NOVA IMS Information Management School

MAA

Master Degree Program in Data Science and Advanced Analytics

DATA VISUALIZATION REPORT

Visualizing Environmental, Economic, Educational and Population indicators of different world's region and continents

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MOTIVATION

The world is divided into different continents such as Asia, Africa, Europe, North America, South America and Oceania. We also work on different region such as East Asia & Pacific, European Union, Europe & Central Asia, South Asia, Sub-Saharan Africa, Africa Eastern and Southern, Africa Western and Central, Middle East & North Africa, Central Europe and the Baltics Latin America & Caribbean and North America. Each region and continent are different from each other including culture, people, social behavior, development indicators and so on. There are few studies has been conducted about the data visualization on continents and several part of the world. With our project, we traying to visualize of dataset of four major human indicators such as environmental, economic, educational and population and also try to figure out the comparison among different part of the world. We visualize the dataset by applying different kind of data visualization techniques that is ultimate goal of this course. As the Data is growing at an extraordinary rate, and it will keep growing in the foreseeable future, it is easy to present data in a pictorial or graphical format using different Data visualization techniques. Data visualization techniques are easier to understand for the people of different disciplines if the visualization technique is used properly according to the types of indicators. With interactive visualization, you can take the concept a step further by using technology to drill down into charts and graphs for more detail, interactively changing what data you see and how it is processed. We use different color for visualizing our data of different region and continents. Color is one of the important areas of study that become most leading aspect as compare to the other design aspects because current technology more work on color in term of accessibility. Color is one of the vast growing elements that would create attention. Usually for visually impaired people, human eye is more capable to catch as it has long history [1].

OVERVIEW OF INDICATORS

Population Indicator (Total Population)

To get a generalized picture, we decided to take datasets, **Population** for six continents. What characterizes the continent better than the Population and Population Growth. We are comparing **Total Population** from 2015 to 2020 to get more accurate data. These variables are some kinds of base for our further research and are responsible for correct perception of the data. The bar graph below shows total population for selected period. Bar graphs are convenient to compare changes over the same period of time for more than one group. Each color represents one continent. We also use pie char to show the information about the population of different continents in 2020.

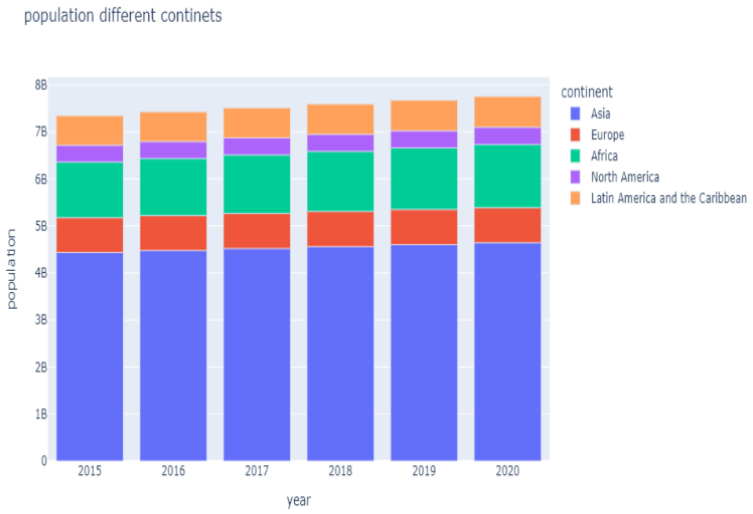

Figure-1: Total population of continents between the year 2015 and 2020

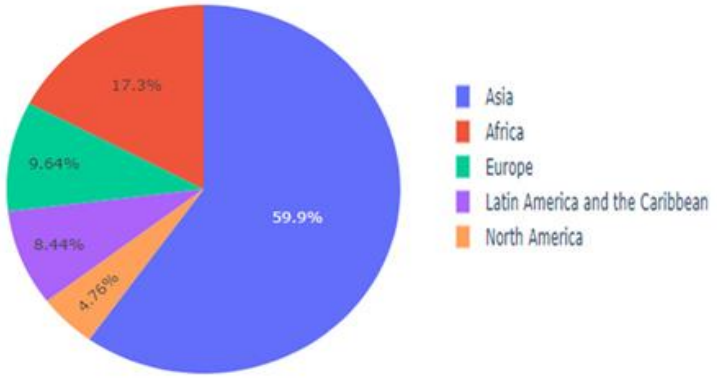

Figure-2: Total population of continents in the year of 2020.

