Covid19_Analytics

July 28, 2021

[1]:
```
#instalando plotly
!pip install plotly
```

```
Requirement already satisfied: plotly in c:\users\murracama\anaconda3\lib\site-
packages (5.1.0)
Requirement already satisfied: tenacity>=6.2.0 in
c:\users\murracama\anaconda3\lib\site-packages (from plotly) (8.0.1)
Requirement already satisfied: six in c:\users\murracama\anaconda3\lib\site-
packages (from plotly) (1.15.0)
```

[2]:
```
#importando as bibliotecas necessarias
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import plotly.express as px
import plotly
import plotly.graph_objs as go
from plotly import tools
from plotly.offline import init_notebook_mode,plot,iplot
```

[3]:
```
#checar as funcoes existentes da biblioteca plotly
dir(px)
```

[3]:
```
['Constant',
 'IdentityMap',
 'NO_COLOR',
 'Range',
 '__all__',
 '__builtins__',
 '__cached__',
 '__doc__',
 '__file__',
 '__loader__',
 '__name__',
 '__package__',
 '__path__',
 '__spec__',
 '_chart_types',
```

```
'_core',
'_doc',
'_imshow',
'_special_inputs',
'absolute_import',
'area',
'bar',
'bar_polar',
'box',
'choropleth',
'choropleth_mapbox',
'colors',
'data',
'defaults',
'density_contour',
'density_heatmap',
'density_mapbox',
'funnel',
'funnel_area',
'get_trendline_results',
'histogram',
'icicle',
'imshow',
'imshow_utils',
'line',
'line_3d',
'line_geo',
'line_mapbox',
'line_polar',
'line_ternary',
'optional_imports',
'parallel_categories',
'parallel_coordinates',
'pd',
'pie',
'scatter',
'scatter_3d',
'scatter_geo',
'scatter_mapbox',
'scatter_matrix',
'scatter_polar',
'scatter_ternary',
'set_mapbox_access_token',
'strip',
'sunburst',
'timeline',
'treemap',
```

```
 'violin']
```

[4]:
```
dir(plotly)
```

[4]:
```
['__version__',
 'colors',
 'data',
 'graph_objects',
 'graph_objs',
 'io',
 'offline',
 'tools',
 'utils']
```

[5]:
```
print(plotly.__version__)
```

```
5.1.0
```

[6]:
```
#carregando os dados do github
data=pd.read_csv('https://raw.githubusercontent.com/datasets/covid-19/master/
 ↪data/countries-aggregated.csv')
```

[7]:
```
#mostando a cabeca
data.head()
```

[7]:

	Date	Country	Confirmed	Recovered	Deaths
0	2020-01-22	Afghanistan	0	0	0
1	2020-01-23	Afghanistan	0	0	0
2	2020-01-24	Afghanistan	0	0	0
3	2020-01-25	Afghanistan	0	0	0
4	2020-01-26	Afghanistan	0	0	0

[8]:
```
#mostrando a cauda
data.tail()
```

[8]:

	Date	Country	Confirmed	Recovered	Deaths
107830	2021-07-23	Zimbabwe	95686	62986	2961
107831	2021-07-24	Zimbabwe	97277	64628	3050
107832	2021-07-25	Zimbabwe	97894	65913	3094
107833	2021-07-26	Zimbabwe	99944	67827	3173
107834	2021-07-27	Zimbabwe	101711	70496	3280

[9]:
```
#plotando os dados para a mapa
fg=px.choropleth(data,locations='Country',locationmode='country names',␣
 ↪color='Confirmed',animation_frame='Date')
```

[10]:
```
#atualizando os dados da mopa
```

```
fg.update_layout(title='Choropleth Map of Confirmed COVID19 Cases Worldwide␣
 ↪Till Today',)
fg.show()
```

[11]:
```
#map com template
fg.update_layout(title='Choropleth Map of Confirmed COVID19 Cases Worldwide␣
 ↪Till Today',template='plotly_dark')
fg.show()
```

[12]:
```
#mapa de um especifico continenete, atribuimos a funcao @scope
fg=px.choropleth(data,locations='Country',locationmode='country names',␣
 ↪color='Confirmed',animation_frame='Date',scope='africa')
fg.update_layout(title='Choropleth Map of Confirmed COVID19 Cases Africa Till␣
 ↪Today',template='plotly_dark')
fg.show()
```

[13]:
```
#mapa de um especifico continenete, atribuimos a funcao @scope
fg=px.choropleth(data,locations='Country',locationmode='country names',␣
 ↪color='Confirmed',animation_frame='Date',scope='asia')
fg.update_layout(title='Choropleth Map of Confirmed COVID19 Cases Asia Till␣
 ↪Today',template="plotly_dark")
fg.show()
```

