Climate Change Data Anlysis on World Bank Data (Population growth and unemplyment rate)

```
import pandas as pd
# Read the Dataset of the Population Growth
df = pd.read_csv("/content/API_SP.POP.GROW_DS2_en_csv_v2_5358698.csv")
df.head()
```

	Country Name	Country Code	Indicator Name	Indicator Code	1960	1961	1962	1963	1964	1965	...	2012
0	Aruba	ABW	Population growth (annual %)	SP.POP.GROW	NaN	2.179059	1.548572	1.389337	1.215721	1.032841	...	0.810231
1	Africa Eastern and Southern	AFE	Population growth (annual %)	SP.POP.GROW	NaN	2.660180	2.732633	2.753248	2.806915	2.840787	...	2.740405
2	Afghanistan	AFG	Population growth (annual %)	SP.POP.GROW	NaN	1.925952	2.014879	2.078997	2.139651	2.216007	...	4.077628
3	Africa Western and Central	AFW	Population growth (annual %)	SP.POP.GROW	NaN	2.115789	2.145723	2.190827	2.211360	2.242567	...	2.812851
4	Angola	AGO	Population growth (annual %)	SP.POP.GROW	NaN	1.558355	1.460738	1.410425	1.301745	1.111041	...	3.758703

5 rows × 66 columns

```
import pandas as pd
```

```
df2 = pd.read_csv("/content/API_SL.UEM.TOTL.ZS_DS2_en_csv_v2_5358416.csv")
df2.head()
```

	Country Name	Country Code	Indicator Name	Indicator Code	1991	1992	1993	1994	1995	1996	...
0	Aruba	ABW	Unemployment, total (% of total labor force) (...	SL.UEM.TOTL.ZS	NaN	NaN	NaN	NaN	NaN	NaN	...
1	Africa Eastern and Southern	AFE	Unemployment, total (% of total labor force) (...	SL.UEM.TOTL.ZS	7.333336	7.318747	7.242706	7.160694	7.063796	7.055998	...
2	Afghanistan	AFG	Unemployment, total (% of total labor force) (...	SL.UEM.TOTL.ZS	8.121000	8.168000	8.123000	8.111000	8.260000	8.165000	...
3	Africa Western and Central	AFW	Unemployment, total (% of total labor force) (...	SL.UEM.TOTL.ZS	4.224595	4.335460	4.372125	4.366898	4.348996	4.379537	...
4	Angola	AGO	Unemployment, total (% of total labor force) (...	SL.UEM.TOTL.ZS	4.489000	4.487000	4.531000	4.395000	4.304000	4.274000	...

5 rows × 35 columns

Double-click (or enter) to edit

```
def convert_to_col(df):
    id_vars = ['Country Name', 'Country Code', 'Indicator Name', 'Indicator Code']
    value_vars = df.columns.difference(id_vars).tolist()
    df = pd.melt(df, id_vars=id_vars, value_vars=value_vars, var_name='Year', value_name='Value')
    df['Year'] = pd.to_datetime(df['Year'], format='%Y')
    return df['Year']
    return df['Year']

def convert_2_datafram(df):
  Year = convert_to_col(df)

  return df['Country Name'] , Year



path = "/content/API_SP.POP.GROW_DS2_en_csv_v2_5358698.csv"
df = pd.read_csv(path)
Country_Name, Year = convert_2_datafram(df)

print(Country_Name)
print(Year)
```

```
     0                                Aruba
     1      Africa Eastern and Southern
     2                      Afghanistan
     3       Africa Western and Central
     4                               Angola
                       ...
     261                             Kosovo
     262                        Yemen, Rep.
     263                       South Africa
     264                             Zambia
     265                           Zimbabwe
     Name: Country Name, Length: 266, dtype: object
     0       1960-01-01
     1       1960-01-01
     2       1960-01-01
     3       1960-01-01
     4       1960-01-01
                ...
     16487   2021-01-01
     16488   2021-01-01
     16489   2021-01-01
     16490   2021-01-01
     16491   2021-01-01
     Name: Year, Length: 16492, dtype: datetime64[ns]
```

To begin exploring the Population and Unemployment dataset, first check its available columns and then generate a summary using the .describe method.

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

# Load dataset
df = pd.read_csv("/content/API_SP.POP.GROW_DS2_en_csv_v2_5358698.csv")
df.columns

     Index(['Country Name', 'Country Code', 'Indicator Name', 'Indicator Code',
            '1960', '1961', '1962', '1963', '1964', '1965', '1966', '1967', '1968',
            '1969', '1970', '1971', '1972', '1973', '1974', '1975', '1976', '1977',
            '1978', '1979', '1980', '1981', '1982', '1983', '1984', '1985', '1986',
            '1987', '1988', '1989', '1990', '1991', '1992', '1993', '1994', '1995',
            '1996', '1997', '1998', '1999', '2000', '2001', '2002', '2003', '2004',
            '2005', '2006', '2007', '2008', '2009', '2010', '2011', '2012', '2013',
            '2014', '2015', '2016', '2017', '2018', '2019', '2020', '2021'],
           dtype='object')


# Calculate summary statistics
print(df.describe())

            1960        1961        1962        1963        1964        1965  \
     count   0.0  264.000000  264.000000  264.000000  264.000000  264.000000
     mean    NaN    2.194004    2.286008    2.358841    2.303821    2.290847
     std     NaN    1.380567    1.382939    1.521203    1.375586    1.419673
     min     NaN   -1.015528   -1.510091   -1.845309   -2.110700   -2.354033
     25%     NaN    1.370124    1.418289    1.484893    1.479080    1.412867
     50%     NaN    2.204979    2.304936    2.394379    2.390442    2.381150
     75%     NaN    2.845553    2.848907    2.885317    2.873235    2.847189
     max     NaN   10.638254   11.774148   12.851885   12.147917   11.964503
```

```
             1966        1967        1968        1969  ...        2012  \
count  264.000000  264.000000  264.000000  264.000000  ...  265.000000
mean     2.253186    2.245973    2.265524    2.235044  ...    1.349639
std      1.426523    1.457580    1.698895    1.813731  ...    1.434792
min     -2.596081   -2.829547   -3.085539   -4.787105  ...   -5.280078
25%      1.295425    1.258571    1.263360    1.172316  ...    0.461311
50%      2.392027    2.339552    2.337629    2.340388  ...    1.255941
75%      2.804877    2.774092    2.808907    2.773119  ...    2.195008
max     11.988676   12.114861   12.612111   17.039974  ...    9.758169

             2013        2014        2015        2016        2017        2018  \
count  265.000000  265.000000  265.000000  265.000000  265.000000  265.000000
mean     1.401124    1.375687    1.323819    1.271352    1.198958    1.179653
std      1.508699    1.588856    1.402870    1.287458    1.250445    1.262902
min     -5.033810   -6.852118   -4.415744   -2.217280   -3.755484   -4.048391
25%      0.481191    0.473649    0.500452    0.468170    0.381500    0.362584
50%      1.236383    1.196115    1.140936    1.133234    1.149954    1.140549
75%      2.220753    2.196927    2.200322    2.162337    2.079584    2.032734
max      9.226496   11.794016    9.219918    7.212802    4.394554    4.556082

