QTM 350 Assignmen 5

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```
# Task 2
# Import data
import pandas as pd
import wbgapi as wb
import matplotlib.pyplot as plt
import seaborn as sns

wdi_data = pd.read_csv("/Users/noora_ni0321/Desktop/QTM 350/Assignment 5/wdi.csv")
```

```
# Define the indicators to download
indicators = {
    'gdp_per_capita': 'NY.GDP.PCAP.CD',
    'gdp_growth_rate': 'NY.GDP.MKTP.KD.ZG',
    'inflation_rate': 'FP.CPI.TOTL.ZG',
    'unemployment_rate': 'SL.UEM.TOTL.ZS',
    'total_population': 'SP.POP.TOTL',
    'life_expectancy': 'SP.DYN.LE00.IN',
    'adult_literacy_rate': 'SE.ADT.LITR.ZS',
    'income_inequality': 'SI.POV.GINI',
    'health_expenditure_gdp_share': 'SH.XPD.CHEX.GD.ZS',
    'measles_immunisation_rate': 'SH.IMM.MEAS',
    'education_expenditure_gdp_share': 'SE.XPD.TOTL.GD.ZS',
    'primary_school_enrolment_rate': 'SE.PRM.ENRR',
    'exports_gdp_share': 'NE.EXP.GNFS.ZS'
}

# Get the list of country codes for the "World" region
country_codes = wb.region.members('WLD')

# Download data for countries only in 2022
```

```python
df = wb.data.DataFrame(indicators.values(), economy=country_codes, time=2022, skipBlanks=True

# Delete the 'economy' column
df = df.drop(columns=['economy'], errors='ignore')

# Create a reversed dictionary mapping indicator codes to names
# Rename the columns and convert all names to lowercase
df.rename(columns=lambda x: {v: k for k, v in indicators.items()}.get(x, x).lower(), inplace=

# Sort 'country' in ascending order
df = df.sort_values('country', ascending=True)

# Reset the index after sorting
df = df.reset_index(drop=True)

# Display the number of rows and columns
print(df.shape)

# Display the first few rows of the data
print(df.head(3))

# Save the data to a CSV file
df.to_csv('wdi.csv', index=False)
```

```
(217, 14)
       country  inflation_rate  exports_gdp_share  gdp_growth_rate  \
0  Afghanistan             NaN          18.380042        -6.240172
1      Albania        6.725203          37.197085         4.826688
2      Algeria        9.265516          30.808979         3.600000

   gdp_per_capita  adult_literacy_rate  primary_school_enrolment_rate  \
0      357.261153                  NaN                            NaN
1     6846.426143                 98.5                      96.371231
2     4961.552577                  NaN                     108.343933

   education_expenditure_gdp_share  measles_immunisation_rate  \
0                              NaN                       56.0
1                         2.744330                       86.0
2                         4.749247                       79.0

   health_expenditure_gdp_share  income_inequality  unemployment_rate  \
0                           NaN                NaN             14.100
```

```
1                          NaN                NaN             10.137
2                          NaN                NaN             12.346

   life_expectancy  total_population
0           62.879        40578842.0
1           76.833         2777689.0
2           77.129        45477389.0
```

Explanatory Data Analysis

```
# Task 3
# Select relevant indicators
list = ["country", "gdp_per_capita", "life_expectancy", "unemployment_rate"]
eda_data = df[list]

# Summary statistics
summary = eda_data.describe()
summary
```

	gdp_per_capita	life_expectancy	unemployment_rate
count	207.000000	209.000000	186.000000
mean	20520.336828	72.416519	7.227344
std	30640.741594	7.713322	5.844462
min	250.634225	52.997000	0.130000
25%	2599.752468	66.782000	3.478000
50%	7606.237525	73.514634	5.334000
75%	27542.145523	78.475000	9.261750
max	226052.001905	85.377000	35.359000

Summary of Findings

The dataset highlights significant global disparities in economic and social indicators.

- **GDP per capita** averages **$20,520**, but a high standard deviation (**$30,640**) and a maximum of **$226,052** indicate strong income inequality.
- **Life expectancy** is more consistent, averaging **72.42 years**, with most countries between **67 and 78 years**.

- **Unemployment rates** vary widely, averaging **7.23%**, with extremes from **0.13% to 35.36%**.

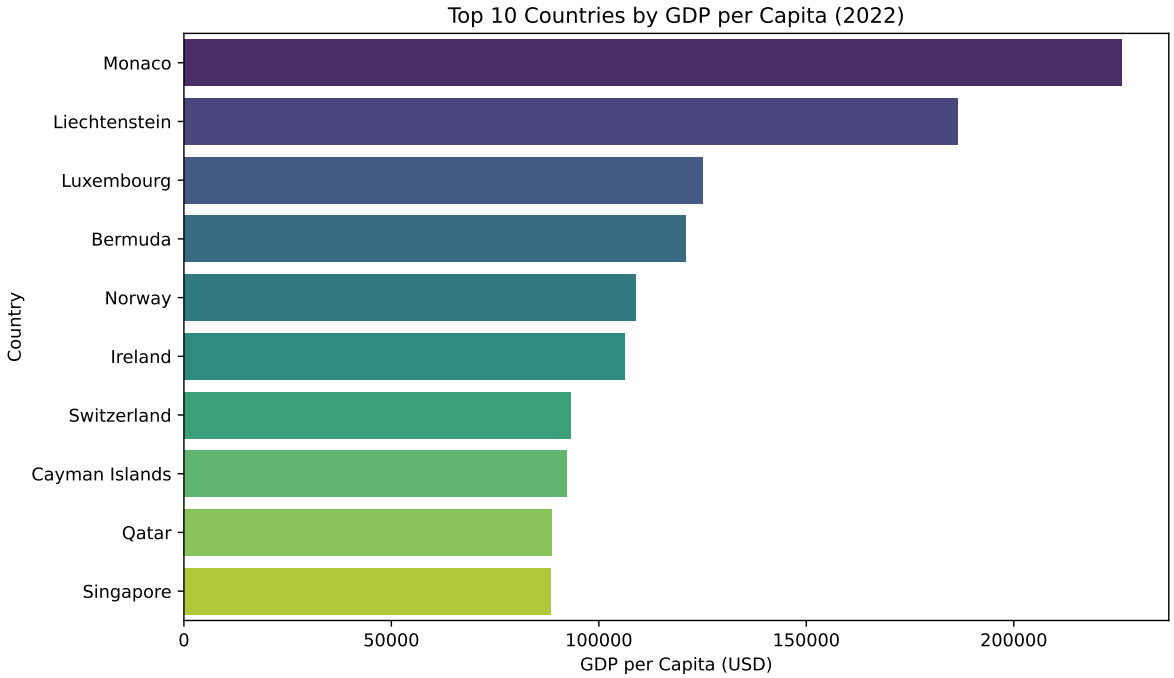
Overall, economic disparities are stark, while life expectancy shows more stability.

Visualization

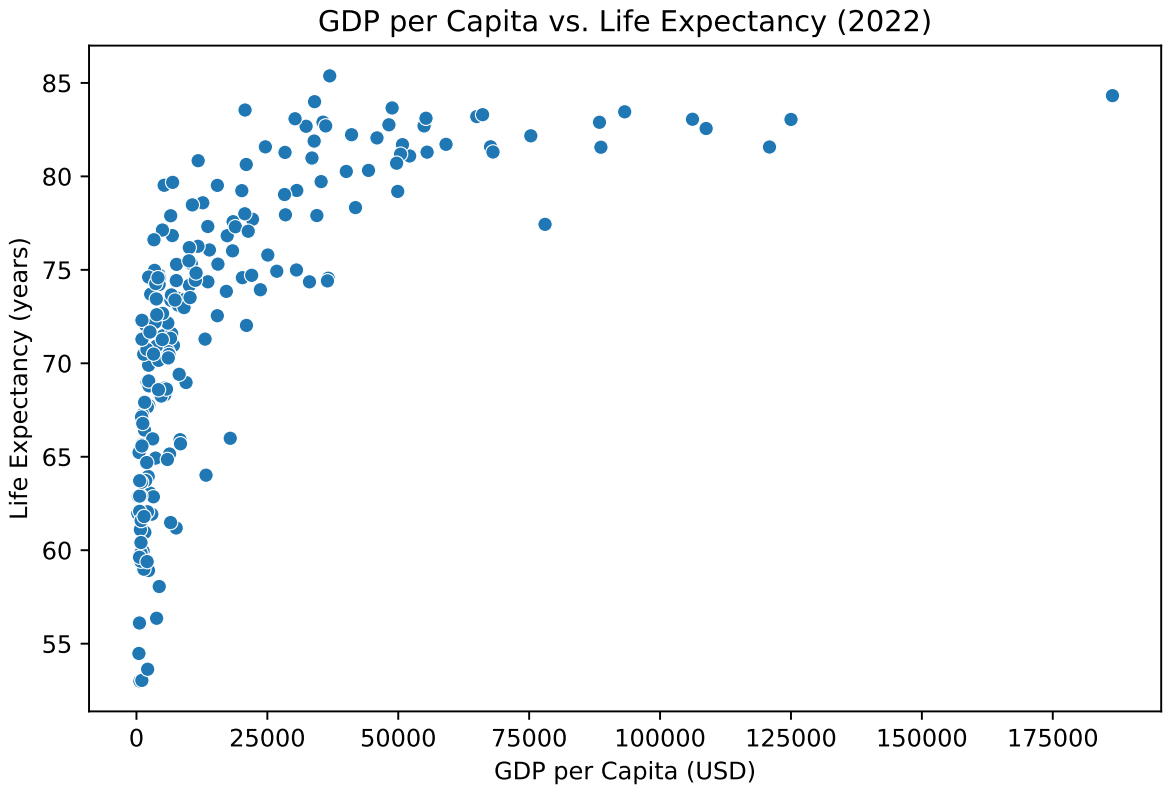
```
# Task 4
# Bar Chart: GDP per Capita by Country