[14]:
```
#criando uma mapa de dispresao @scatter
fg=px.scatter_geo(data,locations='Country',locationmode='country␣
 ↪names',color='Confirmed',size='Confirmed',hover_name='Country',
animation_frame='Date',title='Spread Over time of confirmed COVID19 cases␣
 ↪Worldwide Till Today')
```

[15]:
```
fg.update(layout_coloraxis_showscale=False,layout_template='plotly_dark')
fg.show()
```

[16]:
```
data.columns
```

[16]:
```
Index(['Date', 'Country', 'Confirmed', 'Recovered', 'Deaths'], dtype='object')
```

[17]:
```
#map com template
fg=px.choropleth(data,locations='Country',locationmode='country names',␣
 ↪color='Recovered',animation_frame='Date')
fg.update_layout(title='Choropleth Map of Recovered COVID19 Cases Worldwide␣
 ↪Till Today',template='plotly_dark')
fg.show()
```

[18]:
```
#criando uma mapa de dispresao @scatter
fg=px.scatter_geo(data,locations='Country',locationmode='country␣
 ↪names',color='Recovered',size='Recovered',hover_name='Country',
```

```
animation_frame='Date',title='Spread Over time of Recovered COVID19 cases␣
 ↪Worldwide Till Today')
fg.update(layout_coloraxis_showscale=False,layout_template='plotly_dark')
fg.show()
```

[ ]:

[19]:
```
#map com template
fg=px.choropleth(data,locations='Country',locationmode='country names',␣
 ↪color='Deaths',animation_frame='Date')
fg.update_layout(title='Choropleth Map of Deaths COVID19 Cases Worldwide Till␣
 ↪Today',template='plotly_dark')
fg.show()
```

[20]:
```
#criando uma mapa de dispresao @scatter
fg=px.scatter_geo(data,locations='Country',locationmode='country␣
 ↪names',color='Deaths',size='Deaths',hover_name='Country',
animation_frame='Date',title='Spread Over time of Deaths COVID19 cases␣
 ↪Worldwide Till Today')
fg.update(layout_coloraxis_showscale=False,layout_template='plotly_dark')
fg.show()
```

[21]:
```
data.columns
```

[21]:
```
Index(['Date', 'Country', 'Confirmed', 'Recovered', 'Deaths'], dtype='object')
```

[22]:
```
#instalando algumas bibliotecas para extrair as lat e lon
!pip install geopy
```

```
Requirement already satisfied: geopy in c:\users\murracama\anaconda3\lib\site-
packages (2.2.0)
Requirement already satisfied: geographiclib<2,>=1.49 in
c:\users\murracama\anaconda3\lib\site-packages (from geopy) (1.52)
```

[26]:
```
#importando algumas bibliotecas para extrair as lat e lon
import geopy
from geopy.geocoders import Nominatim
```

[27]:
```
#atribuindo o  Nominatim
geolocator=Nominatim(user_agent='app')
```

[28]:
```
#pegando lat e long de um pais ou continente
location=geolocator.geocode('Mozambique')
print(location.latitude,location.longitude)
```

```
-19.302233 34.9144977
```

[29]:
```
#copiando nosso dataframe para novo dataframe @df
df=data.copy()
```

[30]:
```
df.head()
```

[30]:

	Date	Country	Confirmed	Recovered	Deaths
0	2020-01-22	Afghanistan	0	0	0
1	2020-01-23	Afghanistan	0	0	0
2	2020-01-24	Afghanistan	0	0	0
3	2020-01-25	Afghanistan	0	0	0
4	2020-01-26	Afghanistan	0	0	0

[31]:
```
#aplicando filtro
df[df['Country']=='Mozambique']
```

[31]:

	Date	Country	Confirmed	Recovered	Deaths
67466	2020-01-22	Mozambique	0	0	0
67467	2020-01-23	Mozambique	0	0	0
67468	2020-01-24	Mozambique	0	0	0
67469	2020-01-25	Mozambique	0	0	0
67470	2020-01-26	Mozambique	0	0	0
…	…	…	…	…	…
68014	2021-07-23	Mozambique	107309	82299	1232
68015	2021-07-24	Mozambique	108760	82616	1257
68016	2021-07-25	Mozambique	110288	82767	1282
68017	2021-07-26	Mozambique	111723	84993	1307
68018	2021-07-27	Mozambique	113426	86079	1341