Economic Indicator (GDP per capita)

Next one is **GDP per capita,** an indicator of a country's economic production and output that accounts for its number of people, which takes. This makes it a good measurement of a country's standard of living. It tells you how prosperous a country feels to each of its citizens. We have chosen this dataset to compare the GDP per capita because it will show us the difference of overall economic growth for eleven different regions of the world. We have not used Purchasing power parity (PPP) in line with GDP per capita which may tell us a story about the monetary capability of people of eleven regions. For GDP per capit**a** depiction we chose scatter graph technique, because it is the best way to depict this data. On the x-axis we can observe the years that we picked and on the y-axis the amount of money for each continent in a specific year. We also show the bar graph to make comparison of GDP per Capita tow important regions, North America and European Union.

Figure-3: GDP per Capita of world's regions between the year 2012 and 2020

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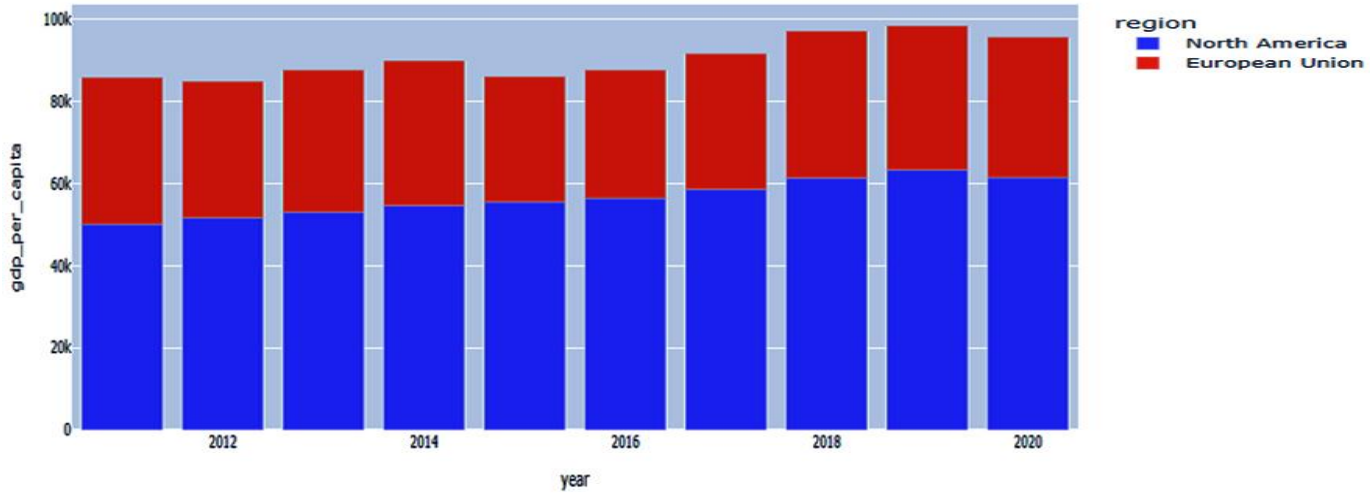

Figure-4: GDP per Capita of North America and European Union between the year 2012 and 2020

Educational Indicator (Basic Education)

Education is broadly recognized to be a vital parameter, for individuals, societies and as a whole for a country's development index. Indeed, in most countries basic education is nowadays perceived not only as a right, but also as a duty – governments are typically expected to ensure access to basic education, while citizens are often required by law to attain education up to a certain basic level. In our project, we

decided to compare seven different regions such as Western Europe, Eastern Europe, Latin America and Caribbean, East Asia, South and South-East Asia, Middle East and North Africa, Sub-Sahara Africa. Countries with better educated citizens are more equipped to deal with new challenges and technological advances. Here we do not provide any information about tertiary education which is also an important indicator for any nation. So, we found this indicator to be crucial and comparing these values is a must. We presented our educational comparison using line graph of seven different regions, so that with the visualization it would be easy to clarify the variances. Here we also visualize the information of Education percentage between two different parts of European continent such as east and west during the year from 1920 to 2010.

