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Data Visualization Final Project

Introduction:

The data I choose is ‘Suicide Rates Overview 1985 to 2016’ from kaggle. This compiled dataset pulled from four other datasets linked by time and place and was built to find signals correlated to increased suicide rates among different cohorts globally, across the socio-economic spectrum.

The reason I chose this particular data is that I want to know how number of suicides is distributed throughout the world and generations. Does the distribution match the assumption in my mind? For example, is the place with higher GDP with lower number of suicides? Or is there any difference in number of suicides between generation? Therefore, I hope to use the data to answers these questions through data visualization.

Summary of Data:

There’re twelve columns in this dataset, including country, year, sex, age, count of suicides, population, suicide rate (suicides/100k pop), HDI (Human Development Index) for year, gdp_for_year ($), gdp_per_capita ($), gdp_for_year ($) and generation. Each data entry in the dataset refers to a single suicides record.

First, we check the distribution of suicide rate in 1985 (Figure 1). It’s a right-skewed distribution for the suicide rate. The most frequent suicide rate in 1985 happens to be with

0~5/100k pop, so does 2016 (Figure 2). We can also find that in 1985, there're more extreme suicide rate between 100~150/100k pop.

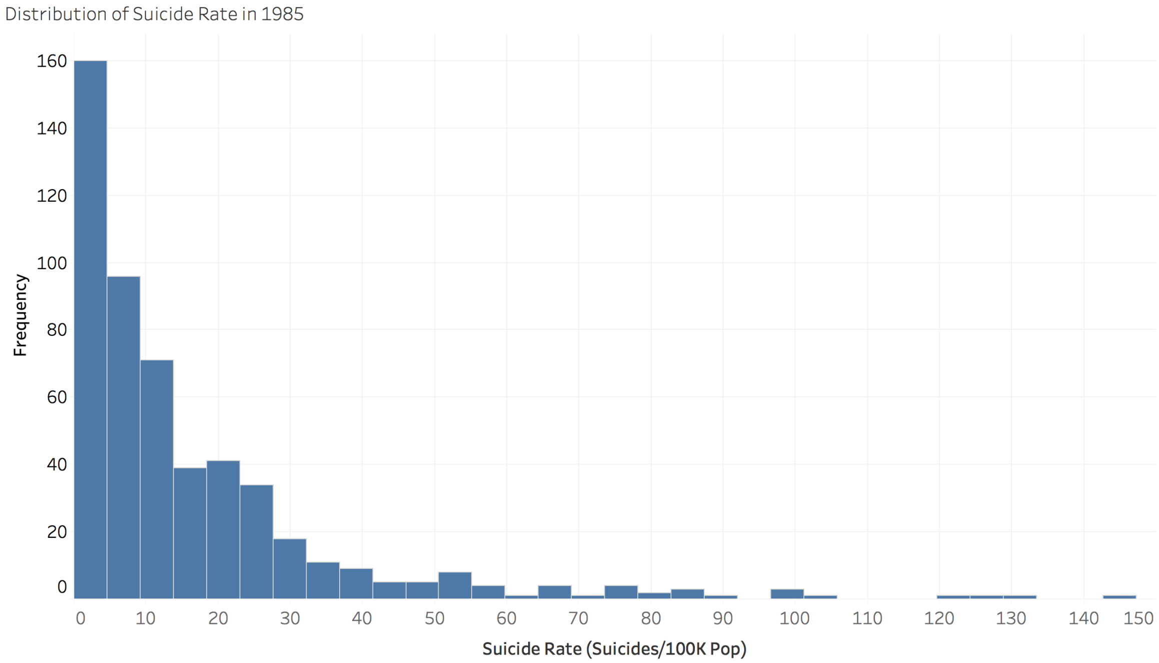


Figure 1: Distribution of Suicide Rate in 1985 (interactive plot)

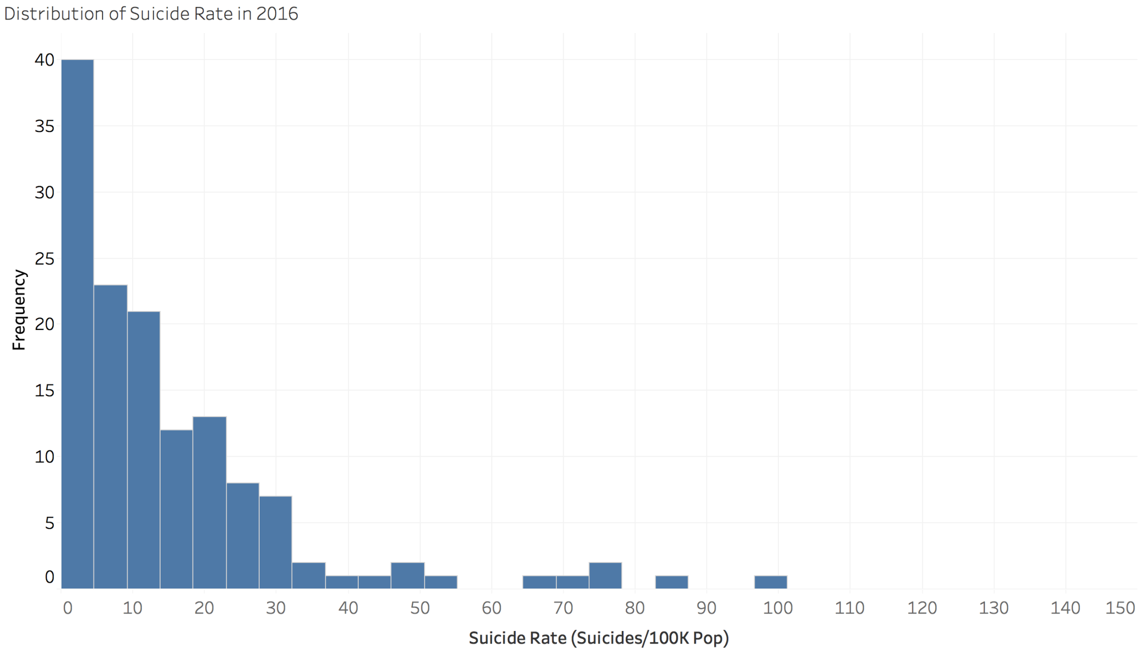


Figure 2: Distribution of Suicide Rate in 2016 (interactive plot)

Now, we look at the information of countries and suicides. I sum up the number of suicides trough 1985 to 2016 and show the top 10 countries with highest total number of suicides (Figure 3). We can tell from Figure 3 that Russia, US and Japan have highest number of suicides and the numbers are much higher than the following countries.