[553 rows x 5 columns]

[32]:
```
#agrupando os colunas com base em Paises
df2=df.groupby(['Country'])[['Confirmed','Recovered','Deaths']].max().
 ↪reset_index()
df2.head(10)
```

[32]:

	Country	Confirmed	Recovered	Deaths
0	Afghanistan	145008	82586	6515
1	Albania	132922	130166	2456
2	Algeria	165204	112050	4112
3	Andorra	14586	14113	127
4	Angola	42110	35742	994
5	Antigua and Barbuda	1288	1229	43
6	Argentina	4875927	4519922	104352
7	Armenia	229090	219280	4597
8	Australia	33473	24013	922
9	Austria	656949	641541	10737

[33]:
```
#a funcao que pega as coordenadas
geolocator=Nominatim(user_agent='app')
```

[34]:
```
#vamos criar uma instrutura de repeticao para colectar lat e lon de cada pais e␣
 ↪guardar na lista
lat=[]
lon=[]
for location in df2['Country']:
    location=geolocator.geocode(location,timeout=None)
    if location is None:
        lat.append(np.nan)
        lon.append(np.nan)
    else:
        lat.append(location.latitude)
        lon.append(location.longitude)
```

[35]:
```
print(lat,lon)
```

```
[33.7680065, 41.000028, 28.0000272, 42.5407167, -11.8775768, 17.2234721,
-34.9964963, 40.7696272, -24.7761086, 47.2, 40.3936294, 24.7736546, 26.1551249,
24.4768783, 13.1500331, 53.4250605, 50.6402809, 16.8259793, 9.5293472,
27.549511, -17.0568696, 44.3053476, -23.1681782, -10.3333333, 4.4137155,
42.6073975, 12.0753083, 17.1750495, -3.3634357, 16.0000552, 13.5066394,
4.6125522, 61.0666922, 7.0323598, 15.6134137, -31.7613365, 35.000074, 2.8894434,
-12.2045176, -0.7264327, -2.9814344, 10.2735633, 7.9897371, 45.5643442,
23.0131338, 34.9823018, 49.8167003, 55.670249, 50.8420975, 11.85677545,
19.0974031, 19.0974031, -1.3397668, 26.2540493, 13.8000382, 1.613172,
15.9500319, 58.7523778, -26.5624806, 10.2116702, -18.1239696, 63.2467777,
46.603354, -0.8999695, 13.470062, 32.3293809, 51.0834196, 8.0300284, 38.9953683,
12.1360374, 15.6356088, 10.7226226, 12.100035, 4.8417097, 19.1399952,
38.9247244, 15.2572432, 47.1817585, 64.9841821, 22.3511148, -2.4833826,
32.6475314, 33.0955793, 52.865196, 31.5313113, 42.6384261, 18.1850507,
36.5748441, 31.1667049, 47.2286086, 1.4419683, -1.2394555500000002, 36.638392,
42.5869578, 29.2733964, 41.5089324, 20.0171109, 56.8406494, 33.8750629,
-29.6039267, 5.7499721, 26.8234472, 47.1416307, 55.3500003, 49.8158683,
52.4387696, -18.9249604, -13.2687204, 4.5693754, 4.7064352, 16.3700359,
35.8885993, 8.9995549, 20.2540382, -20.2759451, 22.5000485, 8.6065, 47.2879608,
43.73844905, 46.8250388, 42.9868853, 31.1728205, -19.302233, -23.2335499,
28.1083929, 52.5001698, -41.5000831, 12.6090157, 17.7356214, 9.6000359,
41.6171214, 60.5000209, 21.0000287, 30.3308401, 5.3783537, 8.559559, -5.6816069,
-23.3165935, -6.8699697, 12.7503486, 52.215933, 40.0332629, 25.3336984,
45.9852129, 64.6863136, -1.9646631, 17.250512, 13.8250489, 12.90447,
-13.7693895, 43.9458623, 0.8875498, 25.6242618, 14.4750607, 44.1534121,
-4.6574977, 8.6400349, 1.2904753, 48.7411522, 45.8133113, -8.7053941, 8.3676771,
-28.8166236, 7.8699431, 39.3260685, 7.5554942, 14.5844444, nan, 4.1413025,
59.6749712, 46.7985624, 34.6401861, 23.9739374, 38.6281733, -6.5247123,
14.8971921, -8.5151979, 8.7800265, 10.8677845, 33.8439408, 38.9597594,
```

```
39.7837304, 1.5333554, 49.4871968, 24.0002488, 54.7023545, -32.8755548,