             2019        2020        2021
count  265.000000  265.000000  265.000000
mean     1.156251    1.054799    0.905508
std      1.205549    1.185017    1.264801
min     -2.904996   -2.984077   -4.170336
25%      0.371554    0.238041    0.180461
50%      1.074975    1.011272    0.902989
75%      1.978457    1.897864    1.796101
max      3.931356    3.727101    3.707424

[8 rows x 62 columns]
```

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

# Load dataset
df = pd.read_csv("/content/unemployement.csv")
```

```
df.columns
```

```
     Index(['Country Name', 'Country Code', 'Indicator Name', 'Indicator Code',
            '1991', '1992', '1993', '1994', '1995', '1996', '1997', '1998', '1999',
            '2000', '2001', '2002', '2003', '2004', '2005', '2006', '2007', '2008',
            '2009', '2010', '2011', '2012', '2013', '2014', '2015', '2016', '2017',
            '2018', '2019', '2020', '2021'],
           dtype='object')
```

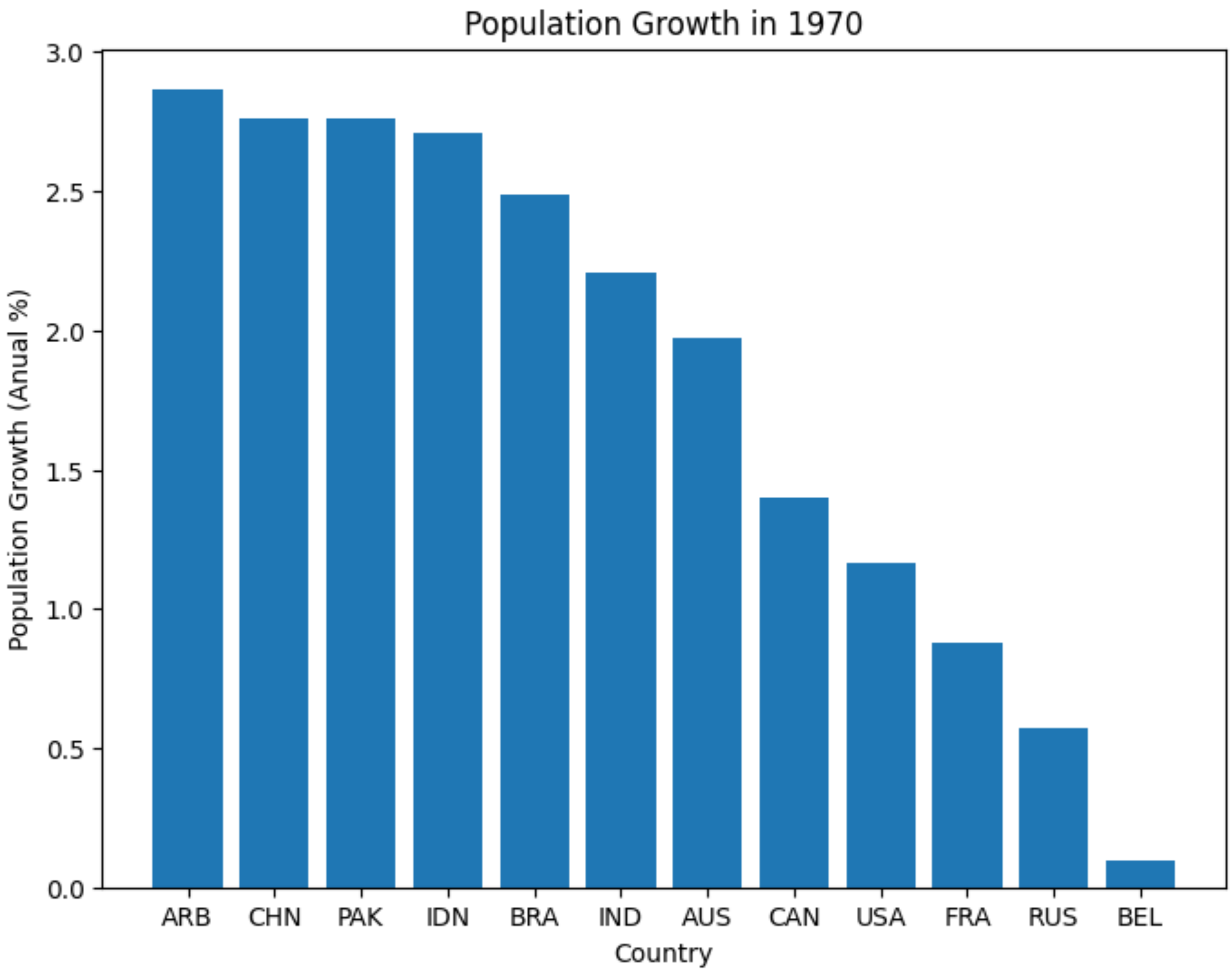
```
# Calculate summary statistics
print(df2.describe())
```

```
                  1991        1992        1993        1994        1995        1996  \
     count  235.000000  235.000000  235.000000  235.000000  235.000000  235.000000
     mean     7.200893    7.538033    7.957919    8.132981    8.204283    8.361057
     std      5.559648    5.853788    5.895106    5.817520    5.894885    5.930076
     min      0.600000    0.661000    0.637000    0.645000    0.647000    0.640000
     25%      3.005000    3.251000    3.719000    3.992487    4.018328    4.098335
     50%      5.815639    5.919194    6.123000    6.550999    7.063796    7.141000
     75%      9.764504   10.176000   10.842606   11.095000   10.980617   11.329000
     max     29.886999   30.014999   29.745001   30.000000   35.599998   38.799999

                  1997        1998        1999        2000  ...        2012  \
     count  235.000000  235.000000  235.000000  235.000000  ...  235.000000
     mean     8.259042    8.308067    8.441300    8.319262  ...    7.991842
     std      5.741922    5.692938    5.672374    5.731190  ...    5.608217
     min      0.610000    0.613000    0.614000    0.611000  ...    0.480000
     25%      4.092500    4.198602    4.353729    4.133000  ...    4.059724
     50%      7.090541    7.048398    6.930000    6.597600  ...    6.712282
     75%     11.015313   11.259500   11.711000   11.319535  ...   10.248132
     max     36.000000   34.500000   32.400002   32.200001  ...   31.200001

                  2013        2014        2015        2016        2017        2018  \
     count  235.000000  235.000000  235.000000  235.000000  235.000000  235.000000
     mean     8.014396    7.856910    7.766160    7.641989    7.397113    7.141719
     std      5.680118    5.538581    5.391755    5.284049    5.132107    5.060204
     min      0.250000    0.200000    0.170000    0.150000    0.140000    0.110000
     25%      4.080076    4.160410    4.305000    4.187633    3.965525    3.822140
     50%      6.512784    6.250916    6.490000    6.010000    5.873657    5.620000
     75%     10.140000   10.125765    9.835000    9.655000    9.360000    9.015000
```

