Assignment 1 Group 85

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In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
```

In [2]:
```
GDP_per_capita = pd.read_csv("./life-expectancy.csv")
life_expect = pd.read_csv("./maddison-data-gdp-per-capita-in-2011us.csv")
GDP = pd.read_csv("./gdp-in-british-pounds.csv")
```

In [3]:
```
d = GDP_per_capita.merge(life_expect, on=('Year', 'Entity'))
d = d.merge(GDP, on=('Year', 'Entity'))
reduced_d = d[d.Year == 2000]
reduced_d.rename(columns={'GDP (Fouquin and Hugot (CEPII 2016))': 'GDP'}, inplace = True)
reduced_d
```

```
/Users/nick/opt/anaconda3/lib/python3.9/site-packages/pandas/core/frame.py:5039: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  return super().rename(
```

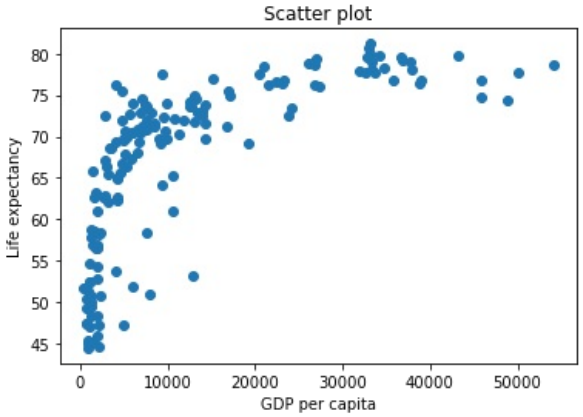
Out[3]:

	Entity	Code_x	Year	Life expectancy at birth (historical)	Code_y	GDP per capita	417485-annotations	Code	GDP
98	Albania	ALB	2000	75.4	ALB	4808.4795	NaN	ALB	2.400530e+09
163	Algeria	DZA	2000	70.5	DZA	6834.5537	NaN	DZA	3.621245e+10
203	Angola	AGO	2000	46.0	AGO	2013.6362	NaN	AGO	6.034059e+09
281	Argentina	ARG	2000	73.9	ARG	14368.9420	NaN	ARG	1.878391e+11
306	Armenia	ARM	2000	70.6	ARM	5139.8257	NaN	ARM	1.263412e+09
...	...	...	...	...	...	...	...	...	...
9882	Venezuela	VEN	2000	72.5	VEN	13992.6080	NaN	VEN	7.742649e+10
9942	Vietnam	VNM	2000	72.5	VNM	2773.1016	NaN	VNM	2.223377e+10
9967	Yemen	YEM	2000	62.6	YEM	4212.1055	NaN	YEM	6.368957e+09
10031	Zambia	ZMB	2000	45.2	ZMB	1428.5024	NaN	ZMB	2.379803e+09
10095	Zimbabwe	ZWE	2000	44.7	ZWE	2211.1963	NaN	ZWE	4.421600e+09

158 rows × 9 columns

In [4]:
```
x,y = reduced_d['GDP per capita'], reduced_d['Life expectancy at birth (historical)']
plt.scatter(x,y)
plt.xlabel('GDP per capita')
plt.ylabel('Life expectancy')
plt.title('Scatter plot')
```

Out[4]:
```
Text(0.5, 1.0, 'Scatter plot')
```



b) Which countries have a life expectancy higher than one standard deviation above the mean?

In [5]:
```
std_exp = np.std(a=reduced_d['Life expectancy at birth (historical)'])
mean_exp = np.mean(a=reduced_d['Life expectancy at birth (historical)'])
mean_std_exp = mean_exp + std_exp
```

In [6]:
```
return_list = []
for i, r in reduced_d.iterrows():
    country = r["Entity"]
    life_exp = r['Life expectancy at birth (historical)']
    if life_exp > mean_std_exp:
        return_list.append(country)
return_list
```

Out[6]:
```
['Australia',
 'Austria',
 'Belgium',
 'Canada',
 'Costa Rica',
 'Finland',
 'France',
 'Germany',
 'Greece',
 'Hong Kong',
 'Iceland',
 'Israel',
 'Italy',
 'Japan',
 'Luxembourg',
 'Malta',
 'Netherlands',
 'New Zealand',
 'Norway',
 'Singapore',
 'Spain',
 'Sweden',
 'Switzerland',
 'United Kingdom']
```

c) Which countries have high life expectancy but have low GDP? Motivate how you have chosen to define “high” and “low”.

In [7]:
```
std_gdp = np.std(a=reduced_d['GDP'])
mean_gdp = np.mean(a=reduced_d['GDP'])