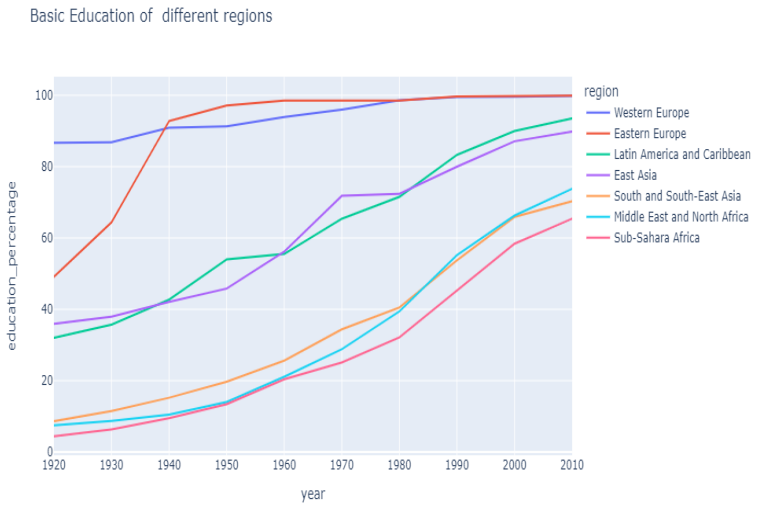

Figure-5: Percentage of basic education of different regions between year 1920 and 2010.

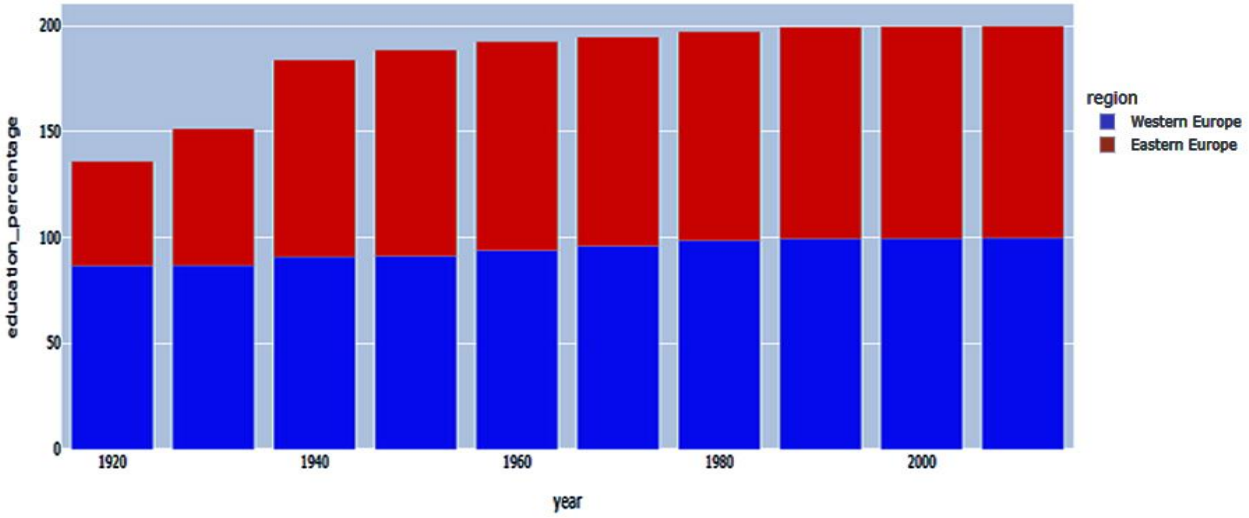

Figure-6: Education percentage of East and West Europe during the year from 1920 and 2010

Environmental Indicator (CO_2 Emissions)

The world's continent emits vastly different amounts of heat-trapping gases into the atmosphere. CO2 data compiled by the International Energy Agency, which estimates carbon dioxide (CO2) emissions from the combustion of coal, natural gas, oil, and other fuels, including industrial waste and non-renewable municipal waste. However, developed nations typically have high carbon dioxide emissions per capita, while some developing countries that belong to any continents lead in the growth rate of carbon dioxide emissions. We tried to figure out a simple comparison of CO2 emission among six continents. Area Chart above is presenting the CO2 emissions of six continents from 2011-2020. After looking at this graph it is not hard to understand that Asia is the continent with the highest amount of emissions. But this assumption may turn out to be misleading. On the

bar graph below it is visualized emission per capita to compare six continent's contribution in emission by the population of the respective continents at a glance to the Stacked Area Chart.