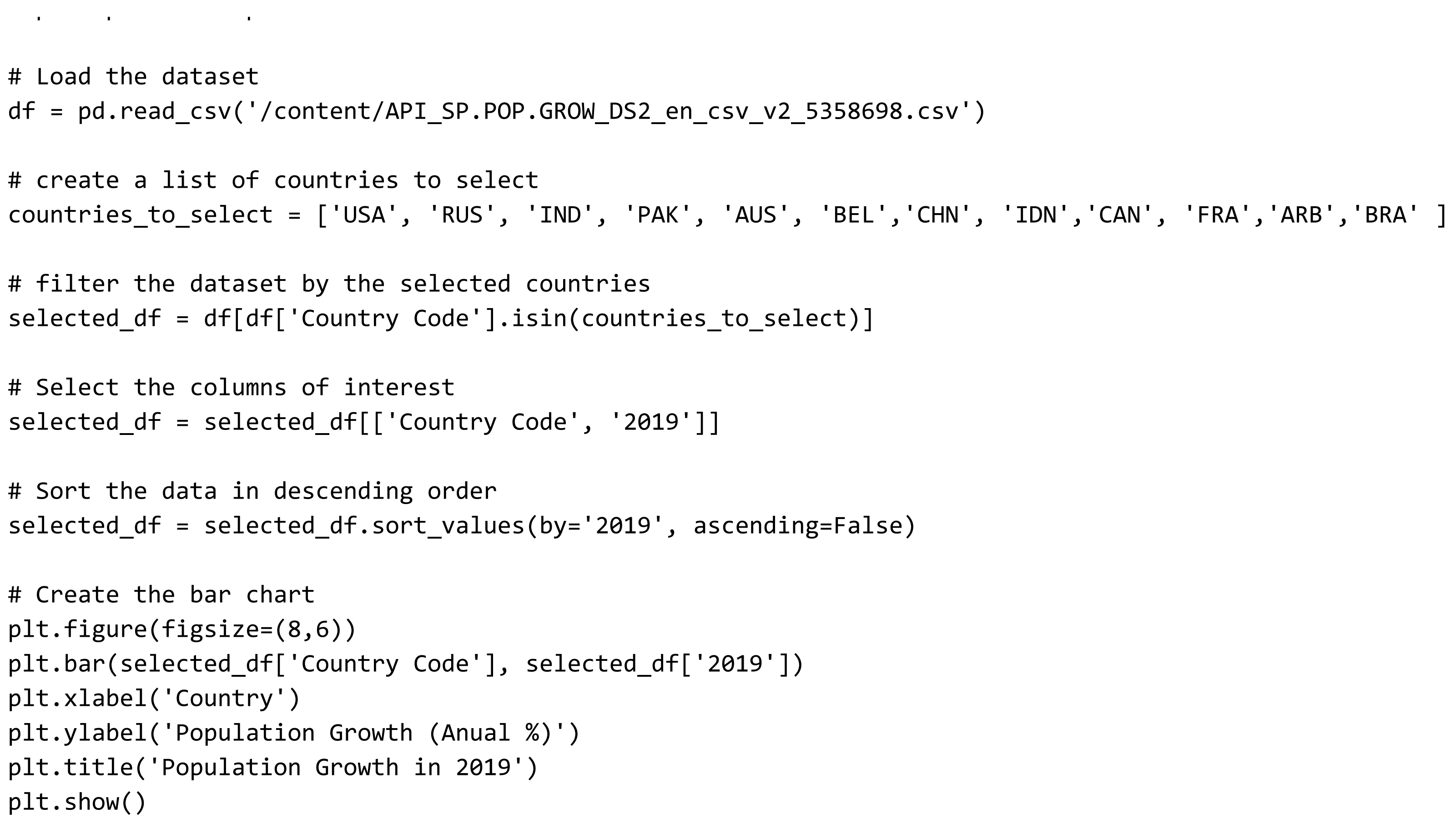
```
max     29.139999   28.379999   27.690001   26.197001   26.059999   26.260000

              2019        2020        2021
count  235.000000  235.000000  233.000000
mean     6.981379    8.091862    7.789410
std      4.933526    5.168388    5.166205
min      0.100000    0.140000    0.170000
25%      3.765450    4.525500    4.370000
50%      5.540000    6.786562    6.333154
75%      8.736000   10.197892    9.582000
max     26.315001   28.048000   28.770000

[8 rows x 31 columns]
```

To compare indicators across different countries over time and explore their interdependence, create a bar chart, line chart, and correlation matrix. To gain deeper insights not only among countries but also among indicators, use a Choropleth Map.

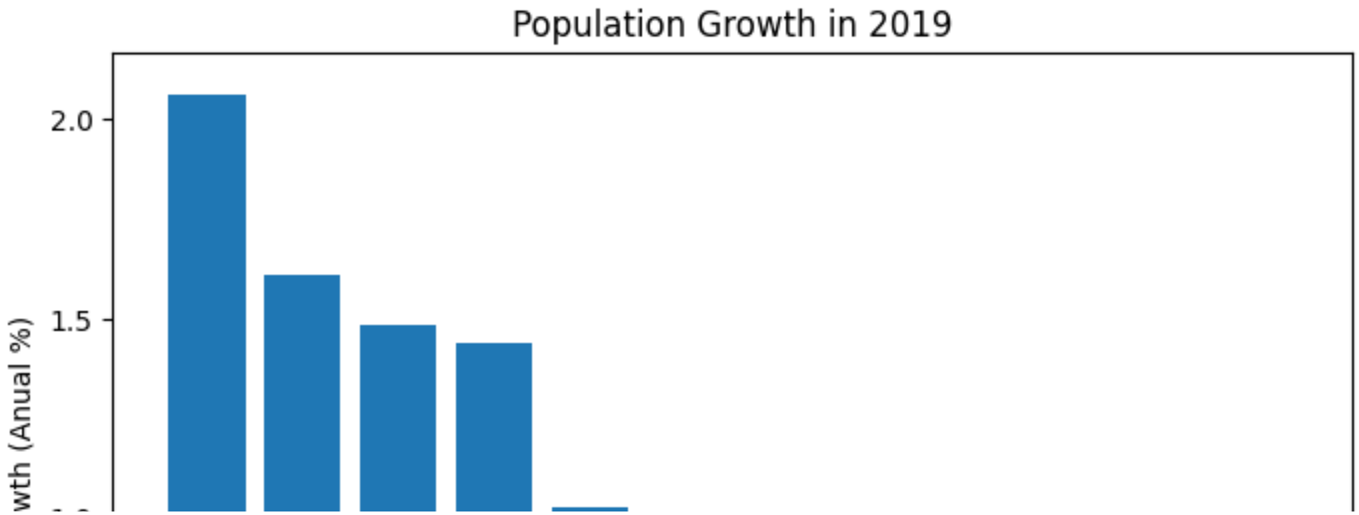
```
import matplotlib.pyplot as plt
import pandas as pd

# Load the dataset
df = pd.read_csv('/content/API_SP.POP.GROW_DS2_en_csv_v2_5358698.csv')

# create a list of countries to select
countries_to_select = ['USA', 'RUS', 'IND', 'PAK', 'AUS', 'BEL','CHN', 'IDN','CAN', 'FRA','ARB','BRA' ]

# filter the dataset by the selected countries
selected_df = df[df['Country Code'].isin(countries_to_select)]

# Select the columns of interest
selected_df = selected_df[['Country Code', '1970']]

# Sort the data in descending order
selected_df = selected_df.sort_values(by='1970', ascending=False)

# Create the bar chart
plt.figure(figsize=(8,6))
plt.bar(selected_df['Country Code'], selected_df['1970'])
plt.bar(selected_df['Country Code'], selected_df['1970'])
plt.xlabel('Country')
plt.ylabel('Population Growth (Anual %)')
plt.title('Population Growth in 1970')
plt.show()
```