std_exp = np.std(a=reduced_d['Life expectancy at birth (historical)'])
mean_exp = np.mean(a=reduced_d['Life expectancy at birth (historical)'])

mean_std_exp = mean_exp + std_exp
mean_std_gdp = mean_gdp - std_gdp
```

In [8]:
```
return_list = []
for i, r in reduced_d.iterrows():
    country = r["Entity"]
    life_exp = r['Life expectancy at birth (historical)']
    gdp = r['GDP']
    if life_exp > mean_std_exp and gdp < mean_std_gdp:
        return_list.append(country)
return_list
```

Out[8]:
```
[]
```

Answer: No countries fit our criteria. For life expectancy we have decided to define "high" as 1 standard deviation above the mean. For GDP we have decided to define "low" as 1 standard deviation below the mean.

d) Does every strong economy (normally indicated by GDP) have high life expectancy?

In [9]:
```
std_gdp = np.std(a=reduced_d['GDP'])
mean_gdp = np.mean(a=reduced_d['GDP'])

std_exp = np.std(a=reduced_d['Life expectancy at birth (historical)'])
mean_exp = np.mean(a=reduced_d['Life expectancy at birth (historical)'])

mean_std_gdp = mean_gdp + std_gdp
mean_std_exp = mean_exp + std_exp
```

In [10]:
```
return_list_high = []
```

```
return_list_low = []
for i, r in reduced_d.iterrows():
    country = r["Entity"]
    life_exp = r['Life expectancy at birth (historical)']
    gdp = r['GDP']
    if gdp > mean_std_gdp:
        if life_exp > mean_std_exp:
            return_list_high.append(country)
        else:
            return_list_low.append(country)
```

In [11]:

```
tot_len = len(return_list_low + return_list_high)

percentage = len(return_list_high)/tot_len
print(f'Percentage of countries with high life expectancy and high GDP is {round(percentage*100, 2)}%')
```

```
Percentage of countries with high life expectancy and high GDP is 71.43%
```

Answer: Yes, mostly. 71,43% of the countries with high GDP have high life expectancy, indicating a weak correlation.

e) Related to question d, what would happen if you use GDP per capita as an indicator of strong economy? Explain the results you obtained, and discuss any insights you get from comparing the results of d and e.

In [12]:

```
std_gdp = np.std(a=reduced_d['GDP per capita'])
mean_gdp = np.mean(a=reduced_d['GDP per capita'])

std_exp = np.std(a=reduced_d['Life expectancy at birth (historical)'])
mean_exp = np.mean(a=reduced_d['Life expectancy at birth (historical)'])

mean_std_gdp = mean_gdp + std_gdp
mean_std_exp = mean_exp + std_exp
```

In [13]:

```
return_list_high = []
return_list_low = []
for i, r in reduced_d.iterrows():
    country = r["Entity"]
    life_exp = r['Life expectancy at birth (historical)']
    gdp = r['GDP per capita']
    if gdp > mean_std_gdp:
        if life_exp > mean_std_exp:
            return_list_high.append(country)
        else:
            return_list_low.append(country)
```

In [14]:

```
tot_len = len(return_list_low + return_list_high)

percentage = len(return_list_high)/tot_len
print(f'Percentage of countries with high life expectancy and high GDP per capita is {round(percentage*100, 2)}%'
```

```
Percentage of countries with high life expectancy and high GDP per capita is 72.41%
```

Answer: From our results GDP per capita and GDP are decent indicators of strong economies. A factor that GDP per capita/GDP doesn't concider, is where the money is coming from, if it's one indusry (eg oil) or multiple intustries. Having multiple strong industries are much prefered as it reduces the risk of an economic collapse.

We tested with diffrent years and found that the percentage varies a lot. From the 1900s the percentage has stedily decreased, indicating weaker coorelation between strong economies and and life expectancy. This might be because either poor countries economies grow faster than their life expectancy, or that their life expectancy grow faster than the economy.

We used the same deviation every time (1 standart deviation), so that we could compare results between questions.

We choose to reduce our dataset to one year to simplify the calculations. The year 2000 was chosen because it is recent and we had data for that year.