

PHASE4 Submission document

Project title:COVID 19 cases analysis

Phase 4: Development part2



COVID 19 cases analysis

Introduction:

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, has left an indelible mark on the world. Since its emergence in late 2019, this global health crisis has reshaped societies, strained healthcare systems, and sparked unprecedented public health responses. Analyzing COVID-19 cases is of paramount importance in comprehending the pandemic's multifaceted impact. In just a span of a few years, COVID-19 has swept across continents, infecting millions and impacting every facet of human life. As we grapple with the evolving nature of this virus, data-driven insights have become our guiding light. This one-page submission seeks to provide a glimpse into our findings, shedding light on the virus's spread, its toll on healthcare systems, and the effectiveness of public health measures. In a world grappling with an ongoing crisis, data-driven insights are not just invaluable; they are imperative for informed decision-making and a collective path forward. Our analysis delves into the numbers and trends that underpin this pandemic, offering a snapshot of its complex and ever-changing landscape. As we navigate these uncharted waters, the story of COVID-19 cases told through data is more than an academic exercise; it's a vital chapter in our ongoing battle to safeguard public health and well-being.

Given data set:

COVID_19_Cases4							COVID_19_Cases4						
A	B	C	D	E	F	G	A	B	C	D	E	F	G
date	day	month	year	cases	deaths	countriesAndTerritories	date	day	month	year	cases	deaths	countriesAndTerritories
1	5/31/2021	31	5	2021	366	5 Austria	2396	5/3/2021	3	5	2021	629	34 Slovakia
2	5/31/2021	30	5	2021	570	6 Austria	2397	5/2/2021	2	5	2021	1015	48 Slovakia
3	5/30/2021	29	5	2021	538	11 Austria	2398	5/1/2021	1	5	2021	1154	37 Slovakia
4	5/29/2021	28	5	2021	639	4 Austria	2399	4/30/2021	30	4	2021	998	36 Slovakia
5	5/28/2021	27	5	2021	405	19 Austria	2400	4/29/2021	29	4	2021	1062	39 Slovakia
6	5/27/2021	26	5	2021	287	8 Austria	2401	4/28/2021	28	4	2021	1193	41 Slovakia
7	5/26/2021	25	5	2021	342	3 Austria	2402	4/27/2021	27	4	2021	1193	36 Slovakia
8	5/25/2021	24	5	2021	520	3 Austria	2403	4/26/2021	26	4	2021	168	37 Slovakia
9	5/24/2021	23	5	2021	626	8 Austria	2404	4/25/2021	25	4	2021	1369	53 Slovakia
10	5/23/2021	22	5	2021	671	12 Austria	2405	4/24/2021	24	4	2021	1531	48 Slovakia
11	5/22/2021	21	5	2021	603	8 Austria	2406	4/23/2021	23	4	2021	1649	53 Slovakia
12	5/21/2021	20	5	2021	866	13 Austria	2407	4/22/2021	22	4	2021	1336	60 Slovakia
13	5/20/2021	19	5	2021	630	11 Austria	2408	4/21/2021	21	4	2021	1409	72 Slovakia
14	5/19/2021	18	5	2021	391	15 Austria	2409	4/20/2021	20	4	2021	1469	66 Slovakia
15	5/17/2021	17	5	2021	476	6 Austria	2410	4/19/2021	19	4	2021	721	63 Slovakia
16	5/16/2021	16	5	2021	684	12 Austria	2411	4/18/2021	18	4	2021	1642	73 Slovakia
17	5/15/2021	15	5	2021	721	14 Austria	2412	4/17/2021	17	4	2021	1586	93 Slovakia
18	5/14/2021	14	5	2021	1100	11 Austria	2413	4/16/2021	16	4	2021	1316	79 Slovakia
19	5/13/2021	13	5	2021	1179	14 Austria	2414	4/15/2021	15	4	2021	1524	82 Slovakia
20	5/12/2021	12	5	2021	958	19 Austria	2415	4/14/2021	14	4	2021	1761	86 Slovakia
21	5/11/2021	11	5	2021	670	16 Austria	2416	4/13/2021	13	4	2021	1784	65 Slovakia
22	5/10/2021	10	5	2021	1009	11 Austria	2417	4/12/2021	12	4	2021	840	79 Slovakia
23	5/9/2021	9	5	2021	1251	14 Austria	2418	4/11/2021	11	4	2021	1681	76 Slovakia
24	5/8/2021	8	5	2021	1383	23 Austria	2419	4/10/2021	10	4	2021	2013	89 Slovakia