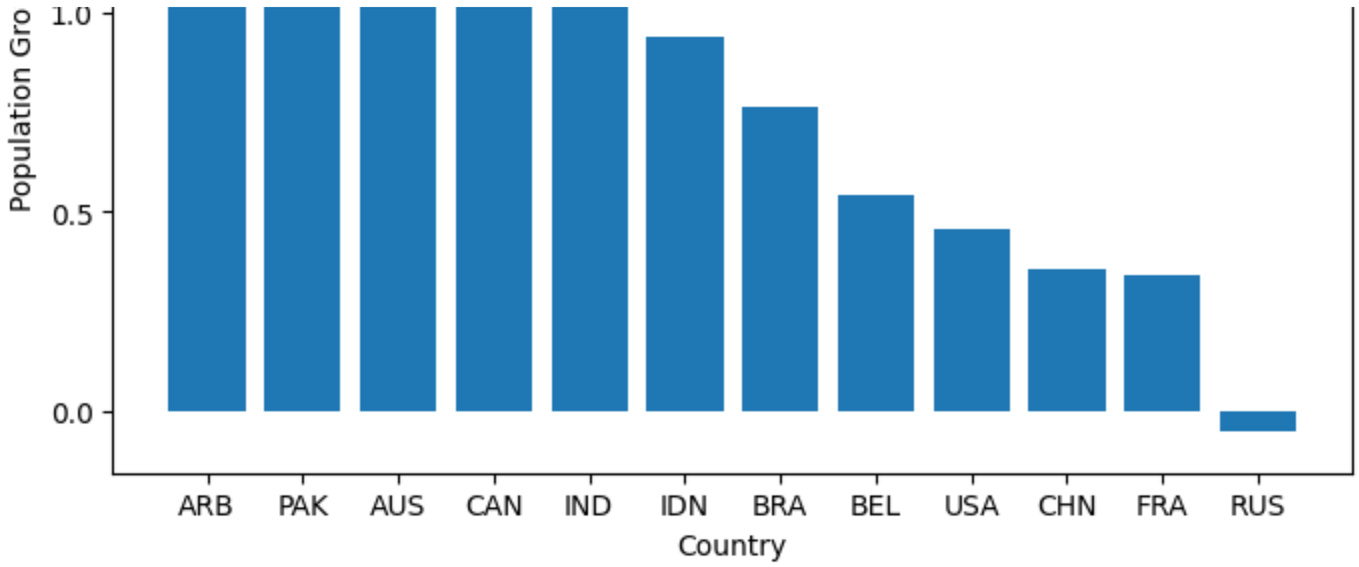


```
import matplotlib.pyplot as plt
import pandas as pd
```

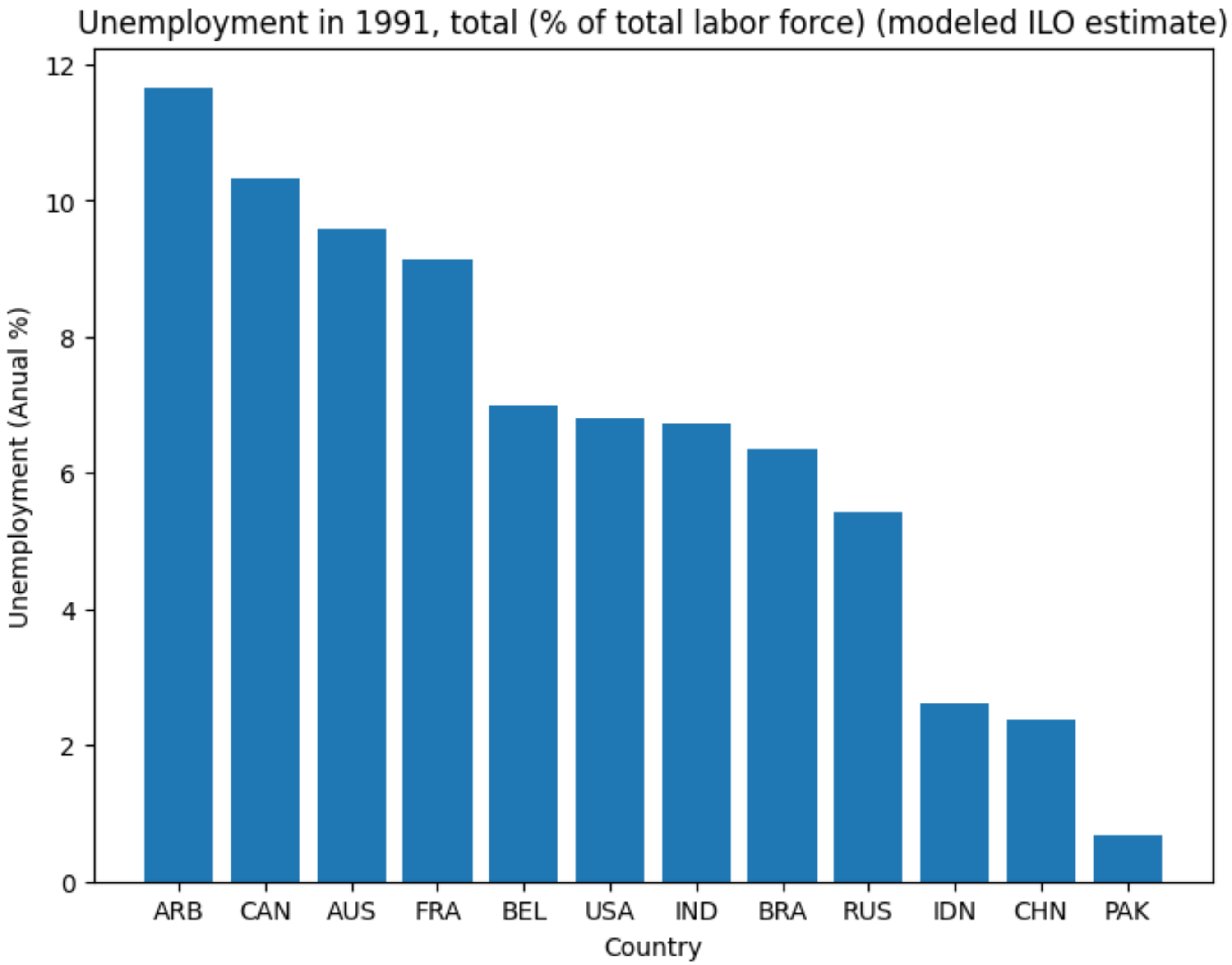


```
# Load the dataset
df = pd.read_csv('/content/API_SP.POP.GROW_DS2_en_csv_v2_5358698.csv')

# create a list of countries to select
countries_to_select = ['USA', 'RUS', 'IND', 'PAK', 'AUS', 'BEL','CHN', 'IDN','CAN', 'FRA','ARB','BRA' ]

# filter the dataset by the selected countries
selected_df = df[df['Country Code'].isin(countries_to_select)]

# Select the columns of interest
selected_df = selected_df[['Country Code', '2019']]

# Sort the data in descending order
selected_df = selected_df.sort_values(by='2019', ascending=False)

# Create the bar chart
plt.figure(figsize=(8,6))
plt.bar(selected_df['Country Code'], selected_df['2019'])
plt.xlabel('Country')
plt.ylabel('Population Growth (Anual %)')
plt.title('Population Growth in 2019')
plt.show()
```