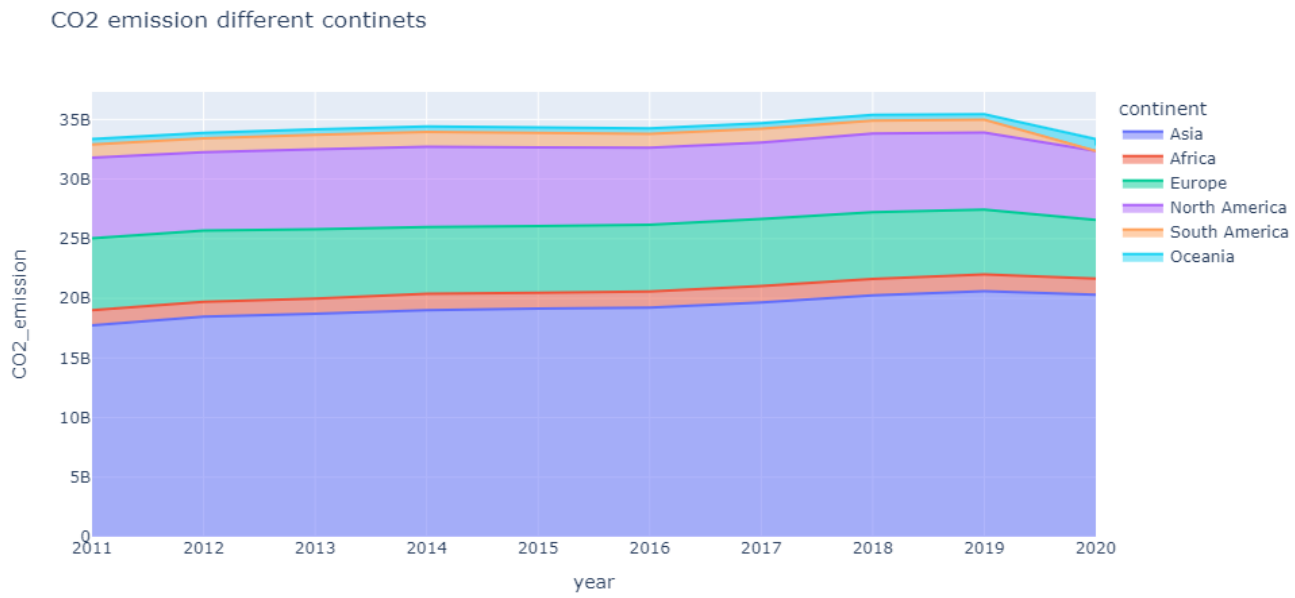

Figure-7: CO2 Emission of continents between the year from 2011 to 2020

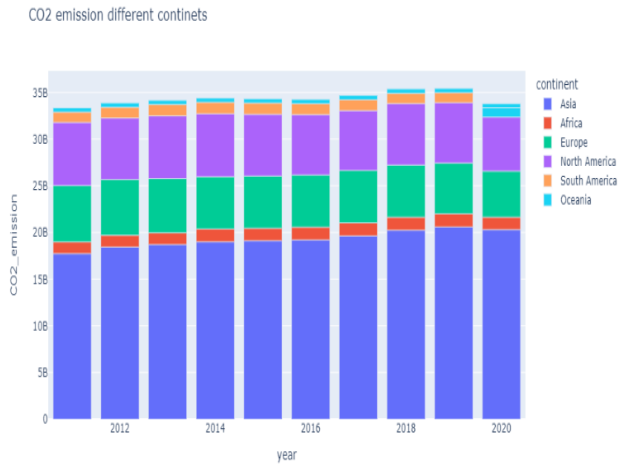

Figure-8: CO2 Emission of continents between the year from 2011 to 2020

Conclusion

After applying different types of visualization techniques dealing with four datasets, i.e., Population, GDP per capita, Basic education rate, and CO2 emission of different continents and regions we can realize the similarities and dissimilarities between the continents and regions. Our scope of visualization was covered all part of the world and we are not only focus on particular continents but also focus on different regions so that one can get the overall scenario of four most important indicators (Environmental, Economic, Education and Population) from our visualization information of our project. We have expected some huge range of differences, when we were thinking about the project idea, because the culture and social behavior are different from one part to another part of the world. After using some visualization techniques, we have found that the percentage of basic education is increasing rapidly between 1920 and 2010, although Middle East and North African, Sub-Sahara African regions are far behind as compare to other regions. On the other perspective, the GDP per capita of different region have substantial variance, for example North American region has the top in position on the other hand African region holding the bottom position in the scatter graph. So, we can say that the living standard of people of these continents are highly varied. CO2 emission has correlation with the GDP per capita, our visualization clearly defines the relation between the

development and GDP. More GDP the county has, the more it emits CO2. East Asian and Latin American continents are improving rapidly in term of percentage of education over the last 80 years.

Reference:

[1] Evergreen, S., & Metzner, C. (2013). Design principles for data visualization in evaluation. *New directions for evaluation, 2013*(140), 5-20.

Source of Datasets: https://ourworldindata.org/

GitHub Link: https://github.com/foazul/DV_FINAL_PROJECT