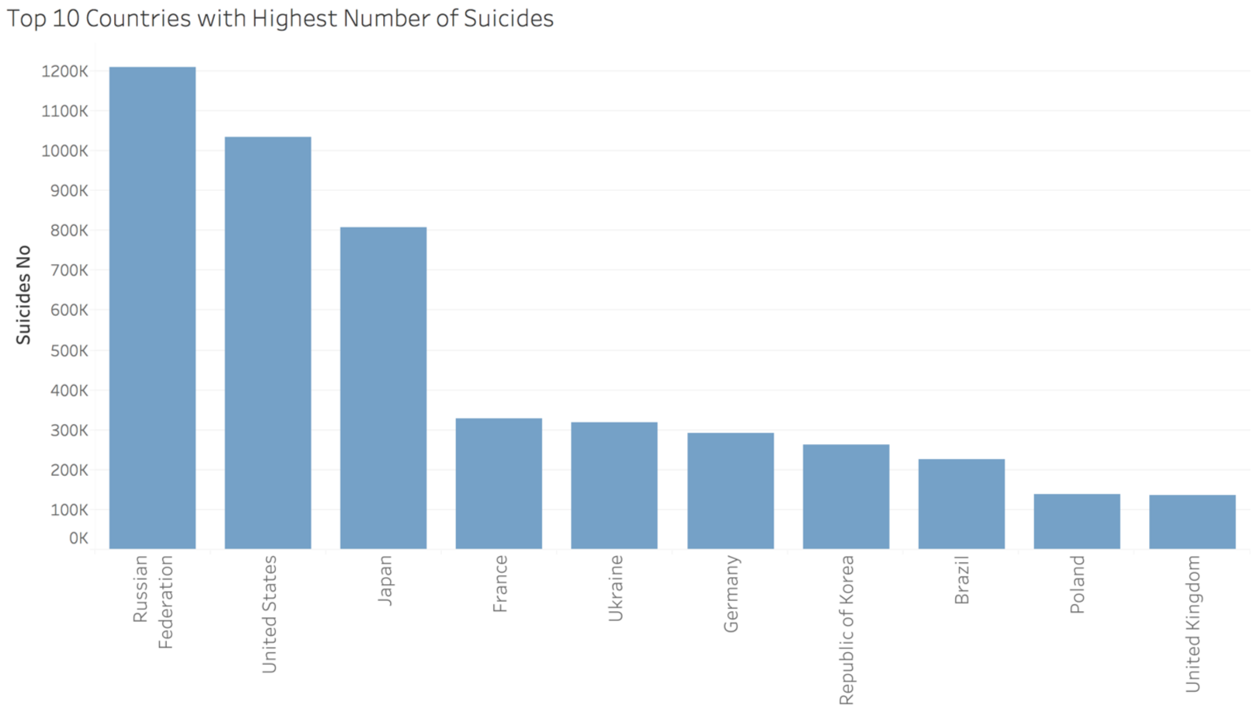


Figure 3: Top 10 countries with highest number of suicides (interactive plot)

For different gender, the distribution of number of suicides are different. We can see from Figure 3, 50% of number of suicides of male is in the range of ~0 to 250. But 50% of number of suicides of male is in the range of ~0 to 75.

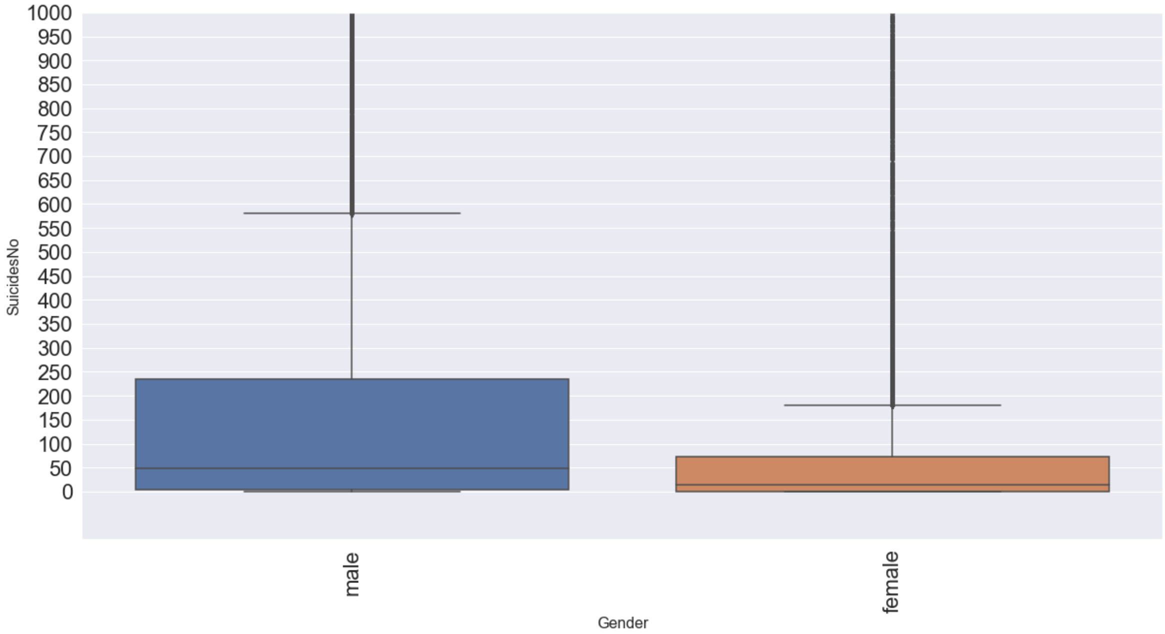


Figure 4: Distribution of Suicide Rate in 2016 (interactive plot)

Figure 5 shows the number of suicides of each year for each generation. Here are the birth years for each generation:

- Gen Z, iGen, or Centennials: Born 1996 – TBD
- Millennials or Gen Y: Born 1977 – 1995
- Generation X: Born 1965 – 1976
- Baby Boomers: Born 1946 – 1964
- Traditionalists or Silent Generation: Born 1945 and before

We can see there are some usual high number of suicides of generation Boomers during 1991 to 2007.

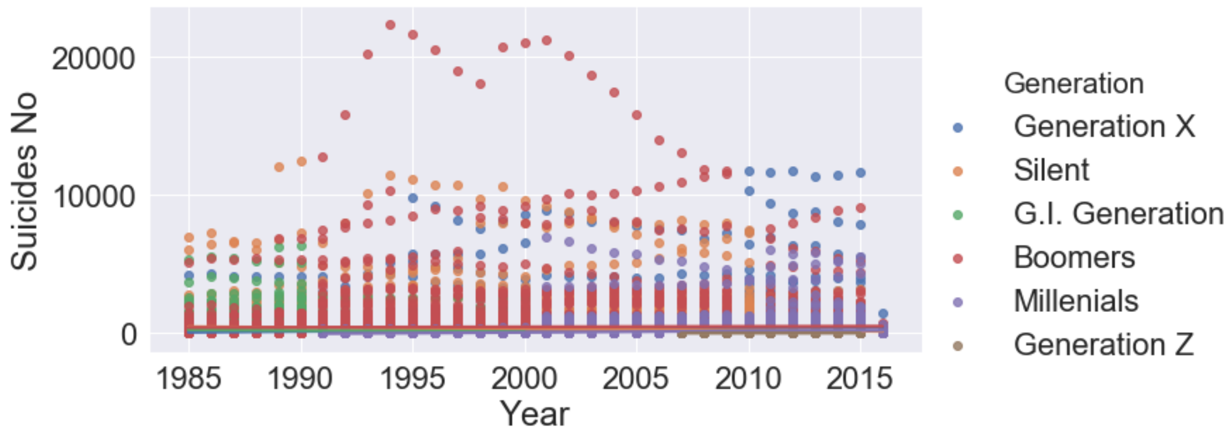


Figure 5: Distribution of Suicide Rate in 2016 (interactive plot)