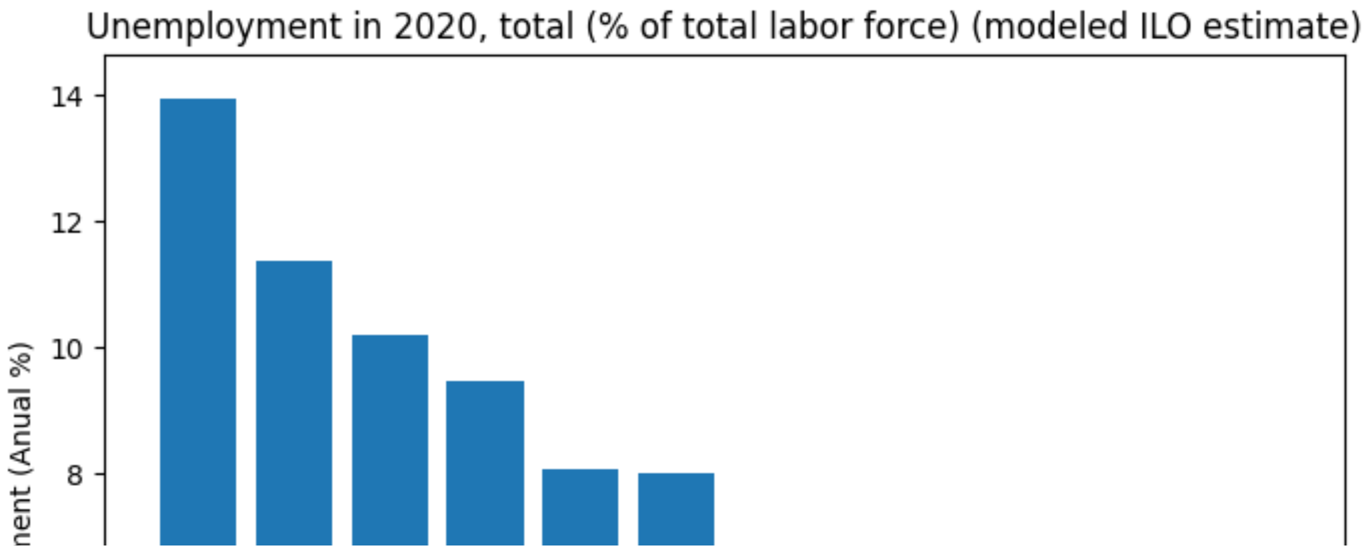


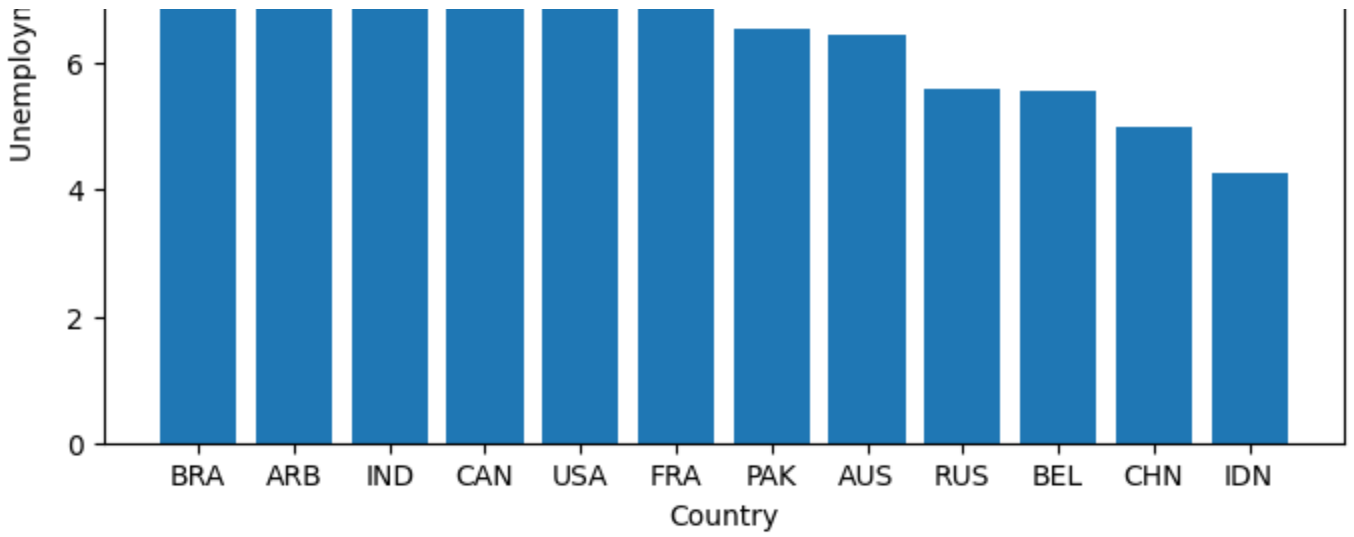
```
import matplotlib.pyplot as plt
import pandas as pd

# Load the dataset
df = pd.read_csv('unemployement.csv')

# create a list of countries to select
countries_to_select = ['USA', 'RUS', 'IND', 'PAK', 'AUS', 'BEL','CHN', 'IDN','CAN', 'FRA','ARB','BRA' ]

# filter the dataset by the selected countries
selected_df = df[df['Country Code'].isin(countries_to_select)]

# Select the columns of interest
selected_df = selected_df[['Country Code', '1991']]

# Sort the data in descending order
selected_df = selected_df.sort_values(by='1991', ascending=False)

# Create the bar chart
plt.figure(figsize=(8,6))
plt.bar(selected_df['Country Code'], selected_df['1991'])
plt.xlabel('Country')
plt.ylabel('Unemployment (Anual %)')
plt.title('Unemployment in 1991, total (% of total labor force) (modeled ILO estimate)')
plt.show()
```



```
import matplotlib.pyplot as plt
import pandas as pd
```

```
# Load the dataset
df = pd.read_csv('unemployement.csv')

# create a list of countries to select
countries_to_select = ['USA', 'RUS', 'IND', 'PAK', 'AUS', 'BEL','CHN', 'IDN','CAN', 'FRA','ARB','BRA' ]

# filter the dataset by the selected countries
selected_df = df[df['Country Code'].isin(countries_to_select)]

# Select the columns of interest
selected_df = selected_df[['Country Code', '2020']]

# Sort the data in descending order
selected_df = selected_df.sort_values(by='2020', ascending=False)

# Create the bar chart
plt.figure(figsize=(8,6))
plt.bar(selected_df['Country Code'], selected_df['2020'])
plt.xlabel('Country')
plt.ylabel('Unemployment (Anual %)')
plt.title('Unemployment in 2020, total (% of total labor force) (modeled ILO estimate)')
plt.show()
```