41.32373, -16.5255069, 8.0018709, 13.2904027, 31.9049661, 16.3471243,
-14.5189121, -19.01688] [66.2385139, 19.9999619, 2.9999825, 1.5732033,
17.5691241, -61.9554608, -64.9672817, 44.6736646, 134.755, 13.2, 47.7872508,
-78.0000547, 50.5344606, 90.2932426, -59.5250305, 27.6971358, 4.6667145,
-88.7600927, 2.2584408, 90.5119273, -64.9912286, 17.5961467, 24.5928742, -53.2,
114.5653908, 25.4856617, -1.6880314, 95.9999652, 29.8870575, -24.0083947,
104.869423, 13.1535811, -107.991707, 19.9981227, 19.0156172, -71.3187697,
104.999927, -73.783892, 44.2832964, 15.6419155, 23.8222636, -84.0739102,
-5.5679458, 17.0118954, -80.8328748, 33.1451285, 15.4749544, 10.3333283,
113.3655317, 42.757784519943655, -70.3028026, -70.3028026, -79.3666965,
29.2675469, -88.9140683, 10.5170357, 37.9999668, 25.3319078, 31.3991317,
38.6521203, 179.0122737, 25.9209164, 1.8883335, 11.6899699, -15.4900464,
-83.1137366, 10.4234469, -1.0800271, 21.9877132, -61.6904045, -89.8988087,
-10.7083587, -14.9000214, -58.6416891, -72.3570972, -77.06572732690151,
-86.0755145, 19.5060937, -18.1059013, 78.6677428, 117.8902853, 54.5643516,
44.1749775, -7.9794599, 34.8667654, 12.674297, -77.3947693, 139.2394179,
36.941628, 65.2093197, 38.4313975, 175.29694553869794, 127.6961188, 20.9021231,
47.4979476, 74.724091, 103.378253, 24.7537645, 35.843409, 28.3350193,
-9.3658524, 18.1236723, 9.5531527, 23.7499997, 6.1296751, 4.8185293, 46.4416422,
33.9301963, 102.2656823, 73.3287853, -2.2900239, 14.4476911, 168.0002575,
-9.2399263, 57.5703566, -100.000037, 152.00846930625, 28.5670941,
7.424224092532953, 103.8499736, 19.5180992, -7.3362482, 34.9144977, 17.3231107,
84.0917139, 5.7480821, 172.8344077, -85.2936911, 9.3238432, 7.9999721,
21.7168387, 9.0999715, 57.0036901, 71.247499, 132.9102573, -81.1308434,
144.2489081, -58.1693445, -75.0458515, 122.7312101, 19.134422, -7.8896263,
51.2295295, 24.6859225, 97.7453061, 30.0644358, -62.6725973, -60.975036,
-61.2765569, -172.1200508, 12.458306, 6.9648718, 42.3528328, -14.4529612,
20.55144, 55.4540146, -11.8400269, 103.8520359, 19.4528646, 14.4808369,
159.1070693851845, 49.083416, 24.991639, 29.6667897, -4.8379791, 80.7137847,
29.4917691, nan, -56.0771187, 14.5208584, 8.2319736, 39.0494106, 120.9820179,
70.8156541, 35.7878438, 100.83273, 125.8375756, 1.0199765, -60.9821067,
9.400138, 34.9249653, -100.4458825, 32.2166578, 31.2718321, 53.9994829,
-3.2765753, -56.0201525, 63.9528098, 168.1069154, -66.1109318, 108.4265113,
35.2023413, 47.8915271, 27.5589884, 29.35365015971339]
```

[36]:
```
#verificando o tipo
type(lat)
```

[36]:
```
list
```

[37]:
```
#mostrando a cabeca
df2.head()
```

[37]:

	Country	Confirmed	Recovered	Deaths
0	Afghanistan	145008	82586	6515
1	Albania	132922	130166	2456
2	Algeria	165204	112050	4112

```
3      Andorra      14586      14113     127
4       Angola      42110      35742     994
```

[38]:
```
#adicionando lat e lon no dataframe
df2['lat']=lat
df2['lon']=lon
```

[39]:
```
#mostrando a cabeca
df2.head()
```

[39]:

	Country	Confirmed	Recovered	Deaths	lat	lon
0	Afghanistan	145008	82586	6515	33.768006	66.238514
1	Albania	132922	130166	2456	41.000028	19.999962
2	Algeria	165204	112050	4112	28.000027	2.999983
3	Andorra	14586	14113	127	42.540717	1.573203
4	Angola	42110	35742	994	-11.877577	17.569124