The bubble plot below shows 2 information, 1) suicides/population of each country and 2) the maximum GDP of those countries. The more reddish the color is, the lower GPD that country has. The larger the size is, the higher suicide rate the country has. For example, if we check United States and Canada, both countries have similar number of suicides, but the GDP/Capita of Canada is lower that United States. There're also some countries with low GDP and low number of suicides, which is impressive.

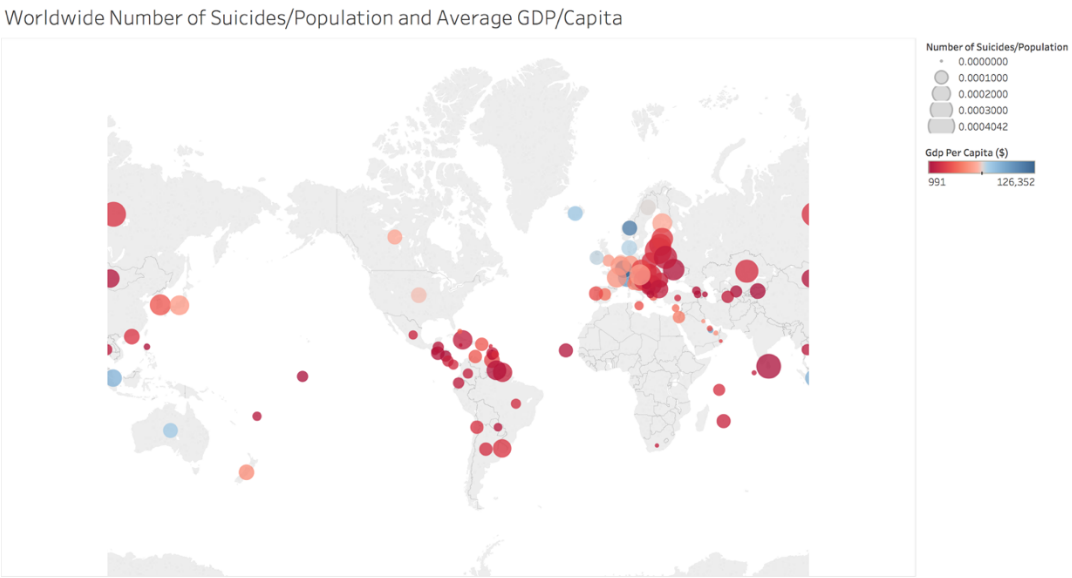

Worldwide Number of Suicides/Population and Average GDP/Capita
Number of Suicides/Population
0.0000000
0.0001000
0.0002000
0.0003000
0.0004042
Gdp Per Capita ($)
991
126,352

Figure 6: Worldwide Suicide Rate and Average GDP/Capita (interactive plot)

In Figure 7, we can see the Human Development Index (HDI) of those countries, which have records of suicides in the dataset. The HDI is a statistic composite index of life expectancy, education, and per capita income indicators, which are used to rank countries. It’s pretty obvious that Russia has the lowest HDI. On the other hand, northern America seems to have higher HDI.

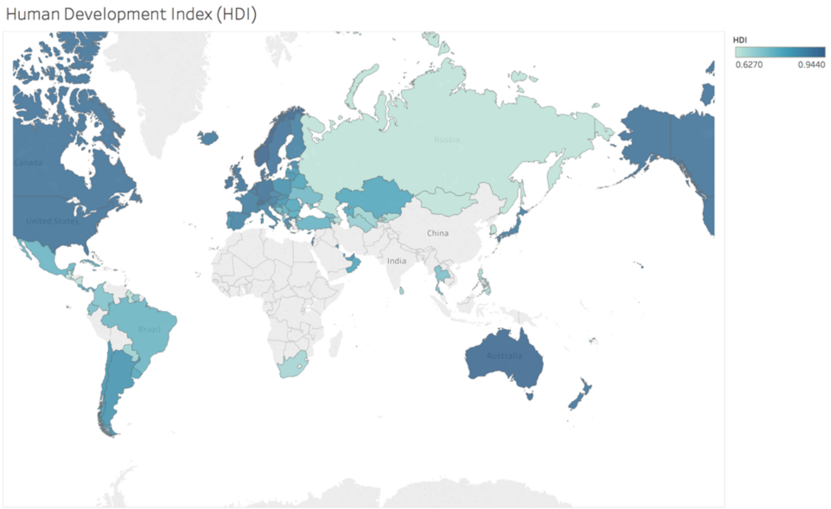


Figure 7: Worldwide Human Development Index (HDI) (interactive plot)

It’s hard to create a connection plot basing on this dataset. Per talked to Aleks, she wants us to show our abilities to create a connection plot. Thus, the following connection is just connecting the top 5 countries with highest number of suicides. They are actually across four main continents.

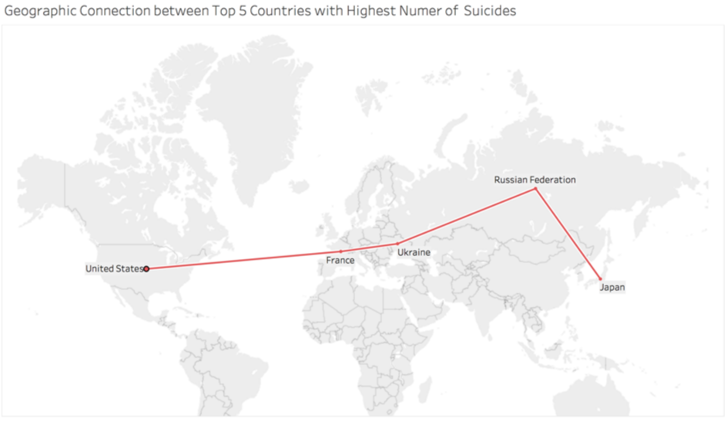

Geographic Connection between Top 5 Countries with Highest Numer of Suicides
Russian Federation
Ukraine
France
United States
Japan

Figure 8: Connection plot of top five countries with highest number of suicides (interactive plot)

Figure 9 is a heatmap showing correlation between 5 columns in the dataset. The darker the color is, the higher correlation it is. Take GdpPerCapitaMoney as an example, it has highest correlation with HDI. This result makes sense since HDI is a statistic composite index of life expectancy, with higher GDP, the HDI is reasonably higher.