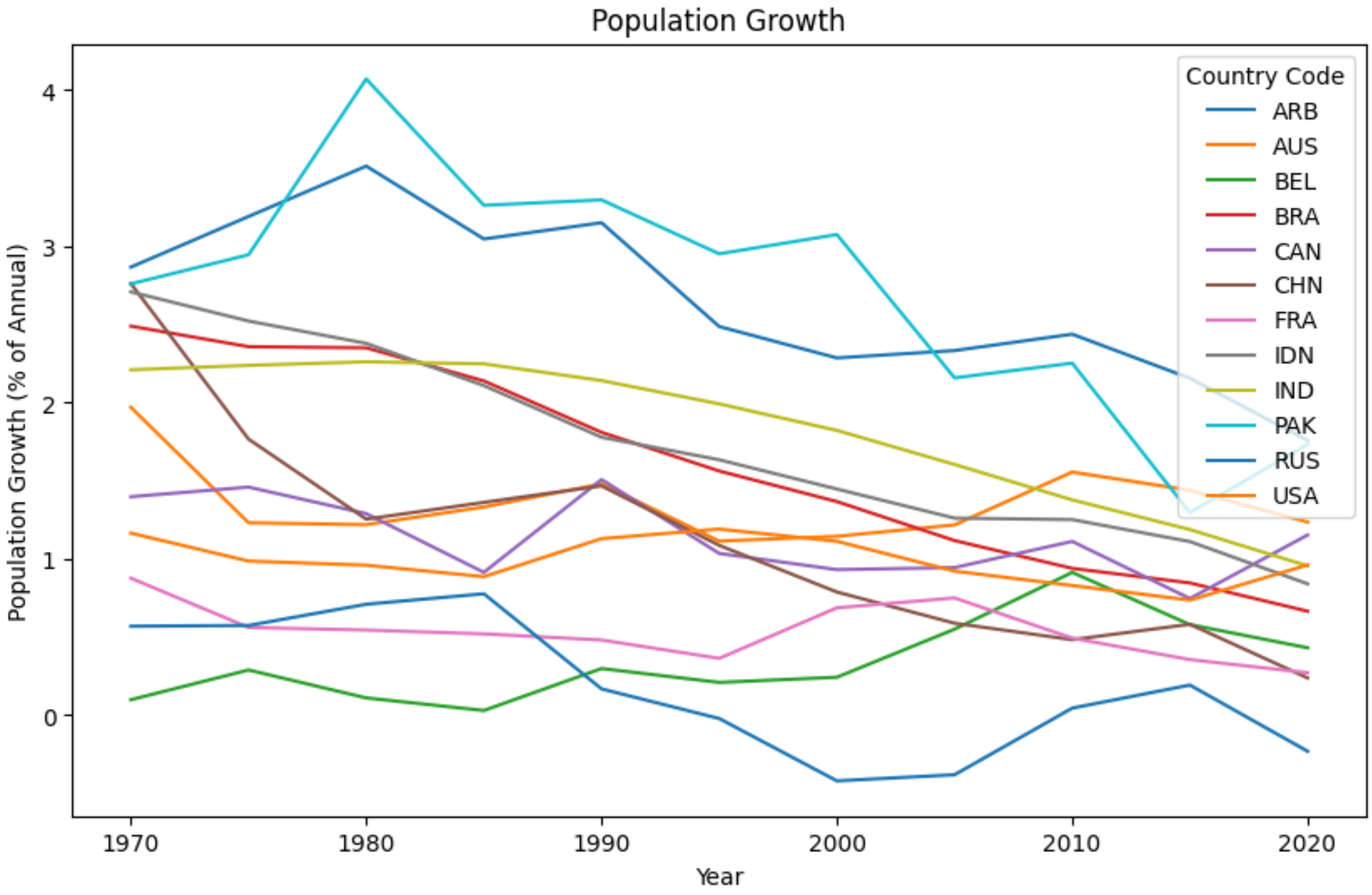




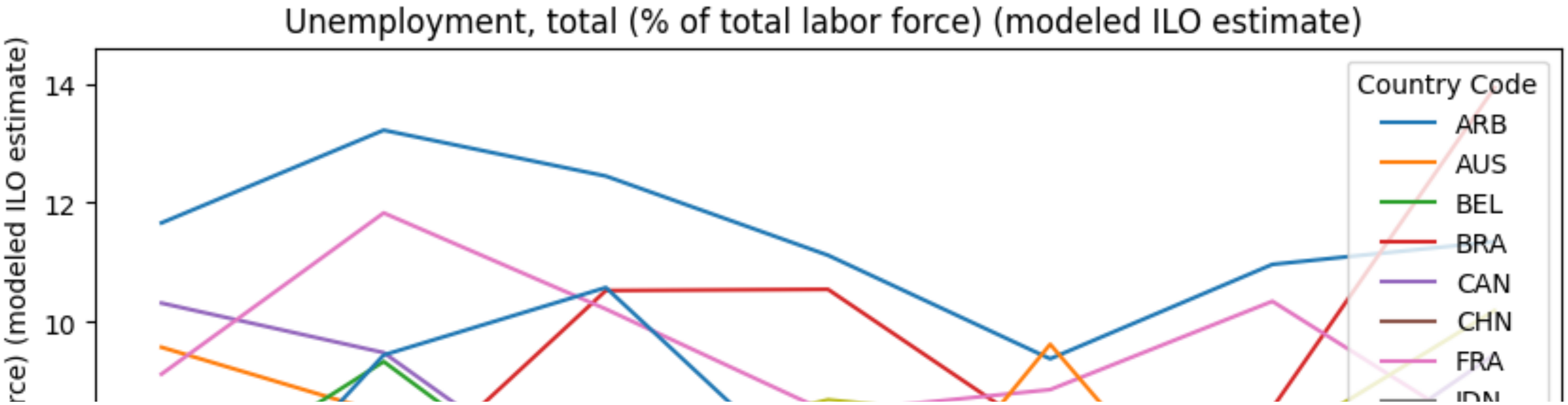
Double-click (or enter) to edit

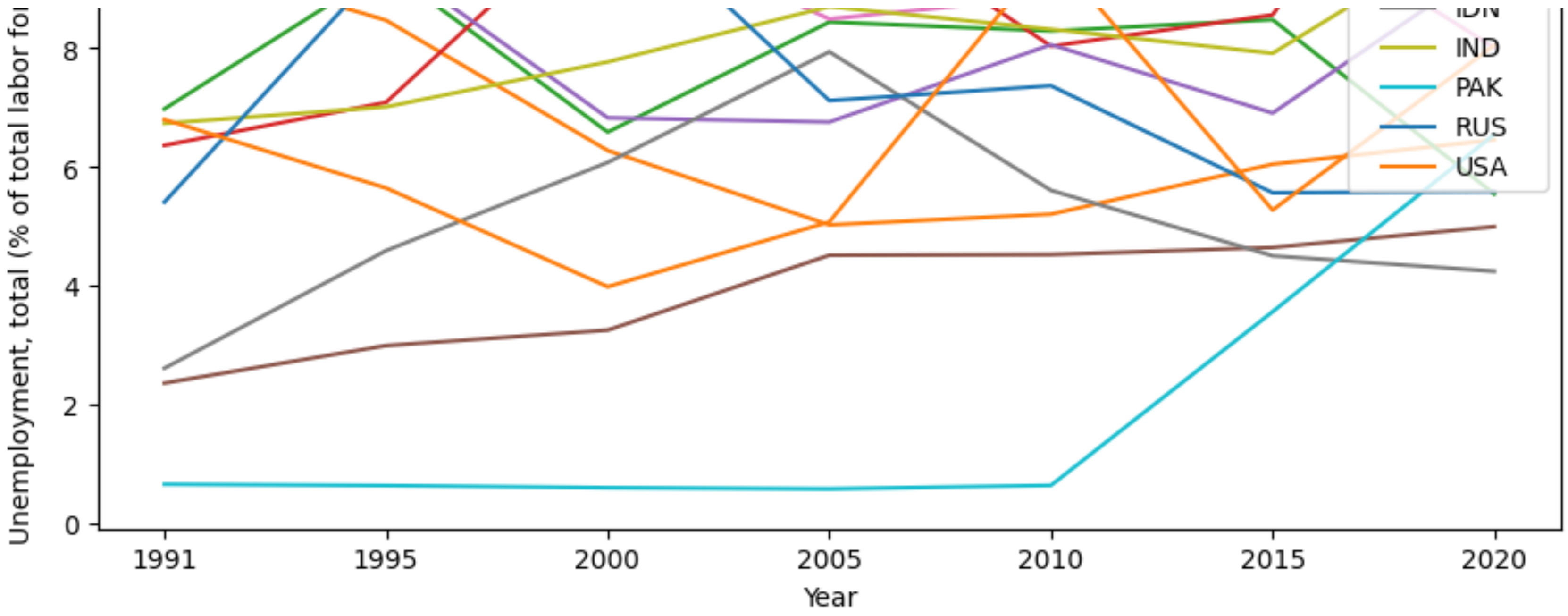
```
import matplotlib.pyplot as plt
import pandas as pd

# Load the dataset
df = pd.read_csv('/content/API_SP.POP.GROW_DS2_en_csv_v2_5358698.csv')

# Select countries of interest
countries = ['USA', 'RUS', 'IND', 'PAK', 'AUS', 'BEL','CHN', 'IDN','CAN', 'FRA','ARB','BRA' ]

# Subset the data for these countries
subset = df[df["Country Code"].isin(countries)]

# Set the index to be the country names
subset.set_index("Country Code", inplace=True)

# Select columns of interest
cols = ['1970', '1975', '1980', '1985', '1990', '1995', '2000','2005', '2010', '2015', '2020']
subset = subset[cols]
```

```
# Plot the data
subset.T.plot(kind='line', figsize=(10,6))
plt.title('Population Growth')
plt.xlabel('Year')
plt.ylabel('Population Growth (% of Annual)')
plt.show()
```