[42]:
```
df2.isna().sum()
```

[42]:
```
Country      0
Confirmed    0
Recovered    0
Deaths       0
lat          1
lon          1
dtype: int64
```

[43]:
```
df2.dropna(axis='index', subset=['lat'],inplace=True)
```

[44]:
```
df2.isna().sum()
```

[44]:
```
Country      0
Confirmed    0
Recovered    0
Deaths       0
lat          0
lon          0
dtype: int64
```

[46]:
```
#Insatalando Folium para criar um Basemap
!pip install folium
```

```
Requirement already satisfied: folium in c:\users\murracama\anaconda3\lib\site-
packages (0.12.1)
Requirement already satisfied: branca>=0.3.0 in
c:\users\murracama\anaconda3\lib\site-packages (from folium) (0.4.2)
Requirement already satisfied: requests in
c:\users\murracama\anaconda3\lib\site-packages (from folium) (2.25.1)
```

```
Requirement already satisfied: jinja2>=2.9 in
c:\users\murracama\anaconda3\lib\site-packages (from folium) (2.11.3)
Requirement already satisfied: numpy in c:\users\murracama\anaconda3\lib\site-
packages (from folium) (1.20.1)
Requirement already satisfied: MarkupSafe>=0.23 in
c:\users\murracama\anaconda3\lib\site-packages (from jinja2>=2.9->folium)
(1.1.1)
Requirement already satisfied: certifi>=2017.4.17 in
c:\users\murracama\anaconda3\lib\site-packages (from requests->folium)
(2020.12.5)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in
c:\users\murracama\anaconda3\lib\site-packages (from requests->folium) (1.26.4)
Requirement already satisfied: chardet<5,>=3.0.2 in
c:\users\murracama\anaconda3\lib\site-packages (from requests->folium) (4.0.0)
Requirement already satisfied: idna<3,>=2.5 in
c:\users\murracama\anaconda3\lib\site-packages (from requests->folium) (2.10)
```

[47]:
```
#importando folium
import folium
```

[48]:
```
#criando basemap
folium.Map(location=[54,15],zoom_start=2)
```

[48]:
```
<folium.folium.Map at 0x21a1dfdc6a0>
```

[49]:
```
#Basemap de casos confirmados
m=folium.Map(location=[54,15],zoom_start=2)

for id,row in df2.iterrows():
    folium.Marker(location=[row['lat'],row['lon']],popup=row['Confirmed']).
 ↪add_to(m)
```

[50]:
```
m
```

[50]:
```
<folium.folium.Map at 0x21a1dfdc520>
```

[51]:
```
#basemap de casos recuperados
m=folium.Map(location=[54,15],zoom_start=2)

for id,row in df2.iterrows():
    folium.Marker(location=[row['lat'],row['lon']],popup=row['Recovered']).
 ↪add_to(m)
m
```

[51]:
```
<folium.folium.Map at 0x21a1fdc5f70>
```

[52]:
```
#basemap de mortes
m=folium.Map(location=[54,15],zoom_start=2)
```

```
for id,row in df2.iterrows():
    folium.Marker(location=[row['lat'],row['lon']],popup=row['Deaths']).
 ↪add_to(m)
m
```

[52]: <folium.folium.Map at 0x21a1f8c50a0>

[53]:
```
from folium.plugins import MarkerCluster
mc=MarkerCluster()
```

[54]:
```
#basemap de mortes
#criando cluster de Map com Marker
m=folium.Map(location=[54,15],tiles='openstreetmap',zoom_start=2)

for id,row in df2.iterrows():
    mc.add_child(folium.
 ↪Marker(location=[row['lat'],row['lon']],popup=row['Deaths']))
m.add_child(mc)
m
```

[54]: <folium.folium.Map at 0x21a1df336d0>

[55]:
```
#criando Heatmap
from folium.plugins import HeatMap
```

[56]:
```
df2.head()
```

[56]:

	Country	Confirmed	Recovered	Deaths	lat	lon
0	Afghanistan	145008	82586	6515	33.768006	66.238514
1	Albania	132922	130166	2456	41.000028	19.999962
2	Algeria	165204	112050	4112	28.000027	2.999983
3	Andorra	14586	14113	127	42.540717	1.573203
4	Angola	42110	35742	994	-11.877577	17.569124

[57]:
```
m=folium.Map(location=[54,15],tiles='openstreetmap',zoom_start=2)
HeatMap(data=df2[['lat','lon','Confirmed']],radius=15).add_to(m)
m
```

[57]: <folium.folium.Map at 0x21a1e2e7f40>

[ ]: