----CSE 564 VISUALIZATION----
Final Project Proposal(Group no - 34)

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OBJECTIVE

To design a dashboard to visualize the data and the relationship between different attributes of World Development Indicators to analyse the growth of a country and plot how the changes in the attributes over the years shaped the growth or decline of the world countries.

BACKGROUND

Different countries of the world are classified according to their level of social and economic development. Economic development and growth are influenced majorly by four factors: human resources, physical capital, natural resources and technology. Highly developed countries have governments that focus on these areas. Less-developed countries, even those with high amounts of natural resources, will lag behind when they fail to promote research in technology and improve the skills and education of their workers.The population, GDP, Economy, Literacy, Employment, Unemployment, Life expectancy and several other factors of different world countries serve as the key metrics and they tell a lot about the country's journey or progress over the years. By plotting the advancement or the change of the factors over the years helps us to tell the interesting information on development of some countries. For this purpose we used the dataset provided by the https://www.worldbank.org/ . It is one of the largest sources of data on the key development indicators. World Development Indicators includes data from 1960 to 2019. World view shows global trends with indicators for measuring the world's economy and progress toward improving lives, Employment and Unemployment ratios, Education etc. World Development Indicators (WDI) is the World Bank's statistics on global development. We can use this data to compare different prospects of each country and how different attributes contribute to the development of the country.

DATASET

Source of the dataset: We have taken World bank's World Development Indicators (WDI) data for visualizing different attributes. Initially we have taken into consideration some attributes like, GDP, Literacy, Population, Employment, Unemployment factors to evaluate the growth of a country.

We are taking 12 years of data for evaluation.The details of different attributes taken are given below :

- *Literacy Rate:*
  Literacy rate, adult total (% of people ages 15 and above)
  Literacy rate, adult female (% of females ages 15 and above)
  Literacy rate, adult male (% of males ages 15 and above)

- *Life Expectancy*:
  Life expectancy at birth, female (years)
  Life expectancy at birth, male (years)
  Life expectancy at birth, total (years)

- *Employment*:
  Employment to population ratio, 15+, female (%) (modeled ILO estimate)
  Employment to population ratio, 15+, male (%) (modeled ILO estimate)
  Employment to population ratio, 15+, total (%) (modeled ILO estimate)

- *GDP*:
  Adjusted net national income per capita (current US$)
  GDP per capita (current US$)
  GDP per capita growth (annual %)

- *Population*:
  Population, total
  Population below age 25
  Middle Age population
  Older Population

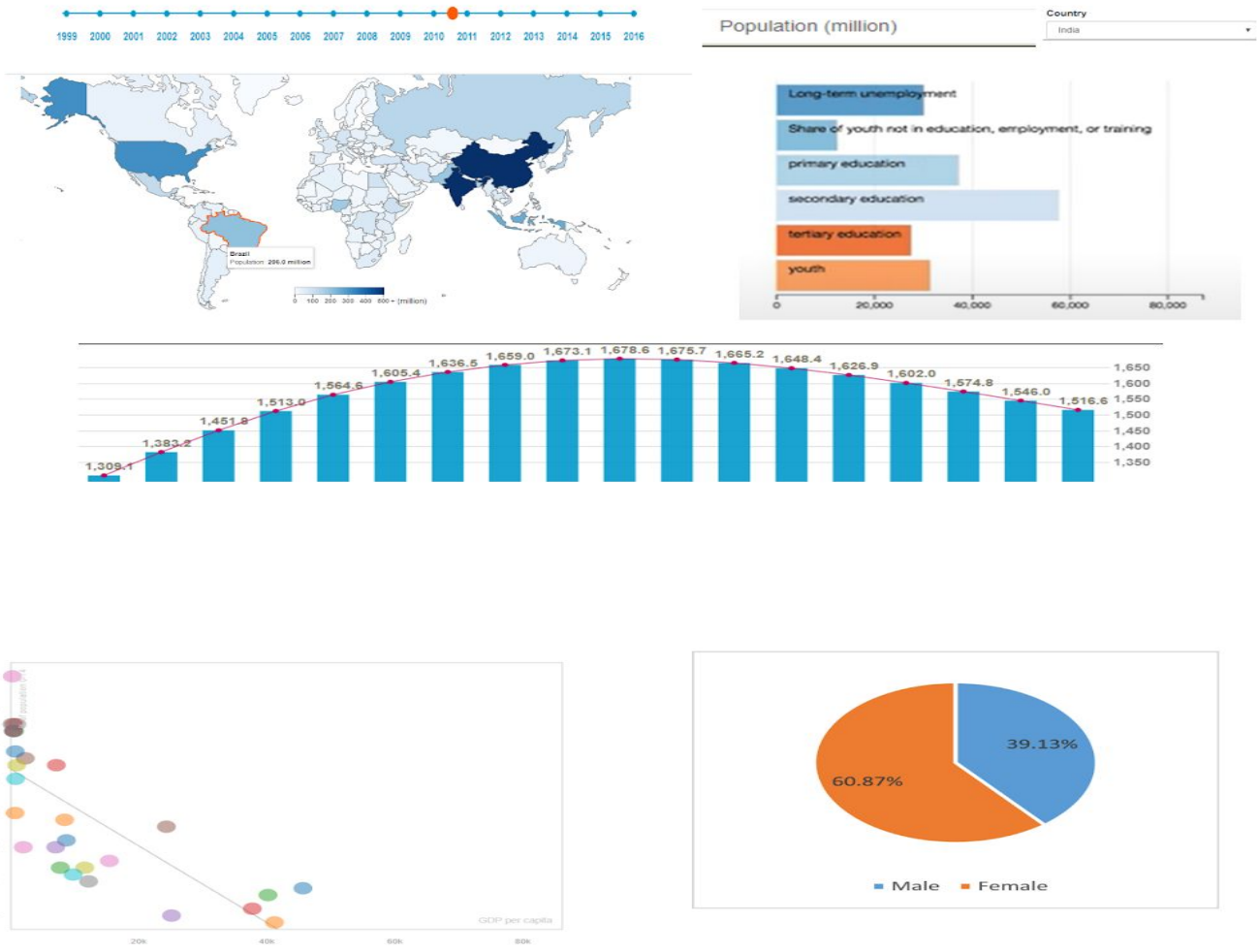
The above mentioned attributes are the key indicators that we have identified i.e., the core factors contributing to the nations development. As, we proceed further, we shall identify the sub-components of the attributes mentioned above and divide into groups for making the visualizations more interesting and their influences or impact on the countries.