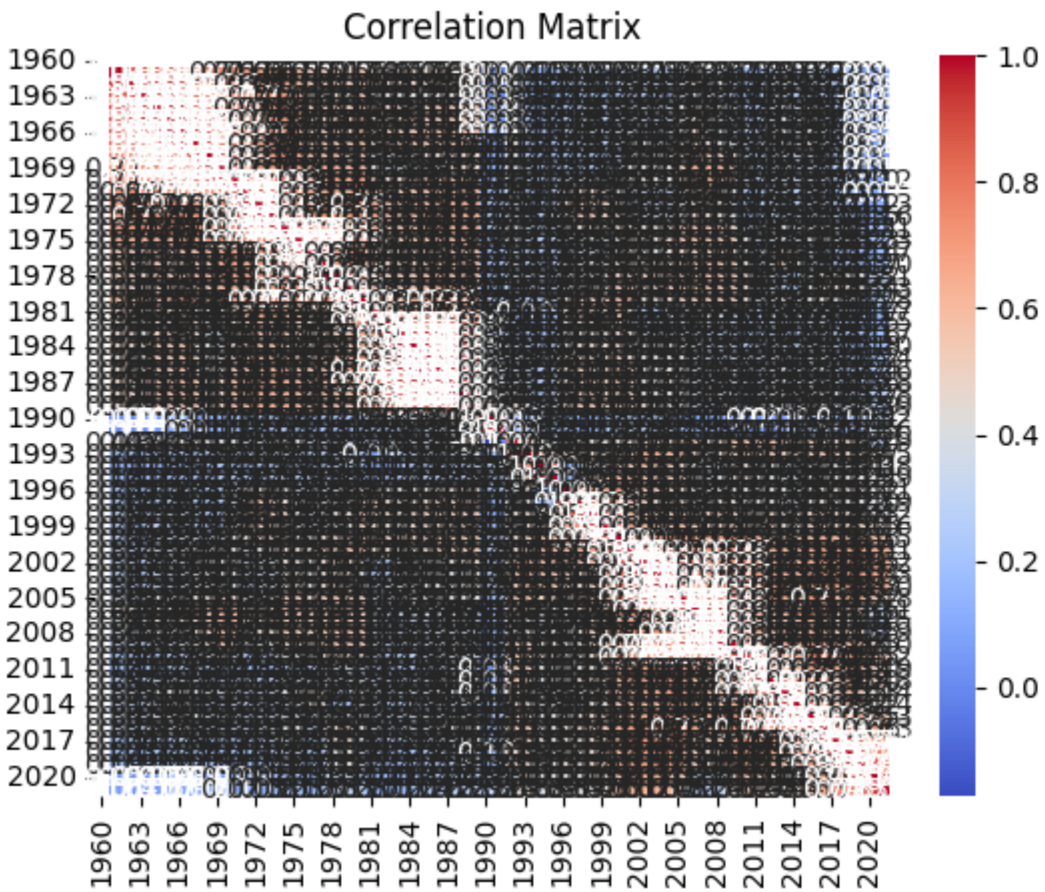
```
import matplotlib.pyplot as plt
import pandas as pd

# Load the dataset
df = pd.read_csv('/content/API_SL.UEM.TOTL.ZS_DS2_en_csv_v2_5358416.csv')
# Select countries of interest
countries = ['USA', 'RUS', 'IND', 'PAK', 'AUS', 'BEL','CHN', 'IDN','CAN', 'FRA','ARB','BRA' ]

# Subset the data for these countries
subset1 = df2[df2["Country Code"].isin(countries)]

# Set the index to be the country names
subset1.set_index("Country Code", inplace=True)

# Select columns of interest
cols = [ '1991', '1995', '2000','2005', '2010', '2015', '2020']
subset1 = subset1[cols]

# Plot the data
subset1.T.plot(kind='line', figsize=(10,6))
plt.title('Unemployment, total (% of total labor force) (modeled ILO estimate) ')
plt.xlabel('Year')
plt.ylabel('Unemployment, total (% of total labor force) (modeled ILO estimate)')
plt.show()
```