# Sort data by GDP per capita
sorted_data = eda_data.sort_values("gdp_per_capita", ascending=False).head(10)

plt.figure(figsize=(10, 6))
sns.barplot(y=sorted_data["country"], x=sorted_data["gdp_per_capita"], palette="viridis")
plt.xlabel("GDP per Capita (USD)")
plt.ylabel("Country")
plt.title("Top 10 Countries by GDP per Capita (2022)")
plt.savefig("gdp_per_capita_bar.png")

# Save the figure before showing it
plt.savefig("top_10_gdp.png", dpi=300)

plt.show()
```

```
/var/folders/w1/1hz6sx6n2l58w0s131c4kg100000gn/T/ipykernel_80311/217072998.py:8: FutureWarni
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assi
```



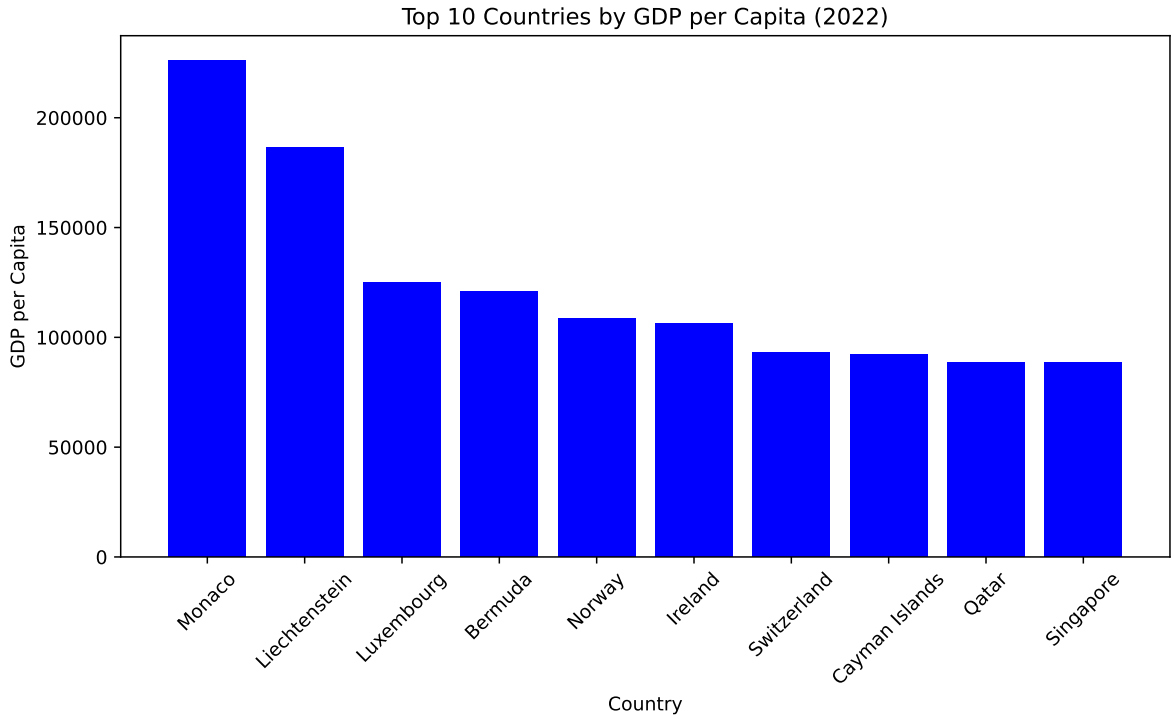

```
# Scatter Plot: GDP per Capita vs Life Expectancy
plt.figure(figsize=(8, 5))
sns.scatterplot(x=wdi_data["gdp_per_capita"], y=wdi_data["life_expectancy"])
plt.xlabel("GDP per Capita (USD)")
plt.ylabel("Life Expectancy (years)")
plt.title("GDP per Capita vs. Life Expectancy (2022)")
plt.savefig("gdp_vs_life_expectancy.png")

plt.savefig("gdp_vs_life.png", dpi=300)

plt.show()
```




```
# Task 5
summary_table = eda_data.groupby("country").mean().reset_index()
summary_table.head(10)
```

	country	gdp_per_capita	life_expectancy	unemployment_rate
0	Afghanistan	357.261153	62.879	14.100
1	Albania	6846.426143	76.833	10.137
2	Algeria	4961.552577	77.129	12.346
3	American Samoa	18017.458938	NaN	NaN
4	Andorra	42414.059009	NaN	NaN
5	Angola	2929.694455	61.929	14.602
6	Antigua and Barbuda	20117.765331	79.236	NaN
7	Argentina	13935.681111	76.064	6.805
8	Armenia	6571.974455	73.372	13.379
9	Aruba	30559.533535	74.992	NaN

```
# Task 6
# Bar Chart - Top 10 Countries by GDP per Capita
top_countries = df.nlargest(10, 'gdp_per_capita')

plt.figure(figsize=(10,5))
plt.bar(top_countries['country'], top_countries['gdp_per_capita'], color='blue')
plt.xlabel("Country")
plt.ylabel("GDP per Capita")
plt.title("Top 10 Countries by GDP per Capita (2022)")
plt.xticks(rotation=45)
plt.show()
```



Bibliography

1. World Bank. International Economics Department. Development Data Group, and World Bank. International Economics Dept. Development Data Group. World development indicators. World Bank, 1978.

2. Zaman, Sojib Bin, et al. "An association of total health expenditure with GDP and life expectancy." Journal of Medical Research and Innovation 1.2 (2017): AU7-AU12.