25	5/7/2021	7	5	2021	1220	8 Austria	2420	4/9/2021	9	4	2021	1692	79 Slovakia
26	5/6/2021	6	5	2021	1682	26 Austria	2421	4/8/2021	8	4	2021	2542	149 Slovakia
27	5/5/2021	5	5	2021	1297	25 Austria	2422	4/7/2021	7	4	2021	2629	0 Slovakia
28	5/4/2021	4	5	2021	888	25 Austria	2423	4/6/2021	6	4	2021	972	69 Slovakia
29	5/3/2021	3	5	2021	1732	11 Austria	2424	4/5/2021	5	4	2021	707	77 Slovakia
30	5/2/2021	2	5	2021	1655	16 Austria	2425	4/4/2021	4	4	2021	2579	71 Slovakia
31	5/1/2021	1	5	2021	2221	26 Austria	2426	4/3/2021	3	4	2021	1381	87 Slovakia
32	4/30/2021	30	4	2021	1995	33 Austria	2427	4/2/2021	2	4	2021	2626	71 Slovakia
33	4/29/2021	29	4	2021	2286	29 Austria	2428	4/1/2021	1	4	2021	2520	95 Slovakia
34	4/28/2021	28	4	2021	1557	20 Austria	2429	3/31/2021	31	3	2021	3043	82 Slovakia
35	4/27/2021	27	4	2021	1380	22 Austria	2430	3/30/2021	30	3	2021	2889	46 Slovakia
36	4/26/2021	26	4	2021	2091	11 Austria	2431	3/29/2021	29	3	2021	1510	79 Slovakia
37	4/25/2021	25	4	2021	2231	15 Austria	2432	3/28/2021	28	3	2021	3129	53 Slovakia
38	4/24/2021	24	4	2021	2407	32 Austria	2433	3/27/2021	27	3	2021	3197	60 Slovakia
39	4/23/2021	23	4	2021	2347	25 Austria	2434	3/26/2021	26	3	2021	2633	52 Slovakia
40	4/22/2021	22	4	2021	2377	40 Austria	2435	3/25/2021	25	3	2021	3062	71 Slovakia
41	4/21/2021	21	4	2021	2005	27 Austria	2436	3/24/2021	24	3	2021	3490	86 Slovakia
42	4/20/2021	20	4	2021	1792	32 Austria	2437	3/23/2021	23	3	2021	3047	60 Slovakia
43	4/19/2021	19	4	2021	2159	34 Austria	2438	3/22/2021	22	3	2021	1966	66 Slovakia
44	4/18/2021	18	4	2021	2591	23 Austria	2439	3/21/2021	21	3	2021	3621	84 Slovakia
45	4/17/2021	17	4	2021	2348	30 Austria	2440	3/20/2021	20	3	2021	3817	80 Slovakia
46	4/16/2021	16	4	2021	2561	33 Austria	2441	3/19/2021	19	3	2021	3291	76 Slovakia
47	4/15/2021	15	4	2021	2855	31 Austria	2442	3/18/2021	18	3	2021	3590	69 Slovakia
48	4/14/2021	14	4	2021	2032	51 Austria	2443	3/17/2021	17	3	2021	4715	64 Slovakia
49	4/13/2021	13	4	2021	1770	37 Austria	2444	3/16/2021	16	3	2021	3802	77 Slovakia
50	4/12/2021	12	4	2021	2136	18 Austria	2445	3/15/2021	15	3	2021	2314	88 Slovakia
51	4/11/2021	11	4	2021	3559	27 Austria	2446	3/14/2021	14	3	2021	4687	94 Slovakia
52	4/10/2021	10	4	2021	2432	34 Austria	2447	3/13/2021	13	3	2021	4742	102 Slovakia
53	4/9/2021	9	4	2021	3052	36 Austria	2448	3/12/2021	12	3	2021	4153	98 Slovakia
54	4/8/2021	8	4	2021	3006	46 Austria	2449	3/11/2021	11	3	2021	3943	109 Slovakia
55	4/7/2021	7	4	2021	2077	35 Austria	2450	3/10/2021	10	3	2021	5645	116 Slovakia
56	4/6/2021	6	4	2021	2268	26 Austria	2451	3/9/2021	9	3	2021	4811	85 Slovakia
57	4/5/2021	5	4	2021	2915	24 Austria	2452	3/8/2021	8	3	2021	2696	97 Slovakia
58	4/4/2021	4	4	2021	3693	23 Austria	2453	3/7/2021	7	3	2021	5210	74 Slovakia
59	4/3/2021	3	4	2021	3077	33 Austria	2454	3/6/2021	6	3	2021	5263	105 Slovakia
60	4/2/2021	2	4	2021	3058	23 Austria	2455	3/5/2021	5	3	2021	4821	71 Slovakia
61	4/1/2021	1	4	2021	3107	28 Austria	2456	3/4/2021	4	3	2021	5285	101 Slovakia
62	3/31/2021	31	3	2021	2810	28 Austria	2457	3/3/2021	3	3	2021	6107	118 Slovakia
63	3/30/2021	30	3	2021	2600	21 Austria	2458	3/2/2021	2	3	2021	5260	81 Slovakia
64	3/29/2021	29	3	2021	1788	9 Slovakia	2459	3/1/2021	1	3	2021	1708	9 Slovakia

5000 Rows x 7 Columns

Overview of the process:

1.Data-Driven Insight:

The analysis is rooted in data collected from various sources, including government reports, healthcare databases, and scientific research. It provides a factual and evidence-based understanding of the COVID-19 pandemic.