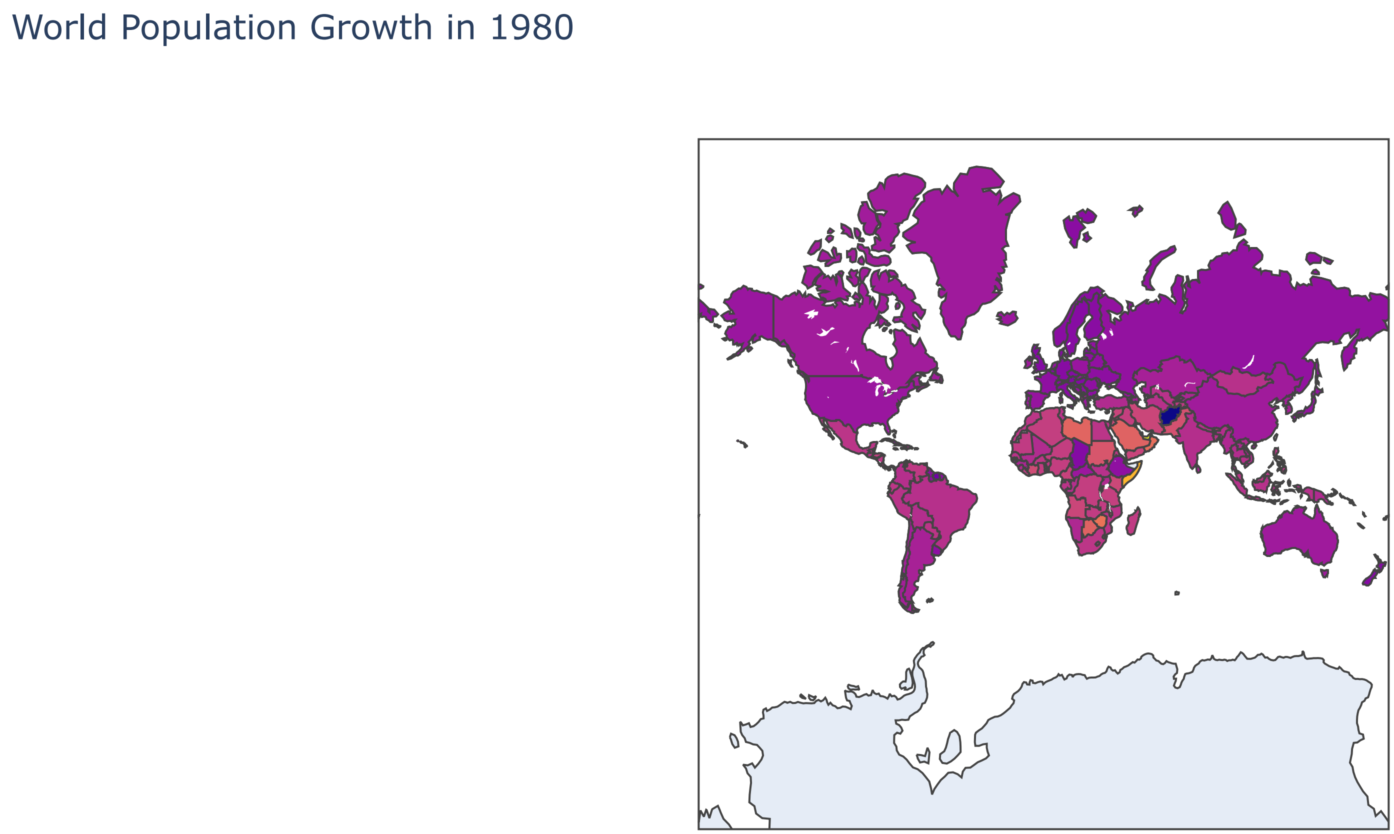


Explore and understand any correlations (or lack of) between indicators. Does this vary between country, have any correlations or trends changed with time?

```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

# Read the data
df = pd.read_csv('/content/API_SP.POP.GROW_DS2_en_csv_v2_5358698.csv')

# Calculate correlation matrix
corr_matrix = df.corr()

# Plot correlation matrix using heatmap
sns.heatmap(corr_matrix, cmap='coolwarm', annot=True, fmt='.2f')
plt.title('Correlation Matrix')
plt.show()
```

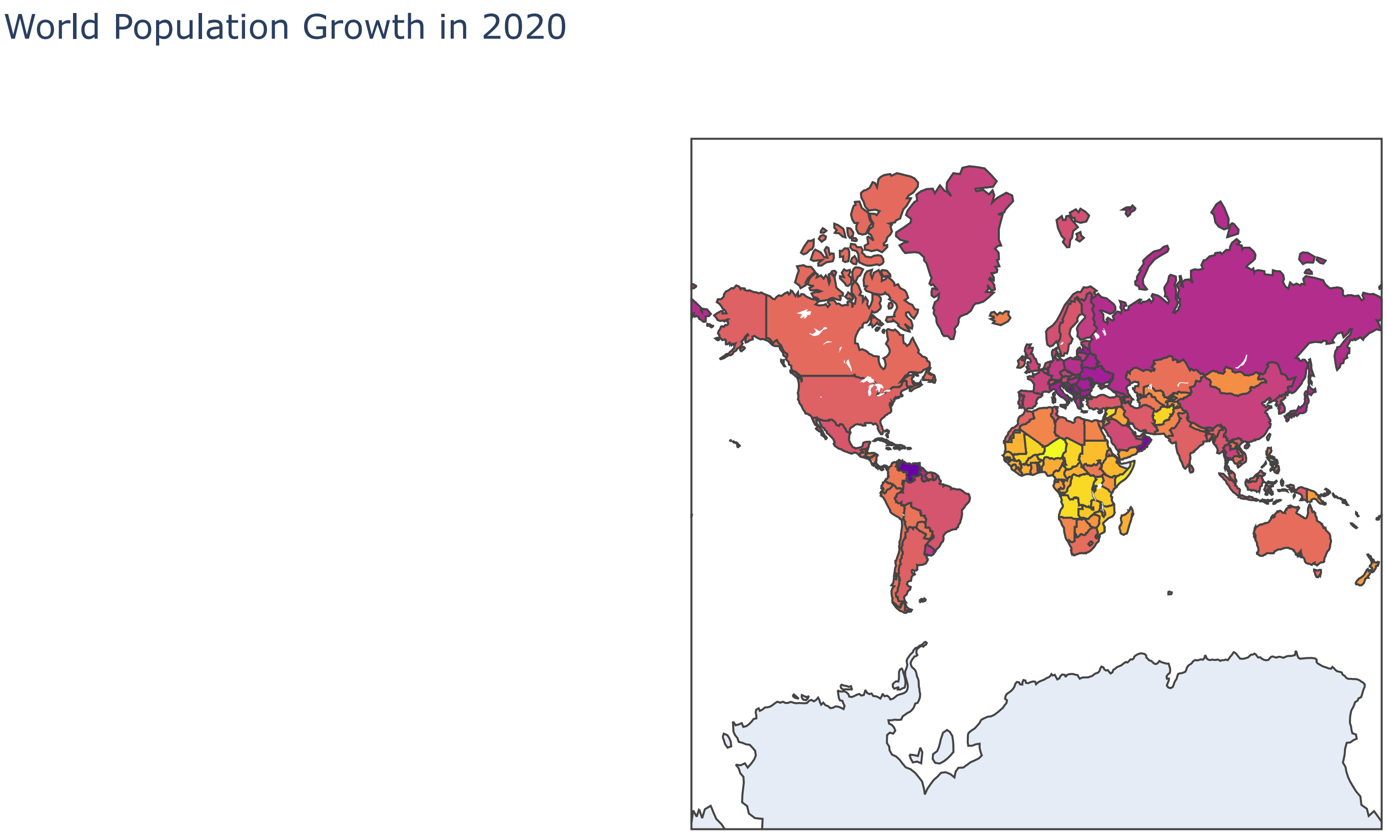


```
import plotly.express as px
import pandas as pd

# Load population data from World Bank dataset
df = pd.read_csv('/content/API_SP.POP.GROW_DS2_en_csv_v2_5358698.csv')

# Create Choropleth Map
fig = px.choropleth(df, locations='Country Code', color='1980',
                    hover_name='Country Name',
                    projection='mercator',
                    title='World Population Growth in 1980')
fig.show()
```



```
import plotly.express as px
import pandas as pd
```

```
# Load population data from World Bank dataset
df = pd.read_csv('/content/API_SP.POP.GROW_DS2_en_csv_v2_5358698.csv')

# Create Choropleth Map
fig = px.choropleth(df, locations='Country Code', color='2020',
                    hover_name='Country Name',
                    projection='mercator',
                    title='World Population Growth in 2020')
fig.show()
```


World Population Growth in 2020