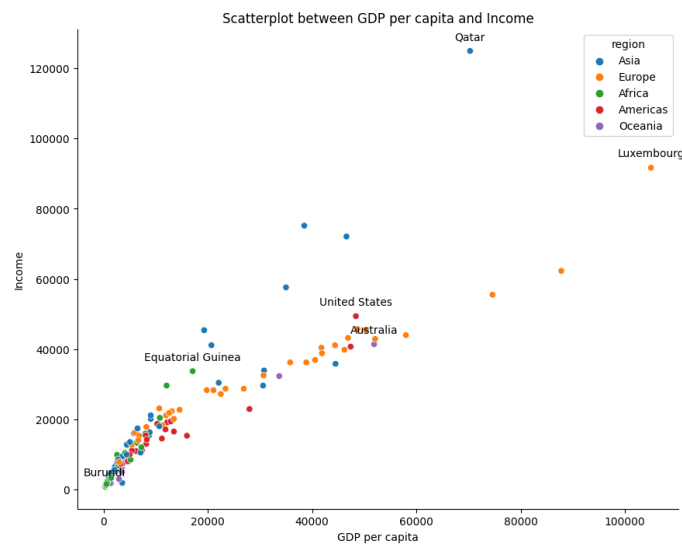


GDP Per Capita and Income Per Country  
Hosea E. Wah

INFSCI 1520  
Lingfei Wu  
April 12th, 2023

## ii. Main Figure Produced in Python



## iii. Legend & Explanation

The legend that accompanies the graph provides valuable insight into the diverse geographical regions that are featured in the data visualization. The graph highlights the countries that are located in five major regions of the world, namely Asia, Europe, Africa, Americas, and Oceania. Each region is represented on the graph by a distinct color, which helps to visually distinguish between the various countries. For instance, the countries in Asia are represented by a cluster of blue dots, while the European countries are depicted as an orange dot. Similarly, the African countries are shown as green dots, while the countries located in the Americas are represented by a striking red dot. Lastly, the countries in the Oceania region are marked with purple dots. This comprehensive legend not only adds aesthetic appeal to the graph but also makes it easier for the viewer to interpret and understand the data presented.

## iv. Findings from Visualization

The scatterplot depicting GDP per capita and income offers significant insights into global economic performance, with the findings revealing that African nations tend to have the lowest GDP per capita and income compared to other regions in the world. This observation is not entirely unexpected, given the history of colonial exploitation and other systemic factors that have perpetuated economic inequality in the region. However, the graph does show that there are notable exceptions, with Equatorial Guinea recording the highest GDP per capita of approximately \$7,000 and an income of \$25,000 among all African nations. Meanwhile, Burundi stands out as the African country with the lowest GDP per capita and income, with an average income of less than \$20,000 and a GDP per capita of around \$250 USD.

Looking at Europe, the graph reveals that many European countries have much higher GDP per capita and income values compared to African nations. Luxembourg emerges as the country with the highest GDP per capita, exceeding \$100,000, with an average income of around \$90,000. Switzerland, Norway, and Ireland follow close behind, with GDP per capita values of approximately \$85,000, \$82,000, and \$80,000, respectively.

In terms of the Americas, the graph shows that the United States leads the region with the highest GDP per capita of around \$55,000, with an average income also around \$55,000.

When it comes to Asian countries, the graph reveals that there is much more dispersion in their GDP per capita and income values. Qatar stands out as the wealthiest nation in Asia based on the data, with an average income higher than \$120,000 and an average GDP per capita around \$65,000. However, it is important to note that some countries in Asia also have relatively low GDP per capita and income values.

Overall, the scatterplot of GDP per capita and income provides a wealth of information on global economic performance, highlighting significant disparities between regions and

countries. The findings underscore the need for continued efforts towards promoting inclusive and sustainable economic growth, reducing poverty, and addressing the root causes of economic inequality.

#### **v. Description of Data & Methods**

The data used in this analysis is sourced from the "Unsupervised Learning on Country Data" dataset available on Kaggle. This dataset contains information about 167 countries, including their GDP per capita (gdpp), income, and region. The primary purpose of this dataset is to provide a basis for unsupervised learning tasks, such as clustering, to uncover underlying patterns and relationships among countries.

In this analysis, I first imported the necessary libraries, including pandas, numpy, matplotlib, and seaborn, to facilitate data manipulation, computation, and visualization. I then proceeded to create a scatter plot using seaborn's scatterplot function to visualize the relationship between GDP per capita (gdpp) and income for the countries in the dataset, while color-coding each data point based on the country's region.

To add more context to the scatterplot, I identified the poorest and richest countries in each region by sorting the dataset based on the GDP per capita and then selecting the first (poorest) and last (richest) country in each region using the groupby method. I also selected a random country from the list of poorest countries. For each of these countries, I extracted their GDP per capita and income values and added annotations to the scatterplot to label the corresponding data points.

Finally, I set appropriate labels for the x and y axes, as well as a title for the scatterplot, and used seaborn's despine function to remove the top and right spines for presentation. The resulting scatter plot provided a clear visual representation of the relationship between GDP per

capita and income for each country in the dataset, with data points grouped by region. By annotating the richest and poorest countries in each region, along with a random country from the list of poorest countries, I could easily identify any trends or outliers within and across regions.

Through this analysis, I gained insights into the distribution of wealth and income across various regions, as well as the economic disparities between the richest and poorest countries within each region. The scatterplot served as a valuable starting point for further exploration, such as clustering countries based on their GDP per capita and income, or incorporating additional variables like population, education, or health indicators to gain a more comprehensive understanding of the factors driving these economic differences.

#### **vi. Significance Statement**

A scatter plot between GDP per capita and income is a graphical representation that can help visualize the relationship between a country's economic output and the average income of its citizens. GDP per capita is calculated by dividing a country's total GDP by its population, while income typically refers to the average earnings of individuals within that population. By plotting these two variables on a scatter plot, one can assess the correlation between a country's economic performance and the income levels of its residents. This visualization can provide valuable insights into how economic growth is distributed among the population and whether it leads to an improvement in living standards.

When comparing the economic disparities between African and European countries, especially in the context of colonization and slavery, the scatter plot can be particularly revealing. European countries that colonized African nations and benefited from the exploitation of resources and labor may exhibit higher GDP per capita and income levels. Conversely,

African countries that suffered from colonization and slavery might display lower GDP per capita and income levels. These disparities can be seen in the plot, highlighting the extent to which European countries profited from these practices and the lasting impact on African economies.

Additionally, the scatter plot can shed light on the degree of income inequality within and between countries. A strong positive correlation between GDP per capita and income would suggest that as a country's economic performance improves, so does the income level of its residents. However, if the correlation is weak or non-existent, it may indicate that economic growth is not translating into higher incomes for the average person. This could imply that certain segments of the population are benefiting disproportionately from economic growth, while others are being left behind.

In the case of African countries, weak correlations between GDP per capita and income could be attributed to lingering structural issues caused by colonization and slavery, such as unequal distribution of resources, lack of infrastructure, and limited access to quality education and healthcare. By examining the relationship between GDP per capita and income through a scatter plot, we can gain valuable insights into the economic consequences of historical injustices and the challenges that African nations continue to face in their pursuit of development and prosperity. The scatter plot serves as a powerful tool for illustrating the long-lasting effects of colonization and slavery on African nations and the continued benefits European countries experience from this dark chapter in history.