basic_plot_6

February 3, 2023

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```
# import libraries
import numpy as np
import pandas as pd
import matplotlib as mpl
import matplotlib.pyplot as plt
import folium as fm
import json
```

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# read the data file
df_can = pd.read_excel ('Canada.xlsx', sheet_name = 'Canada by Citizenship',␣
 ↪skiprows = 20, skipfooter = 2)
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# get the head of the data frame
df_can.head()
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# clean up the dataset to remove unnecessary columns (eg. REG)
df_can.drop(['AREA','REG','DEV','Type','Coverage'], axis = 1, inplace = True)

# let's rename the columns so that they make sense
df_can.rename (columns = {'OdName':'Country', 'AreaName':'Continent','RegName':
 ↪'Region'}, inplace = True)

# for sake of consistency, let's also make all column labels of type string
df_can.columns = list(map(str, df_can.columns))

# years that we will be using in this lesson - useful for plotting later on
years = list(map(str, range(1980, 2014)))

# add the number of immigrants for all the years for each country
df_tot = df_can[years].sum(axis = 1)

# create a new column
df_can ['Total'] = df_tot
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# read the geojson file
world_geo = open('world_countries.geojson').read()
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# create a plain world map
world_map = fm.Map(location = [0, 0], zoom_start = 2)
```

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# create a numpy array of length 6 and has linear spacing from the minimum␣
 ↪total immigration to the maximum total immigration
threshold_scale = np.linspace(df_can['Total'].min(),
                              df_can['Total'].max(),
                              6, dtype=int)
threshold_scale = threshold_scale.tolist() # change the numpy array to a list
threshold_scale[-1] = threshold_scale[-1] + 1 # make sure that the last value␣
 ↪of the list is greater than the maximum immigration
```

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# generate choropleth map using the total immigration of each country to Canada␣
 ↪from 1980 to 2013
fm.Choropleth(
    geo_data = world_geo,
    name="choropleth",
    data = df_can,
    columns=["Country", "Total"],
    key_on="feature.properties.name",
    threshold_scale = threshold_scale,
    fill_color="YlOrRd",
    fill_opacity=0.7,
    line_opacity=0.2,
    legend_name = "Immigration to Canada",
).add_to(world_map)

fm.LayerControl().add_to(world_map)

# display map
world_map
```