2.Pandemic Impact Assessment:

This analysis focuses on assessing the impact of the pandemic, with an emphasis on how the virus has spread across regions, influenced healthcare systems, and affected populations.

3. Healthcare System Strain:

The analysis highlights the strain on healthcare systems due to the surge in COVID-19 cases. It delves into aspects such as hospitalization rates, ICU bed occupancy, and the use of critical resources like ventilators.

4. Effectiveness of public health Measures:

It evaluates the effectiveness of various public health measures implemented to control the pandemic. These measures include social distancing, mask mandates, lockdowns, and vaccination campaigns.

5. Decision-Making and recommendations:

The analysis concludes with data-driven recommendations for future actions. It emphasizes the importance of vaccination, preparedness for future outbreaks, and informed decision-making in addressing the ongoing and potential health crises.

PROCEDURE:

Feature selection:

1. Gather a comprehensive dataset that includes various potential features related to COVID-19 cases. This may include demographic data, testing and diagnostic information, geographical variables, healthcare resources, and public health measures.
2. Clean the data by handling missing values, outliers, and inconsistencies. Ensure the dataset is in a usable format for analysis.
3. Conduct EDA to gain insights into the data. Visualizations and statistical techniques can help identify initial patterns and relationships among features.
4. Utilize statistical techniques to evaluate the importance of each feature. Common methods include: Correlation analysis to identify relationships with the target variable (e.g., case counts or mortality rates). Feature ranking through techniques like mutual information, ANOVA, or feature importance from machine learning models.
5. Employ various feature selection methods to choose the most relevant features:
 - Filter Methods: These methods use statistical metrics to score features and select the top-ranked ones.
 - Wrapper Methods: They involve training a machine learning model and selecting features based on their impact on model performance (e.g., recursive feature elimination).
 - Embedded Methods: Some machine learning algorithms have built-in feature selection techniques (e.g., Lasso regression).

Feature Selection:

Open a new Syntax Editor session in SPSS Statistics by selecting File > New > Syntax.

Copy the following syntax into the Syntax Editor dialog box.

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
print('Modules are imported.')
Modules are imported.
```

```
importing
"Covid19_Confirmed_dataset.c
sv" from "./Dataset" folder.
```

```
In[2]
```

```
df=pd.read_csv("../input/covid19/covid19_Confirmed_datas
et.csv")
df.head()
```

Out[2]:

```
Province/State Country/Region Lat Long 1/22/20 1/23/20 1/24/20 1/25/20
1/26/20 1/27/20 ... 4/21/20 4/22/20 4/23/20 4/24/20 4/25/20 4/26/20
4/27/20 4/28/20 4/29/20 4/30/20
0 NaN Afghanistan 33.0000 65.0000 0 0 0 0 0 0 ... 1092 1176 1279 1351
1463 1531 1703 1828 1939 2171
1 NaN Albania 41.1533 20.1683 0 0 0 0 0 0 ... 609 634 663 678 712 726
736 750 766 773
2 NaN Algeria 28.0339 1.6596 0 0 0 0 0 0 ... 2811 2910 3007 3127 3256
3382 3517 3649 3848 4006
3 NaN Andorra 42.5063 1.5218 0 0 0 0 0 0 ... 717 723 723 731 738 738
743 743 743 745
4 NaN Angola -11.2027 17.8739 0 0 0 0 0 0 ... 24 25 25 25 25 26 27 27
27 27
```

Let's check the shape of the dataframe

In[3]:

df.shape

Out[3]:

(266, 104)

Model training:

Delete the useless columns

In[4]:

df.drop(["Lat","Long"],axis=1,inplace=True)

In[5]:

df.head()

Out[5]:

```
Province/State Country/Region 1/22/20 1/23/20 1/24/20 1/25/20 1/26/20 1/27/20
1/28/20 1/29/20 ... 4/21/20 4/22/20 4/23/20 4/24/20 4/25/20 4/26/20 4/27/20
4/28/20 4/29/20 4/30/20
0 NaN Afghanistan 0 0 0 0 0 0 0 0 ... 1092 1176 1279 1351 1463 1531 1703
1828 1939 2171
1 NaN Albania 0 0 0 0 0 0 0 0 ... 609 634 663 678 712 726 736 750 766 773
2 NaN Algeria 0 0 0 0 0 0 0 0 0 ... 2811 2910 3007 3127 3256 3382 3517 3649
3848 4006
3 NaN Andorra 0 0 0 0 0 0 0 0 0 ... 717 723 723 731 738 738 743 743 743 745
4 NaN Angola 0 0 0 0 0 0 0 0 0 ... 24 25 25 25 25 26
```

Aggregating the rows by the country

In[6]:

```
aggregating=df.groupby("Country/Region").sum()
```

In[7]:

```
aggregating.head()
```

Out[7]:

```
1/22/20 1/23/20 1/24/20 1/25/20 1/26/20 1/27/20 1/28/20 1/29/20
1/30/20 1/31/20 ... 4/21/20 4/22/20 4/23/20 4/24/20 4/25/20 4/26/20
4/27/20 4/28/20 4/29/20 4/30/20
```

Country/Region

```
Afghanistan 0 0 0 0 0 0 0 0 0 0 ... 1092 1176 1279 1351 1463 1531
1703 1828 1939 2171
```

```
Albania 0 0 0 0 0 0 0 0 0 0 ... 609 634 663 678 712 726 736 750
766 773
```

```
Algeria 0 0 0 0 0 0 0 0 0 0 ... 2811 2910 3007 3127 3256 3382
3517 3649 3848 4006
```

```
Andorra 0 0 0 0 0 0 0 0 0 0 ... 717 723 723 731 738 738 743 743
743 745
```

```
Angola 0 0 0 0 0 0 0 0 0 0 ... 24 25 25 25 25 26 27 27 27 27
```


In[8]:

```
aggregating.shape
```

Out[8]:

(187, 100)

Visualizing data related to a country for example China

visualization always helps for better understanding of our data.

In[9]:

```
aggregating.loc["China"].plot()
```

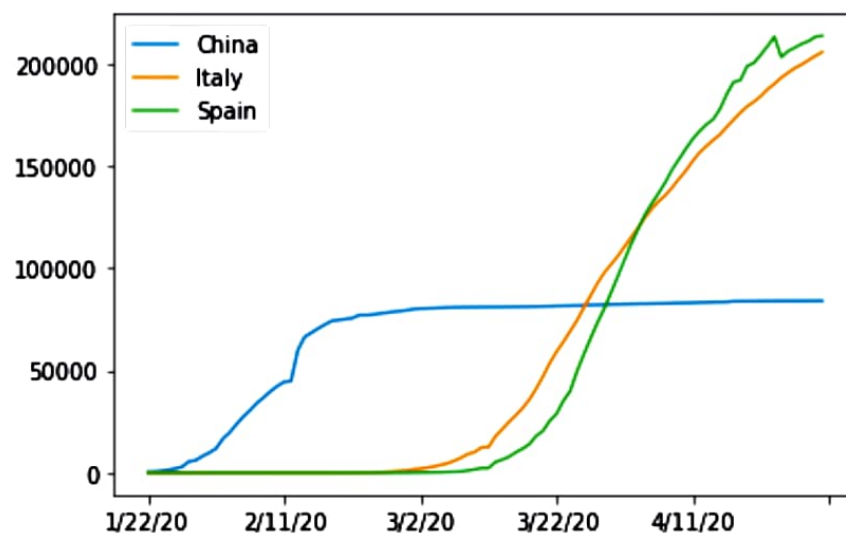
```
aggregating.loc["Italy"].plot()
```

```
aggregating.loc["Spain"].plot()
```

```
plt.legend()
```

Out[9]:

<matplotlib.legend.Legend at 0x7f482e1e3990>



Calculating a good measure

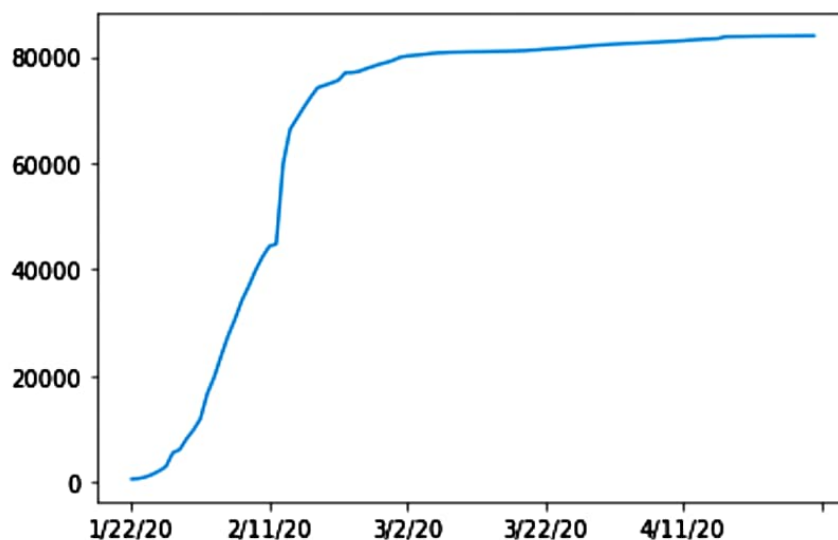
we need to find a good measure represented as a number, describing the spread of the virus in a country.

In[10]:

```
aggregating.loc['China'].plot()
```

Out[10]:

<matplotlib.axes._subplots.AxesSubplot at 0x7f482df94d90>

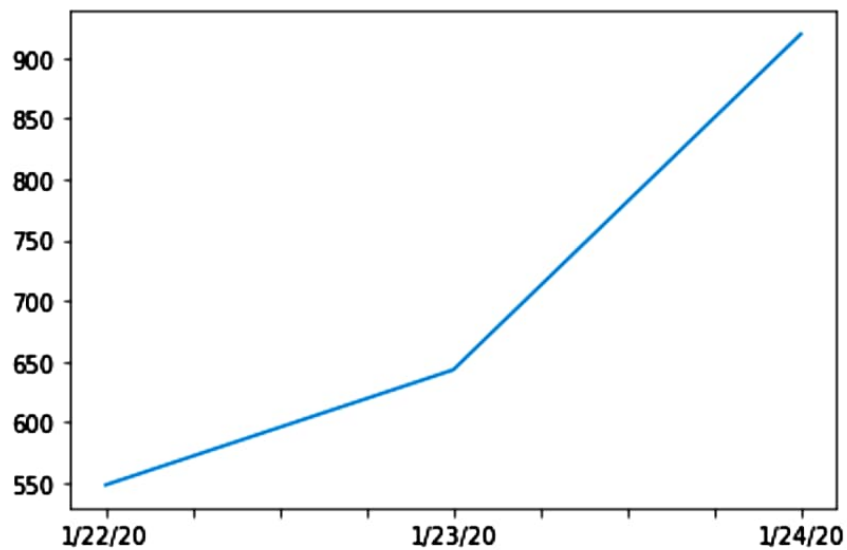


In[11]:

```
aggregating.loc['China'][:3].plot()
```

Out[11]:

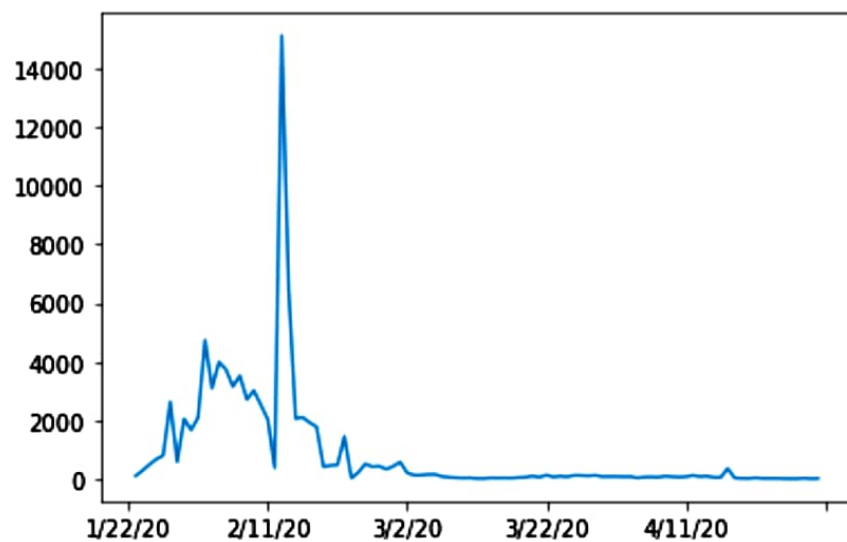
<matplotlib.axes._subplots.AxesSubplot at 0x7f482df83990>



calculating the first derivative of the curve

In[12]:
`aggregating.loc['China'].diff().plot()`

Out[12]:
 <matplotlib.axes._subplots.AxesSubplot at 0x7f482df09290>



find maximum infection rate for China

In[13]:

```
aggregating.loc['China'].diff().max()
```

Out[13]:

15136.0

In[14]:

```
aggregating.loc['Italy'].diff().max()
```

Out[14]:

6557.0

In[15]:

```
aggregating.loc['Spain'].diff().max()
```

Out[15]:

9630.0

find maximum infection rate for all of the countries.

In[16]:

```

countries=list(aggregating.index)
max_infection_rates=[]
for c in countries:
    max_infection_rates.append(aggregating.loc[c].diff().max())
aggregating["max_infection_rates"]=max_infection_rates

```

In[17]:

```
aggregating.head()
```

Out[17]:

```

1/22/20 1/23/20 1/24/20 1/25/20 1/26/20 1/27/20 1/28/20 1/29/20 1/30/20
1/31/20 ... 4/22/20 4/23/20 4/24/20 4/25/20 4/26/20 4/27/20 4/28/20 4/29/20
4/30/20 max_infection_rates
Country/Region
Afghanistan 0 0 0 0 0 0 0 0 0 ... 1176 1279 1351 1463 1531 1703 1828 1939 2171
232.
Albania 0 0 0 0 0 0 0 0 0 ... 634 663 678 712 726 736 750 766 773 34.
Algeria 0 0 0 0 0 0 0 0 0 ... 2910 3007 3127 3256 3382 3517 3649 3848 4006 199.
Andorra 0 0 0 0 0 0 0 0 0 ... 723 723 731 738 738 743 743 743 745 43.
Angola 0 0 0 0 0 0 0 0 0 ... 25 25 25 25 26 27 27 27 27 5.0
5 rows × 101 columns

```

create a new dataframe with only needed column

In[18]:

```
data=pd.DataFrame(aggregating["max_infection_rates"])
```

In[19]:

```
data.head()
```

Out[19]:

	max_infection_rates
Country/Region	
Afghanistan	232.0
Albania	34.0
Algeria	199.0
Andorra	43.0
Angola	5.0

Importing the WorldHappinessReport.csv dataset

selecting needed columns for our analysis

join the datasets

calculate the correlations as the result of our analysis

importing the dataset

In[20]:

```
happiness=pd.read_csv("../input/covid19/worldwide_happiness_report.csv")
```

In[21]:

```
happiness.head()
```

Out[21]:

	Overall rank	Country or region	Score	GDP per capita	Social suppor	Healthy life expectancy	Freedom to make life choices	Generosity	Perceptions of corruption
0	1	Finland	7.769	1.340	1.587	0.986	0.596	0.153	0.393
1	2	Denmark	7.600	1.383	1.573	0.996	0.592	0.252	0.410
2	3	Norway	7.554	1.488	1.582	1.028	0.603	0.271	0.341
3	4	Iceland	7.494	1.380	1.624	1.026	0.591	0.354	0.118
4	5	Netherlands	7.488	1.396	1.522	0.999	0.557	0.322	0.298

let's drop the useless columns

In[22]:

```
cols=["Overall rank","Score","Generosity","Perceptions of corruption"]
```

In[23]:

```
happiness.drop(cols,axis=1,inplace=True)
```

```
happiness.head()
```

Out[23]:

	Country or region	GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices
0	Finland	1.340	1.587	0.986	0.596
1	Denmark	1.383	1.573	0.996	0.592
2	Norway	1.488	1.582	1.028	0.603
3	Iceland	1.380	1.624	1.026	0.591
4	Netherlands	1.396	1.522	0.999	0.557

changing the indices of the dataframe

In[24]:

```
happiness.set_index("Country or region",inplace=True)
```

```
happiness.head()
```

Out[24]:

	GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices
Country or region				
Finland	1.340	1.587	0.986	0.596
Denmark	1.383	1.573	0.996	0.592
Norway	1.488	1.582	1.028	0.603
Iceland	1.380	1.624	1.026	0.591
Netherlands	1.396	1.522	0.999	0.557

now let's join two dataset we have prepared

Corona Dataset :

In[25]:

```
data.head()
```

Out[25]:

	max_infection_rates
Country/Region	
Afghanistan	232.0
Albania	34.0
Algeria	199.0
Andorra	43.0
Angola	5.0

wolrd happiness report Dataset :

In[26]:

```
happiness.head()
```

Out[26]:

	GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices
2country or region				
Finland	1.340	1.587	0.986	0.596
Denmark	1.383	1.573	0.996	0.592
Norway	1.488	1.582	1.028	0.603
Iceland	1.380	1.624	1.026	0.591
Netherlands	1.396	1.522	0.999	0.557

In[27]:

```
final=data.join(happiness,how="inner")
```

```
final.head()
```

Out[27]:

	max_infection_rates	GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices
Afghanistan	232.0	0.350	0.517	0.361	0.000
Albania	34.0	0.947	0.848	0.874	0.383
Algeria	199.0	1.002	1.160	0.785	0.086
Argentina	291.0	1.092	1.432	0.881	0.471
Armenia	134.0	0.850	1.055	0.815	0.283

correlation matrix

In[28]:

```
final.corr()
```

Out[28]:

	max_infection_rates	GDP per capita	Healthy life expectancy	Freedom to make life choices
max_infection_rates	1.000000	0.250118	0.289263	0.078196
GDP per capita	0.250118	1.000000	0.863062	0.394603
Social support	0.191958	0.759468	0.765286	0.456246
Healthy life expectancy	0.289263	0.863062	1.000000	0.427892
Freedom to make life choices	0.078196	0.394603	0.427892	1.000000

Visualization of the results

our Analysis is not finished unless we visualize the results in terms figures and graphs so that everyone can understand what you get out of our analysis

In[29]:

```
final.head()
```

Out[29]:

	max_infection_rates	GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices
Afghanistan	232.0	0.350	0.517	0.361	0.000
Albania	34.0	0.947	0.848	0.874	0.383
Algeria	199.0	1.002	1.160	0.785	0.086
Argentina	291.0	1.092	1.432	0.881	0.471
Armenia	134.0	0.850	1.055	0.815	0.283

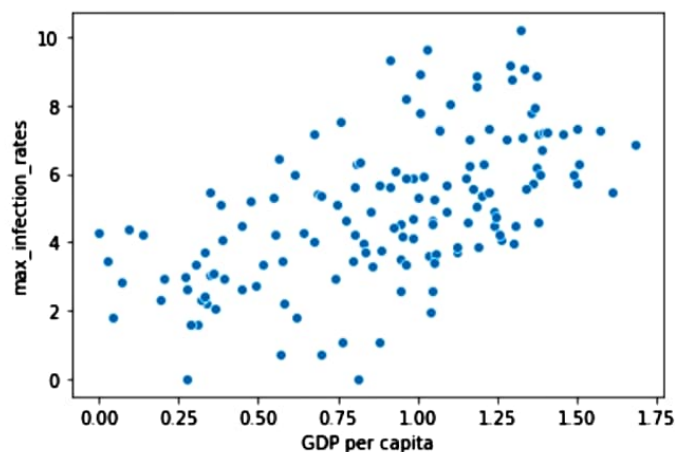
Plotting GDP vs maximum Infection rate

1. In[30]:

```
x=final["GDP per capita"]
y=final["max_infection_rates"]
sns.scatterplot(x,np.log(y))
```

Out [30]:

<matplotlib.axes._subplots.AxesSubplot at 0x7f482de36590>

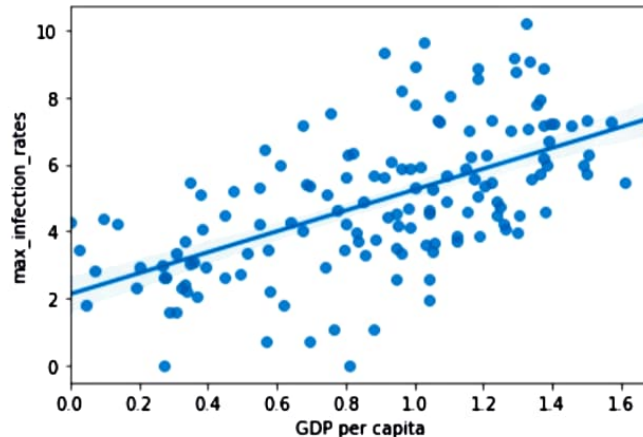


In[31]:

```
sns.regplot(x,np.log(y))
```

Out [31]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f482dd8b3d0>
```



-
-
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- Plotting Social support vs maximum Infection rate

In[32]:

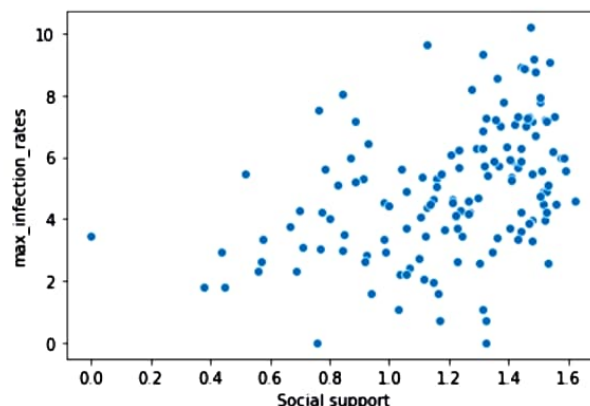
```
x=final["Social support"]
```

```
y=final["max_infection_rates"]
```

-
- sns.scatterplot(x,np.log(y))

Out [32]:

-
- <matplotlib.axes._subplots.AxesSubplot at 0x7f482de1b210>

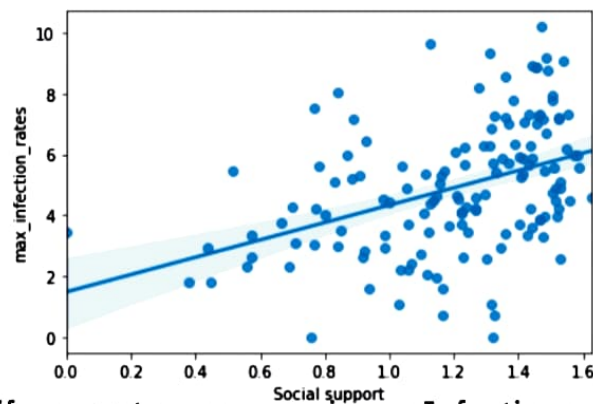


In[33]:

```
sns.regplot(x,np.log(y))
```

Out [33]:

<matplotlib.axes._subplots.AxesSubplot at 0x7f482b49a610>



Plotting Healthy life expectancy vs maximum Infection rate

In[34]:

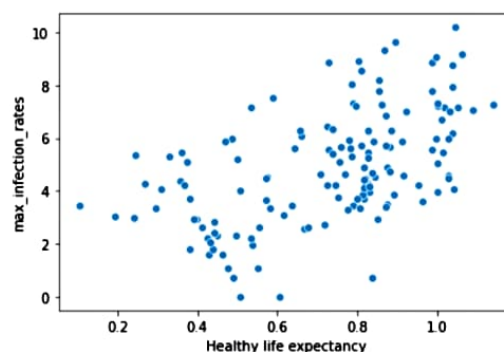
```
x=final["Healthy life expectancy"]
```

```
y=final["max_infection_rates"]
```

```
sns.scatterplot(x,np.log(y))
```

Out [34]:

<matplotlib.axes._subplots.AxesSubplot at 0x7f482b3d8650>

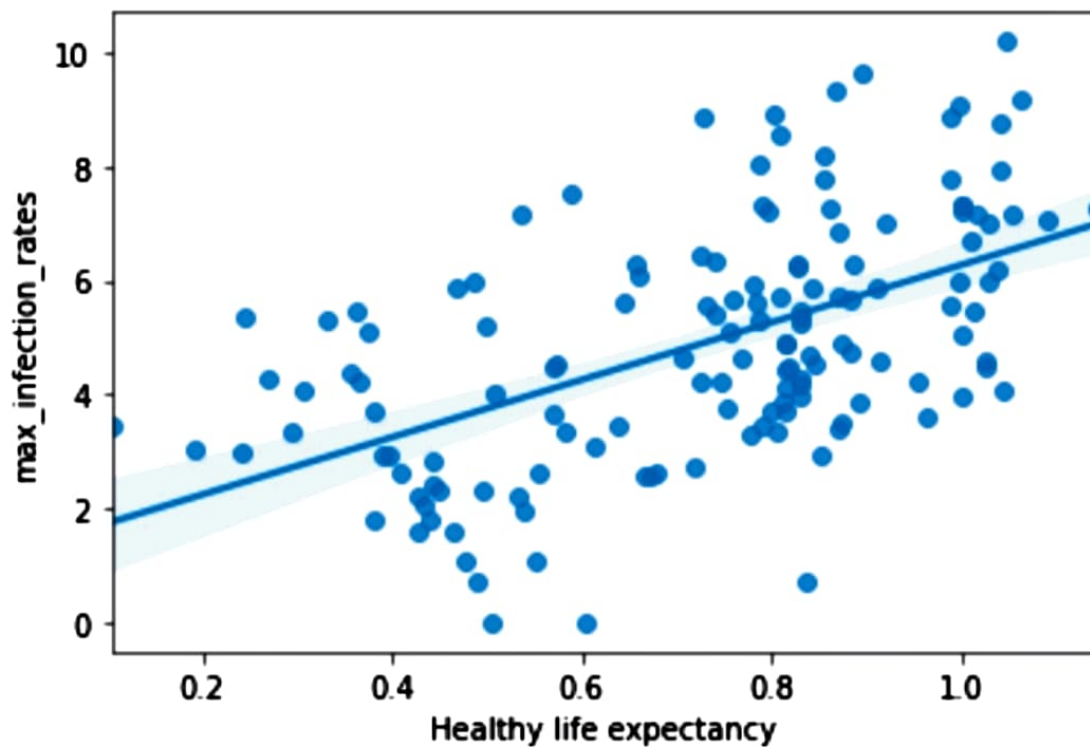


In[35]:

```
sns.regplot(x,np.log(y))
```

Out [35]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f482b3be950>
```



Plotting Freedom to make life choices vs maximum Infection rate

In[36]:

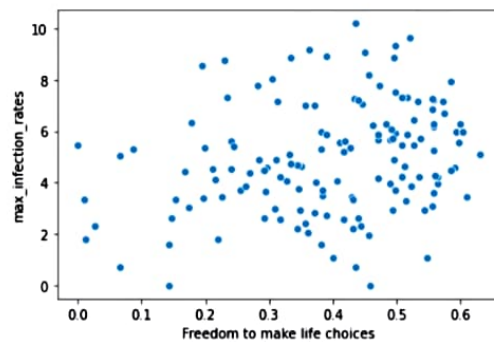
```
x=final["Freedom to make life choices"]
```

```
y=final["max_infection_rates"]
```

```
sns.scatterplot(x,np.log(y))
```

Out [36]:

<matplotlib.axes._subplots.AxesSubplot at 0x7f482b328c90>

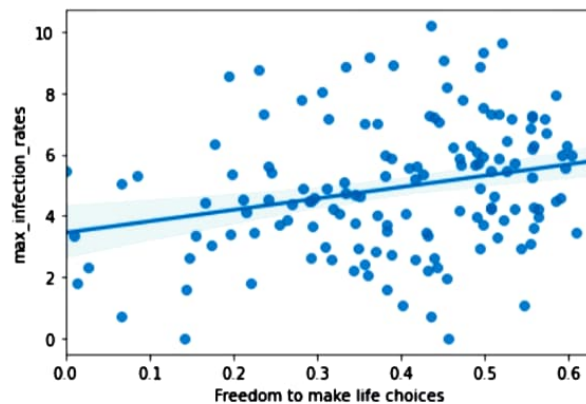


In[37]:

```
sns.regplot(x,np.log(y))
```

Out [37]:

<matplotlib.axes._subplots.AxesSubplot at 0x7f482b2a2450>



CONCLUSION:

In conclusion, the analysis of COVID-19 cases has revealed the complex and multifaceted nature of this global pandemic. It has highlighted the importance of public health measures, such as vaccination, mask-wearing, and social distancing, in controlling the spread of the virus. Furthermore, the pandemic has exposed health disparities and underscored the need for equitable access to healthcare and vaccines. While we have made significant progress in understanding and managing the virus, the ongoing vigilance and cooperation of individuals, communities, and nations are essential to overcoming this unprecedented challenge. COVID-19 has reshaped our world, emphasizing the value of science, public health, and international collaboration in confronting global health crises. As we move forward, the lessons learned from this pandemic will guide our efforts to better prepare for and respond to future threats.