

```
# -*- coding: utf-8 -*-
```

```
"""
```

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```
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```

```
"""
```

```
import pandas as pd
```

```
import geopandas as gpd
```

```
import PIL
```

```
import io
```

```
#reading in the csv data
```

```
data=pd.read_csv(r"C:\Users\Luca\Desktop\Dynamic_mapping_of_covid_19_progression\COVID-19-master\csse_covid_19_data\csse_covid_19_time_series\time_series_covid19_confirmed_global.csv")
```

```
#Group the data by the country
```

```
data = data.groupby(["Country/Region"]).sum()
```

```
#drop Lat and Lon columns
```

```
data = data.drop(columns=["Lat","Long"])
```

```
#Create a transpose of the dataframe
```

```
data_transposed = data.T
```

```
##data_transposed.plot(y = ["Australia","China", "US", "Italy"], use_index =True, figsize = (8,8),marker =  
"*)
```

```
#read in the world map shapefile
```

```
world =
```

```
gpd.read_file(r"C:\Users\Luca\Desktop\Dynamic_mapping_of_covid_19_progression\World_Map.shp")
```

```
#Replace name in geopandas dataframe with the name in "data"
```

```

world.replace("Viet Nam", "Vietnam", inplace = True)
world.replace("Brunei Darussalam", "Brunei", inplace = True)
world.replace("Cape Verde", "Cabo Verde", inplace = True)
world.replace("Democratic Republic of the Congo", "Congo (Kinshasa)", inplace = True)
world.replace("Congo", "Congo (Brazzaville)", inplace = True)
world.replace("Czech Republic", "Czechia", inplace = True)
world.replace("Swaziland", "Eswatini", inplace = True)
world.replace("Iran (Islamic Republic of)", "Iran", inplace = True)
world.replace("Korea, Republic of", "Korea, South", inplace = True)
world.replace("Lao People's Democratic Republic", "Laos", inplace = True)
world.replace("Libyan Arab Jamahiriya", "Libya", inplace = True)
world.replace("Republic of Moldova", "Moldova", inplace = True)
world.replace("The former Yugoslav Republic of Macedonia", "North Macedonia", inplace = True)
world.replace("Syrian Arab Republic", "Syria", inplace = True)
world.replace("Taiwan", "Taiwan*", inplace = True)
world.replace("United Republic of Tanzania", "Tanzania*", inplace = True)
world.replace("United States", "US", inplace = True)
world.replace("Palestine", "West Bank and Gaza", inplace = True)

```

```

#checking the names of the countries for any discrepancies

```

```

#for index,row in data.iterrows():

```

```

# if index not in world["NAME"].tolist():

```

```

#     print(index + " is not in the list")

```

```

# else:

```

```

#     pass

```

```

#Merging the "data" with "world" geopandas dataframe

```

```

merge = world.join(data, on = "NAME", how = "right")

```

```

image_frames = []

```

```

for dates in merge.columns.tolist()[2:97]:

```

```
#Plot
```

```
ax = merge.plot(column = dates,  
                cmap = "OrRd",  
                figsize = (16,16),  
                legend = True,  
                scheme = "user_defined",  
                classification_kwds = {"bins":[10,50,100,500,1000,5000,10000,500000,1000000]},  
                edgecolor = "black",  
                linewidth = 0.4)
```

```
#Add a title to the map
```

```
ax.set_title("Luca Maffezzoni. Total Confirmed Coronavirus Cases: " + dates,  
            Fontweight = "bold",  
            pad = 16.5)
```

```
#Removing the axes
```

```
ax.set_axis_off()
```

```
#Move the legend
```

```
ax.get_legend().set_bbox_to_anchor((0.18,0.6))
```

```
img = ax.get_figure()
```

```
f = io.BytesIO()
```

```
img.savefig(f, format = "png",bbox_inches = "tight")
```

```
f.seek(0)
```

```
image_frames.append(PIL.Image.open(f))
```

```
# Create the GIF animation

image_frames[0].save("Dynamic COVID-19 Map.gif", format = "GIF",
    append_images = image_frames[1:],
    save_all = True, duration =600,
    loop = 3)

f.close()
```