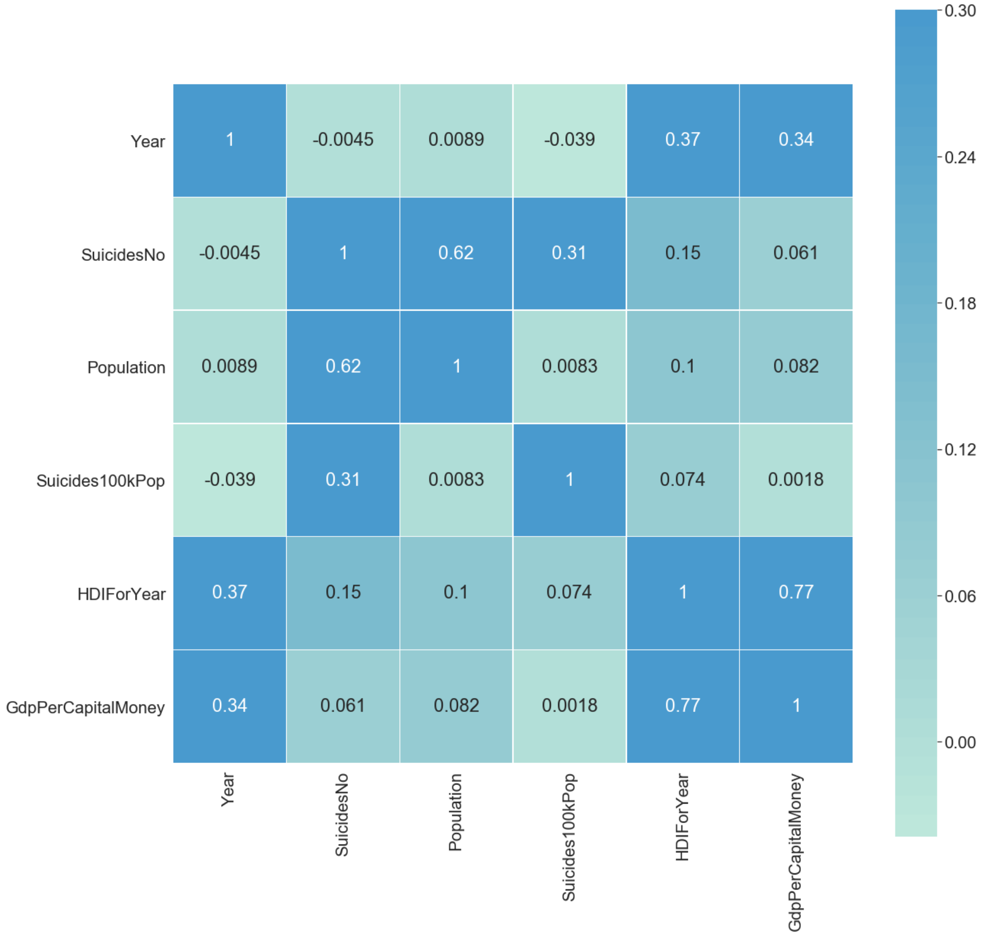


Figure 9: Connection plot of top five countries with highest number of suicides (interactive plot)

Figure 10 shows the stacked area plot of top ten countries with highest number of suicides. The width of each county reveals the number of suicides of that year, the wider the width is, the more suicides happened in that year. Some data are missing in the dataset so that's why there're some discontinuity in the graph. We can tell from the graph that most of the countries keep stable numbers of suicides each year except Russia and South Korea.

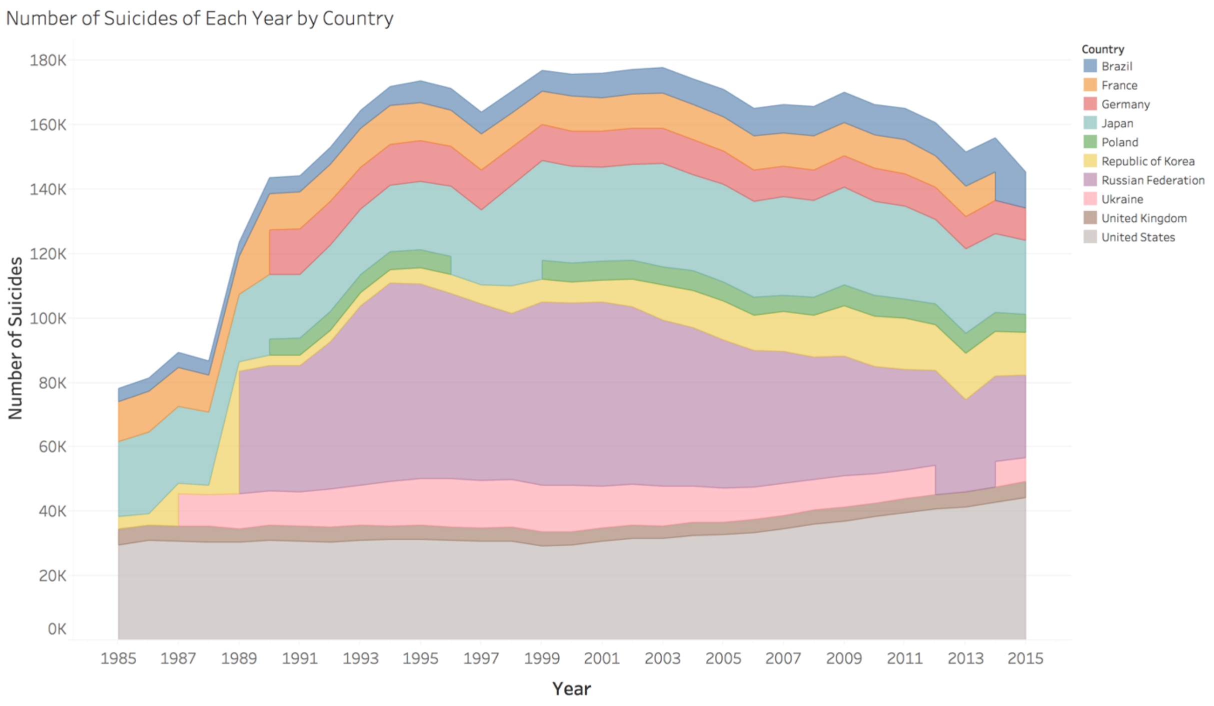


Figure 10: Stacked area plot of top ten countries with highest number of suicides (interactive plot)

The treemapping below shows the number of suicides of each year, from 1985-2016. Both the area and the color of the box give information about it. The more reddish the color is, the more suicides happened in that year. In terms of the area, the larger the area is, the more suicides happened in that year. Based on this plot, it easy to notice that in the year of 1999, we have the most number of people suicided. There were least number of suicided in 2016, which is a bluest box on bottom right corner. Although the detail is not shown on the box here due to limitation of the area of the box, the detail is shown when you hover over that box. There were 15603 people suicided in 2016.

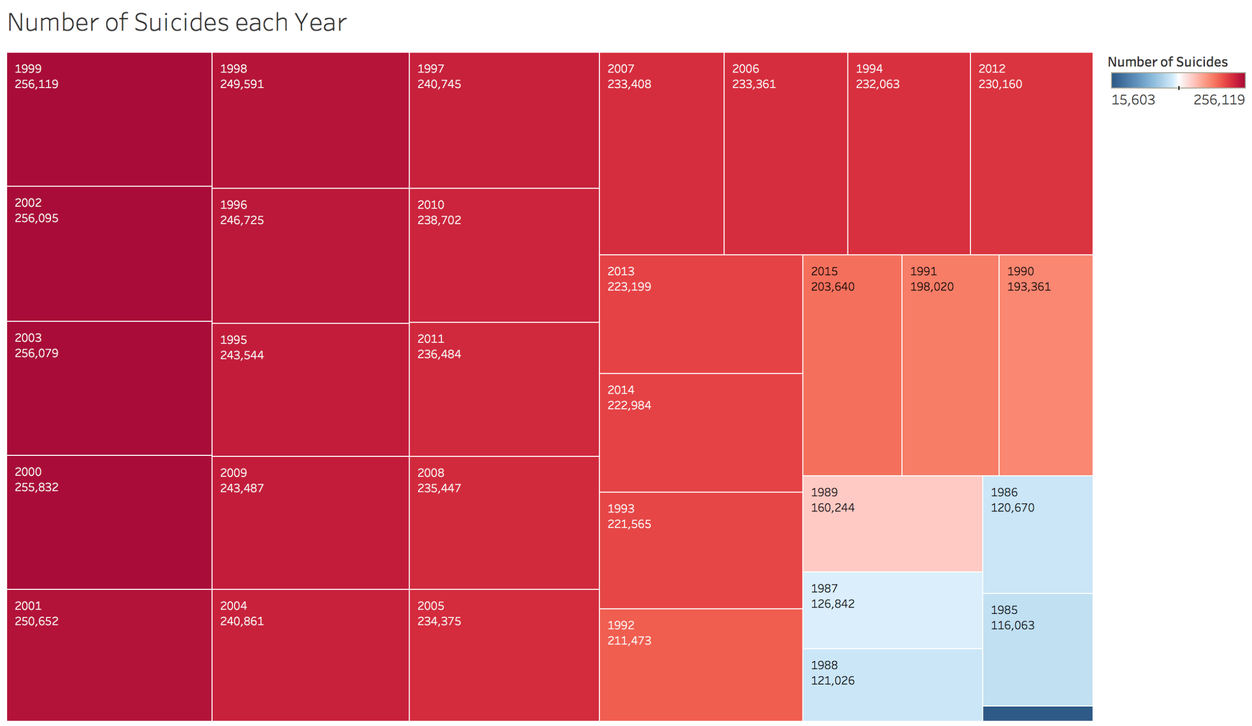


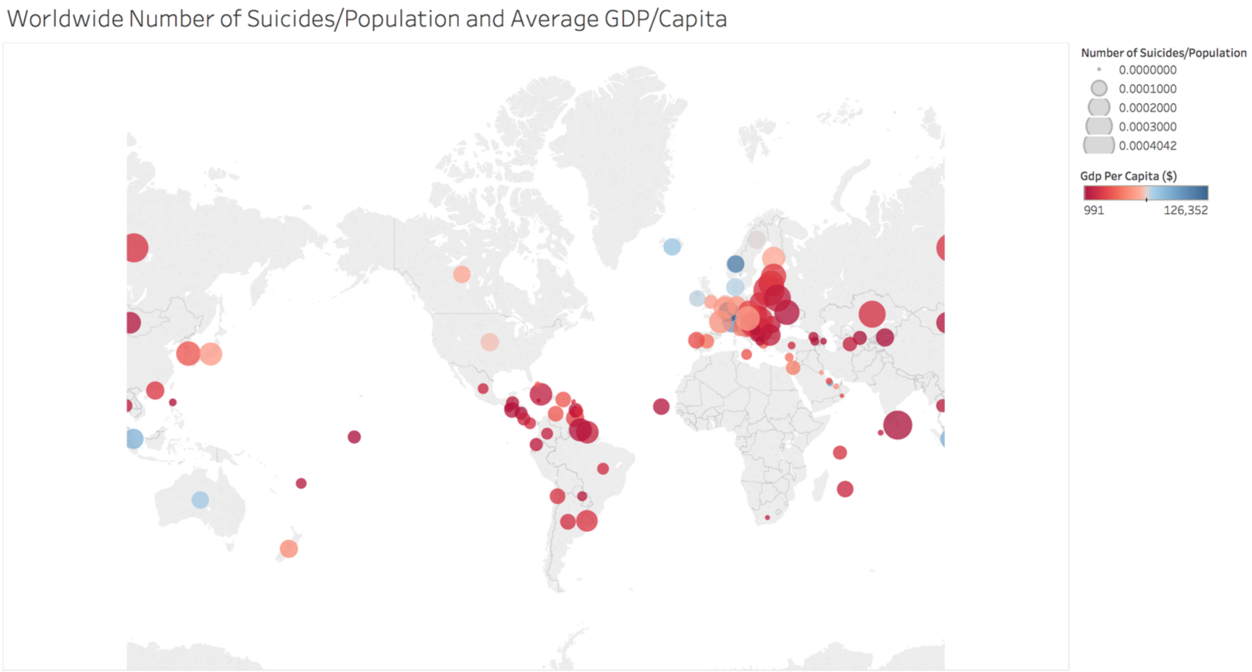
Figure 11: Stacked area plot of top ten countries with highest number of suicides (interactive plot)

My storyline:

Before working on this suicide dataset, I was imagining that GDP would be a strong indicator of the number of suicides, since GDP is the most commonly used measure of economic activity and serves as a good indicator to track the economic health of a country.

In figure 12, it shows 2 information, 1) the suicide rate (number of suicides/population) of each country and 2) the maximum GDP of those countries. The more reddish the color is, the lower GPD that country has. The larger the size is, the higher suicide rate the country has. Based on the graph, we can conclude that most of the bubble with more reddish color are generally larger. However, when we compare Australia and New Zealand, they have quite different GDP but they have almost the same suicide rate. Also, Countries like Fiji and Kiribati, they both have lower

GDP but they have small suicide rate. This changes my stereotype for the relationship of suicide rate and economics status. There're more reasons that lead to suicides.


Worldwide Number of Suicides/Population and Average GDP/Capita
Number of Suicides/Population
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Gdp Per Capita ($)
991
126,352

Figure 12: Worldwide Number of Suicides/Population and Average GDP/Capita (interactive plot)

Results/Summary/Conclusion:

While we have some stereotype of correlation between data, it's better for us to deep dive the data first before any conclusion. Like my assumption in my storyline, I won't notice the special cases in Fiji and Kiribati if I didn't create the bubble plot on the map. Besides, it's important to think about how to process your data while visualizing data. For example, if I choose 'average GDP' as the indicator, the plot will dramatically change. We need to deeply elaborate the data before what we want to present on the plot.

Link to github page with this analysis:

https://github.com/JoyceMTChang/datavis

References:

https://www.kaggle.com/russellyates88/suicide-rates-overview-1985-to-2016

http://hdr.undp.org/en/content/human-development-index-hdi

In [1]:

```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
import seaborn as sns
from IPython.display import Image
```

Import Data

In [2]:

```
data = pd.read_csv('master.csv')
```

In [3]:

```
data.head()
```

Out[3]:

	country	year	sex	age	suicides_no	population	suicides/100k pop	country-year	HDI for year	gdp_for_year ($)	gdp_per_capita ($)	generation
0	Albania	1987	male	15-24 years	21	312900	6.71	Albania1987	NaN	2,156,624,900	796	Generation X
1	Albania	1987	male	35-54 years	16	308000	5.19	Albania1987	NaN	2,156,624,900	796	Silent
2	Albania	1987	female	15-24 years	14	289700	4.83	Albania1987	NaN	2,156,624,900	796	Generation X
3	Albania	1987	male	75+ years	1	21800	4.59	Albania1987	NaN	2,156,624,900	796	G.I. Generation
4	Albania	1987	male	25-34 years	9	274300	3.28	Albania1987	NaN	2,156,624,900	796	Boomers

In [21]:

```
data = data.rename(columns={'country': 'Country', 'year': 'Year', 'sex': 'Gender', 'age': 'Age', 's
uicides_no': 'SuicidesNo', 'population': 'Population', 'suicides/100k pop': 'Suicides100kPop',
                            'country-year': 'CountryYear', 'HDI for year': 'HDIForYear', ' gdp_for_
ear ($) ': 'GdpForYearMoney', 'gdp_per_capita ($)': 'GdpPerCapitalMoney', 'generation':
'Generation'})
```

In [22]:

```
data.head()
```

Out[22]:

	Country	Year	Gender	Age	SuicidesNo	Population	Suicides100kPop	CountryYear	HDIForYear	GdpForYearMoney	GdpPerCapit
0	Albania	1987	male	15-24 years	21	312900	6.71	Albania1987	NaN	2,156,624,900	
1	Albania	1987	male	35-54 years	16	308000	5.19	Albania1987	NaN	2,156,624,900	
2	Albania	1987	female	15-24 years	14	289700	4.83	Albania1987	NaN	2,156,624,900	
3	Albania	1987	male	75+ years	1	21800	4.59	Albania1987	NaN	2,156,624,900	

	Country	Year	Gender	Age	SuicidesNo	Population	Suicides100kPop	CountryYear	HDIForYear	GdpForYearMoney	GdpPerCapit
4	Albania	1987	male	25-34 years	9	274300	3.28	Albania1987	NaN	2,156,624,900	

In [6]:

```
data.dtypes
```

Out[6]:

```
Country                  object
Year                      int64
Gender                   object
Age                      object
SuicidesNo                int64
Population                int64
Suicides100kPop         float64
CountryYear              object
HDIForYear              float64
GdpForYearMoney          object
GdpPerCapitalMoney        int64
Generation               object
dtype: object
```

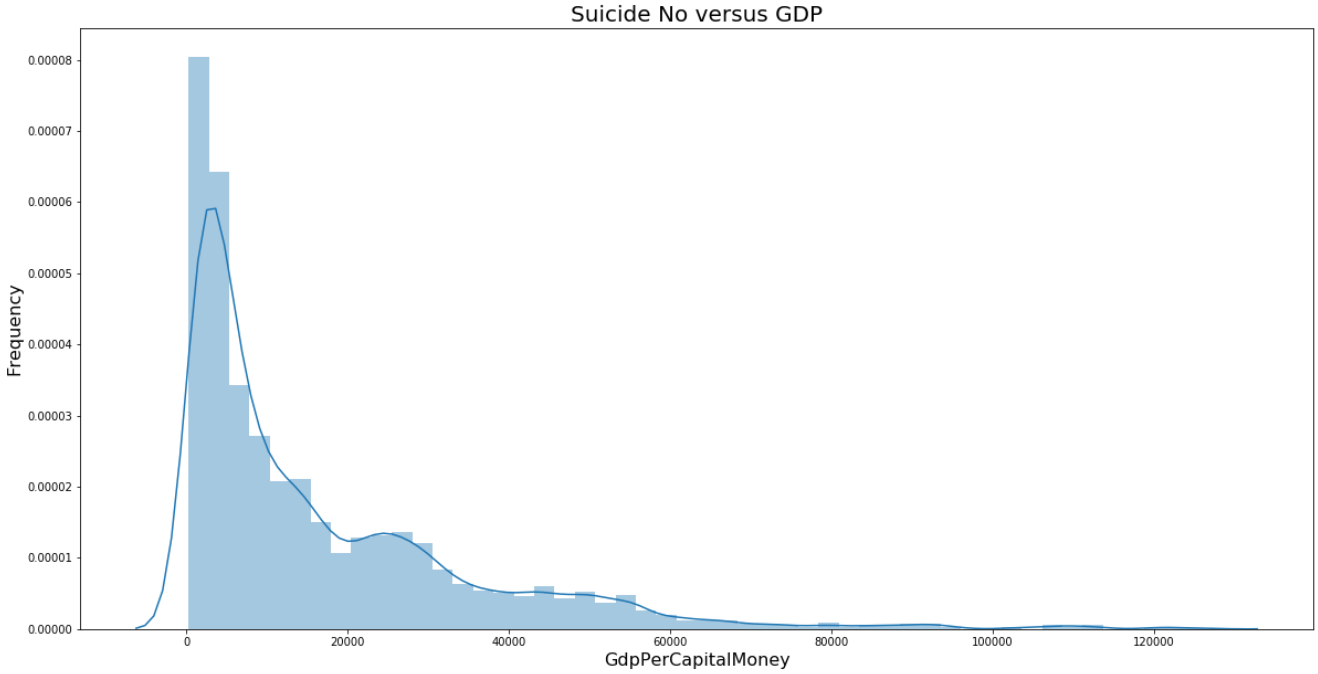
Histogram

In [7]:

```
# # An "interface" to matplotlib.axes.Axes.hist() method
plt.figure(figsize=(20,10))
# n, bins, patches = plt.hist(x=data.GdpPerCapitalMoney, bins='auto', alpha=0.7)
# plt.grid(axis='y', alpha=0.75)
plt.xlabel('GDP per Capita', fontsize=16)
plt.ylabel('Frequency', fontsize=16)
plt.title('Suicide No versus GDP', fontsize=20)
# maxfreq = n.max()
# # Set a clean upper y-axis limit.
# plt.ylim(0, maxfreq+10)
sns.distplot(data.GdpPerCapitalMoney)
```

Out[7]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x1a158d4550>
```



Barplot

In [17]:

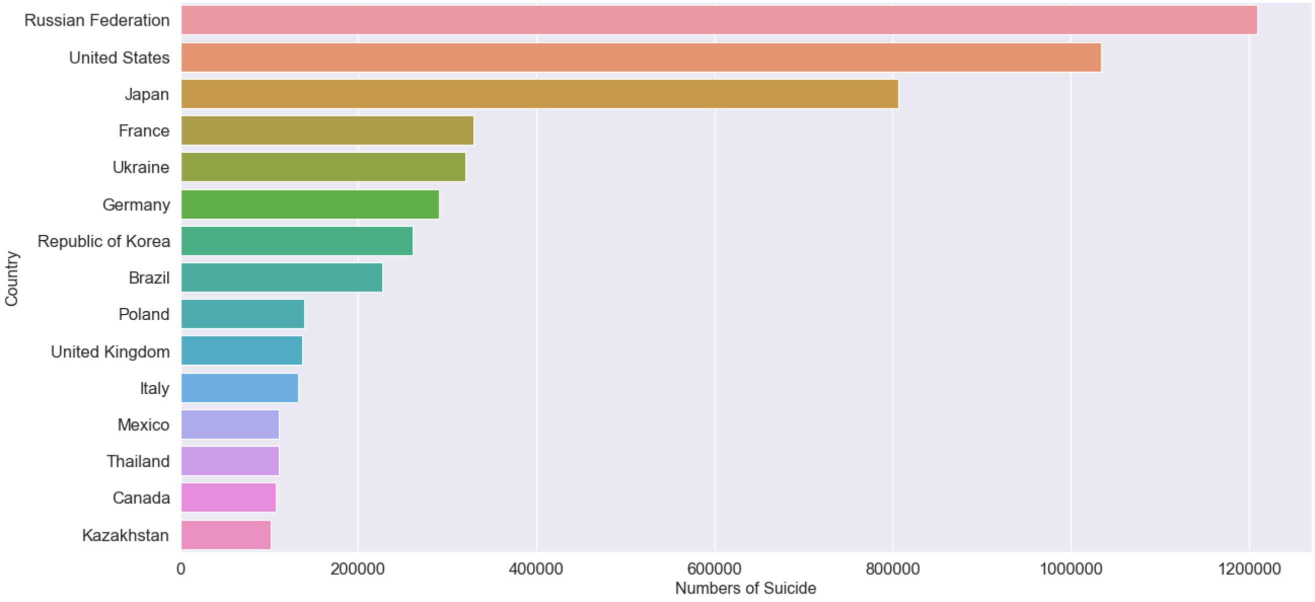
```
plt.figure(figsize=(20,10))

suicidesNo=[]
for country in data.Country.unique():
    suicidesNo.append(sum(data[data['Country']==country].SuicidesNo))

suicidesNo=pd.DataFrame(suicidesNo,columns=['suicidesNo'])
country=pd.DataFrame(data.Country.unique(),columns=['country'])
data_suicide_countr=pd.concat([suicidesNo,country],axis=1)

data_suicide_countr=data_suicide_countr.sort_values(by='suicidesNo',ascending=False)

sns.barplot(y=data_suicide_countr.country[:15],x=data_suicide_countr.suicidesNo[:15])
plt.xlabel('Numbers of Suicide', fontsize=16)
plt.ylabel('Country', fontsize=16)
plt.show()
```



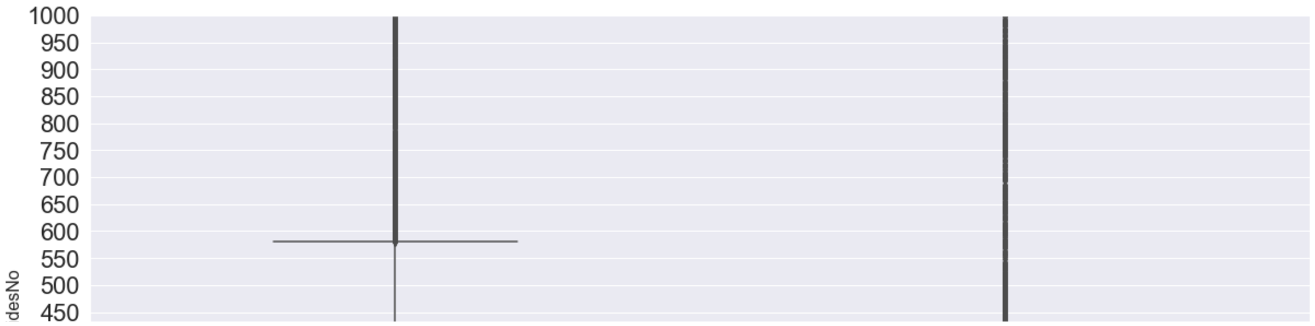
Boxplot

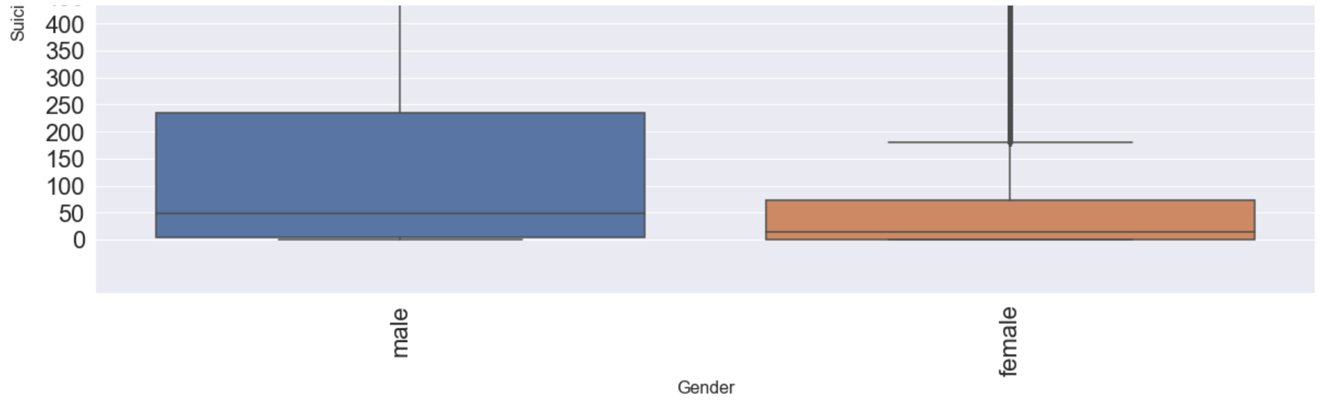
In [37]:

```
sns.set(font_scale=2)
plt.figure(figsize=(20,10))
sns.boxplot(x=data['Gender'],y=data['SuicidesNo'])
plt.xticks(rotation=90)
plt.yticks([i*50 for i in range(0, 100)])
plt.ylim(-100, 1000)
plt.xlabel('Gender', fontsize=16, )
plt.ylabel('SuicidesNo', fontsize=16)
```

Out[37]:

```
Text(0, 0.5, 'SuicidesNo')
```





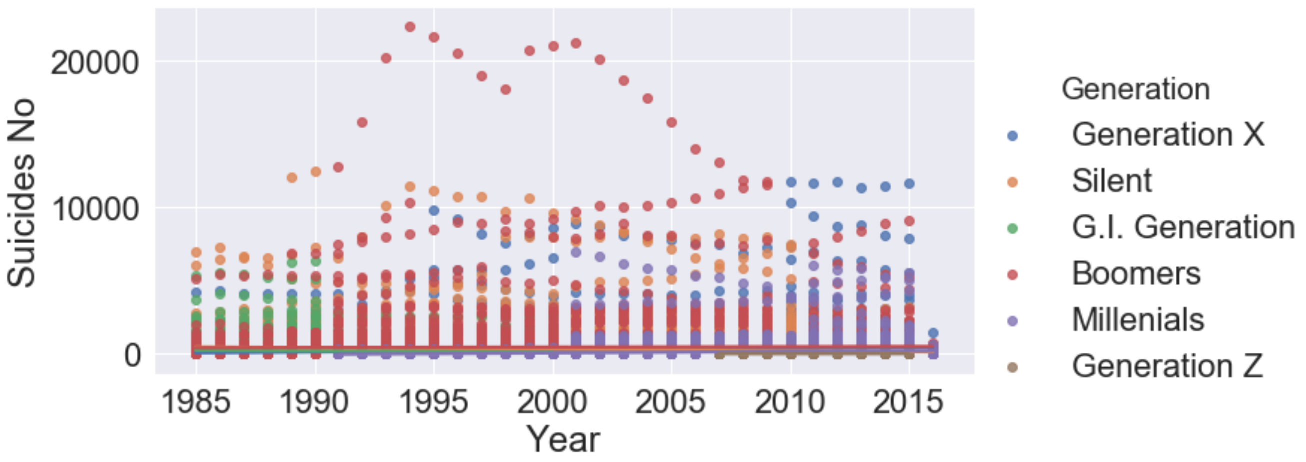
Scatterplot

In [39]:

```
# Plot sepal with as a function of sepal_length across days
plt.figure(figsize=(20,10))
g = sns.lmplot(x="Year", y="SuicidesNo", hue="Generation",
               truncate=True, height=5, aspect=2, data=data)

# Use more informative axis labels than are provided by default
g.set_axis_labels("Year", "Suicides No")
plt.show()
```

```
<Figure size 1440x720 with 0 Axes>
```



Bubble Map

check tableau

Chloropleth Map

check tableau

Connection Map

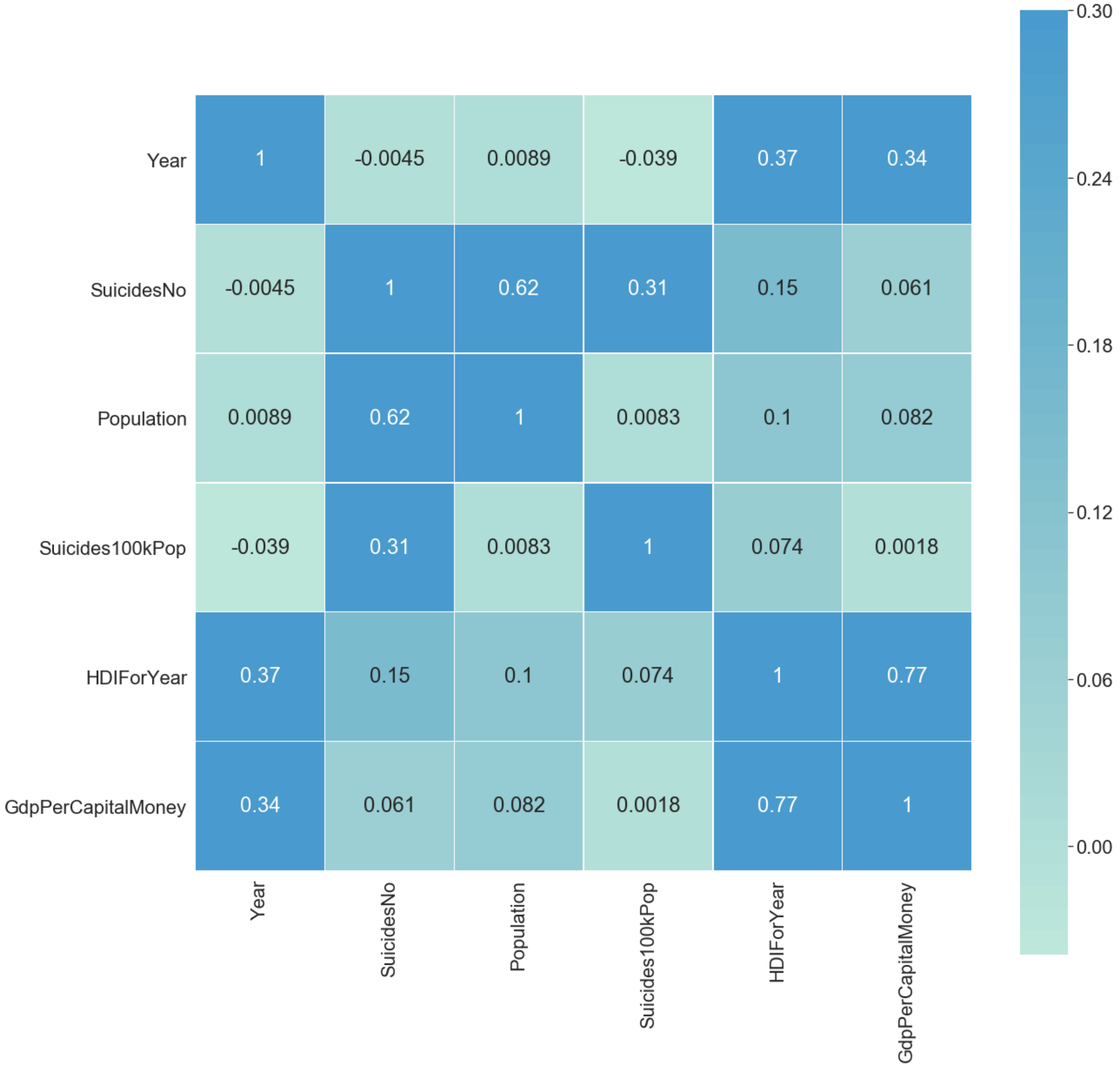
Heat map

In [44]:

```
plt.figure(figsize=(20,20))

sns.heatmap(data.corr(), vmax=.3, center=1
sns.heatmap(data.corr(), vmax=.3, center=1,
            square=True, linewidths=.5,annot=True)
plt.yticks(rotation=0)

plt.show()
```



Stacked plot

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Treemapping

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