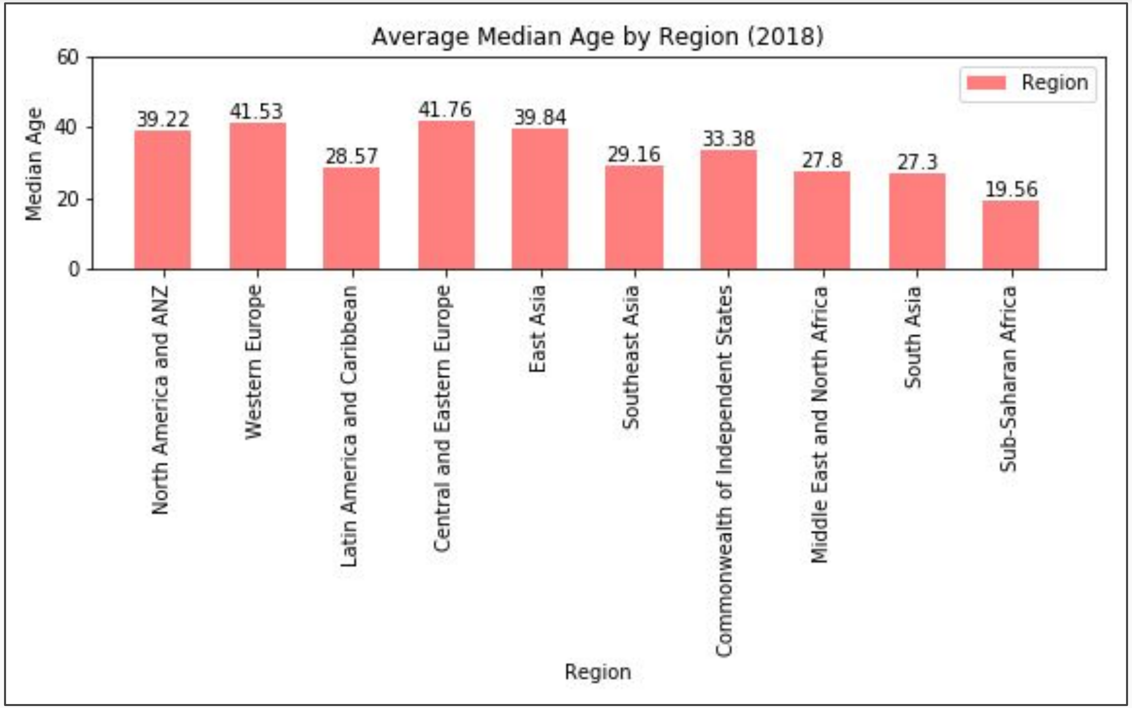


Data Analysis - Median Age vs Happiness Score
Scatter Plot & Linear Regression

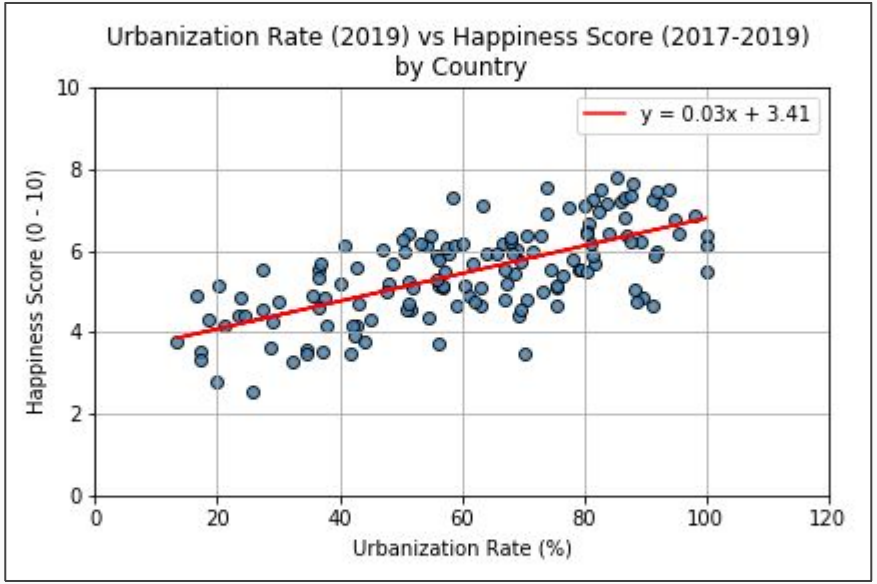


- The correlation coefficient for these two variables is R=0.6753.
- The scatter plot indicates a moderate positive linear association between a country's Happiness Score and its Median Age.
- There appears to be a moderate relationship between the two variables.
- It's interesting to see the data show us that for many countries, the Happiness Score increases as the Median Age increases.

Data Analysis - Average Median Age by Region
Bar Chart



Data Analysis - Urbanization vs Happiness Score
Scatter Plot & Linear Regression



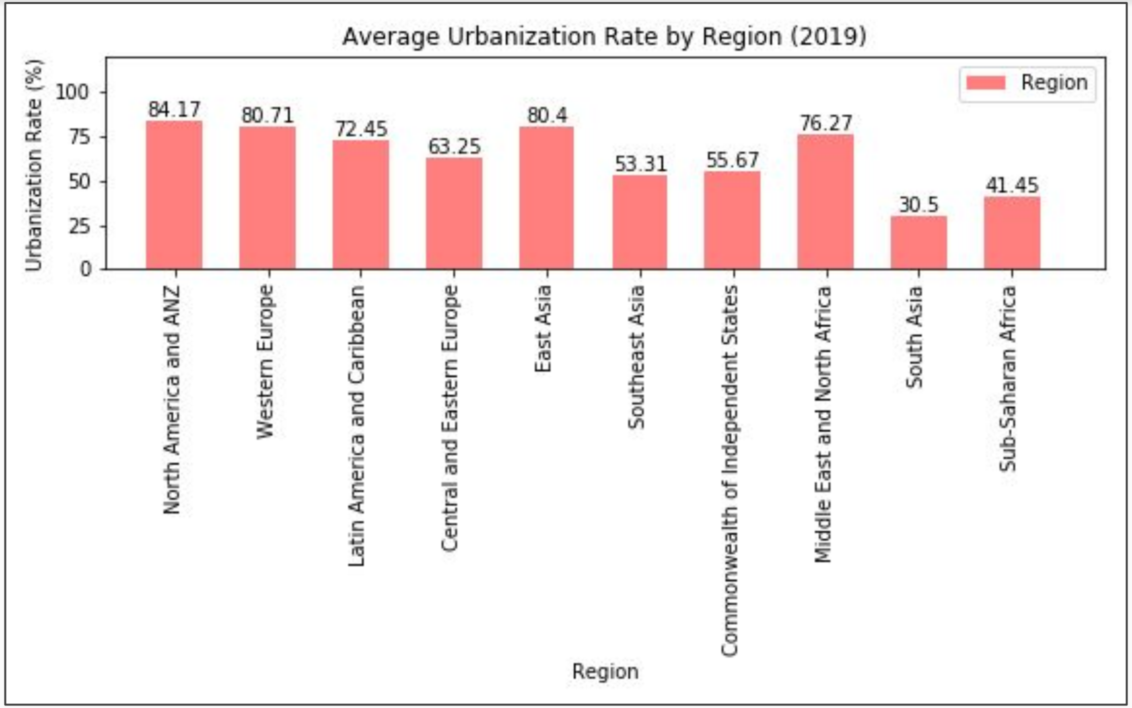
- The correlation coefficient for these two variables is R=0.6676.

- The scatter plot indicates a moderate positive linear association between a country's Happiness Score and Urbanization Population in 2019.

- There appears to be a moderate relationship between the two variables.

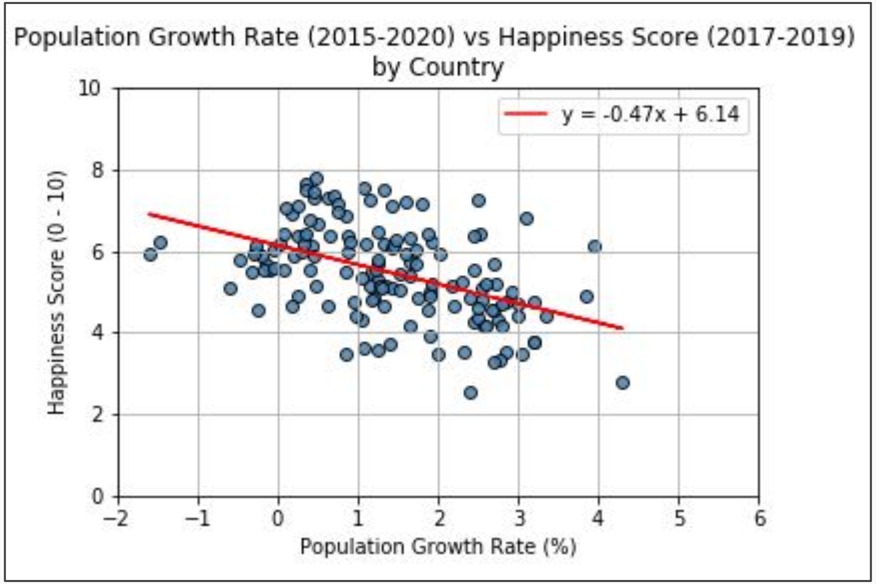
- It's interesting to see the data show us that for many countries the Happiness Score is higher when more of the population is urbanized.

Data Analysis - Avg. Urbanization Rate by Region
Bar Chart



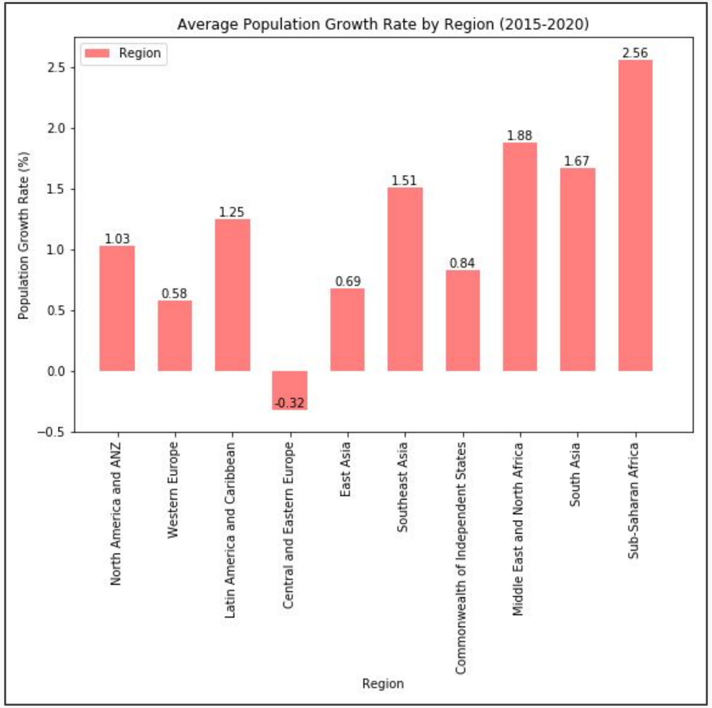
Data Analysis - Pop. Growth vs Happiness Score

Scatter Plot & Linear Regression



- The correlation coefficient for these two variables is R=-0.4712.
- The scatter plot indicates a semi-moderate negative linear association between a country's Happiness Score and Population Growth Rate (estimated 2015-2020).
- There appears to be a semi-moderate relationship between the two variables.
- It's interesting to see the data show us that for some countries the Happiness Score decreases as the Population Growth Rate increases.

Data Analysis - Avg. Pop. Growth Rate by Region
Bar Chart



Findings & Conclusion

- I expected to find stronger correlations than what I did.

- I believe there is a moderate correlation between the World Happiness Score and 3 out of the 4 variables, which were: Fertility Rate, Median Age, and Urbanization Population Rate.

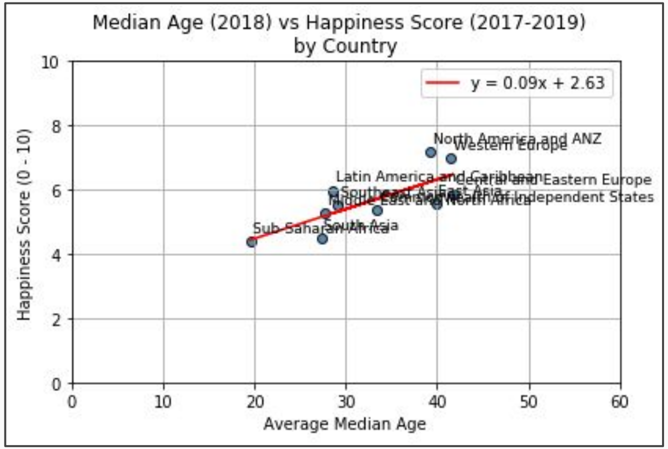
- The correlation between World Happiness Score and Population Growth Rate was the weakest out of the 4 variables, though still semi-moderate.

Final Thoughts

- Difficulties that arose mainly came during the plotting of the bar charts (as the region names were very long and overlapped each other) and displaying the data in a way that makes sense to others. Another issue came during comparison of variables with different years (though they overlapped). The data analysis might not be as accurate as I would've hoped for because of this.

- I also tried very hard to make scatter plots by region with the names of the region next to each plot, but the labels overlapped too much and wasn't readable (as shown to the right).

- Overall, this was an interesting topic to analyze. It made me curious about the endless possibility of variables I could compare against.



Example of code I would try harder to crack next time

THANK YOU