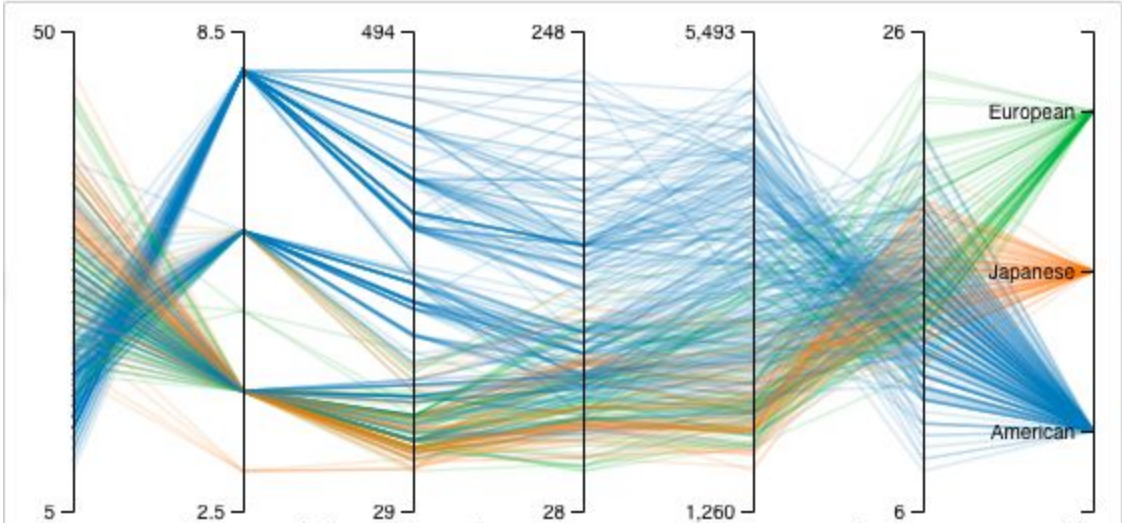
PROBLEM

The changes in the attributes over the years shaped the growth or decline of the world countries helps us analyze or give insights like how stable economies evolved during the course of time and how the unstable economies suffered. The measures or the policies the countries adopted during the bad times like recessions, pandemics etc will give us great insights into the future for risk mitigation and prosperity. The division of the

population of the countries is correlated with the Adjusted net national income per capita (current US$),GDP per capita (current US$) and GDP per capita growth (annual %)
The attributes like Employment to population ratio, 15+, female (%) (modeled ILO estimate), Employment to population ratio, 15+, male (%) (modeled ILO estimate) and Employment to population ratio, 15+, total (%) (modeled ILO estimate) will give us good overview of the country's current and the past situation.

FIGURE SHOWING SAMPLE PAGES OF DASHBOARD





In the above parallel coordinates plot we will plot the attributes or the development factors on the x-axis and the countries on the y-axis.

APPROACH:

We are planning to make a dashboard that consists of the world map choropleth. By clicking on each country we should be able to see the different statistics of the country. Each category considered for evaluation of the growth of the country will have different sub categories. Further we will try to focus on the relations between all attributes. Python will be used as the backend. We will use the libraries like pandas,numpy,scikit to process the data and render the graphs using the d3.js to the front end. The datasets of the various attributes are present in different csv files. The datasets will be merged and the missing values for certain countries that are not available(For example, the employment and life expectancy data is not available for afghanistan properly and also, for some countries the data pertaining to certains years aren't available and some of them are available) will be collected from other sources if available. Also, We plan to add a data not available category for the attributes.

IMPLEMENTATION

1. We have plotted the world map choropleth till now for the total world population. We added the tooltip displaying the count and the name of the country on mouse over event.
2. Moving forward we plan to implement on-click events for each country, By clicking on the country two bar charts will be displayed that contain the sub-groups of every attribute in one bar-chart for that particular year; In the other bar-chart the attribute data over the years will be plotted.
3. A pie chart that contains the gender distribution will be also updated automatically depending on the attribute selected from the drop down.
4. There will be a slider that contains the years for the past 12 years and also the projection of the coming years(if any data is available).

5. There will be a parallel coordinate plot which will plot the attributes or the development factors on the x-axis and the countries on the y-axis.
6. We will draw scatter plots that show per-capita income (x), life expectancy (y) and population (area) of all the nations over the last 15 years, colored by region.

Reference:

1. **http://wdi.worldbank.org/tables**
2. **https://observablehq.com/@d3/gallery**
3. **https://datahelpdesk.worldbank.org/knowledgebase/topics/21173-data-visualization-tools**