Introduction

In this project, I have developed interactive data visualizations to analyze and compare the relationship between various aspects of the Human Development report gathered for all the countries in the world. We utilized python libraries such as plotly, matplotlib and pandas to create easy cognitive graphs to show the important features of the flights which would illustrate significant details pertaining to the dataset.

Dataset

The Human Development Report dataset in whole contains six key factors such as gender development, gender inequality, historical index, human development, inequality adjusted, and multidimensional poverty.

We choose two datasets 'human development' and 'gender development' to further explore, analyze and visualize the key aspects of the report. Primarily, these datasets contain details on development index, gross capital, education, and life expectancy which we choose to utilize on our visual representations to explain them with better cognitive points.

The dataset is loaded onto our python program using Pandas library and each column is extracted and kept in local dataframes to generate the visualization charts in an efficient manner.

Data Visualization Techniques

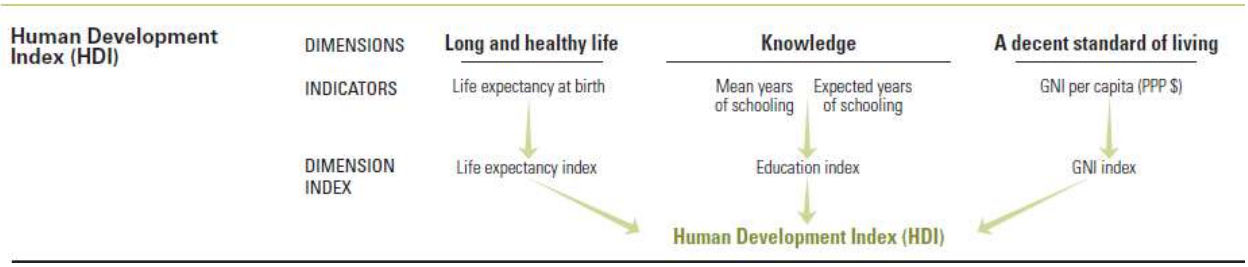
The Important questions we pose to find on this project are 'What is the correlation between Human development Index and a country's development?' and 'What are the key difference among the male and female in gender development?'

The dataset could be illustrated in several ways; however, we choose the illustrations that best represent the relationship among Human Development Index (HDI), Gross National Income (GNI), Mean/Expected Years of Education, Life expectancy for Male/Female, Gender Development Index (GNI). Our illustrations contain following interactive charts,

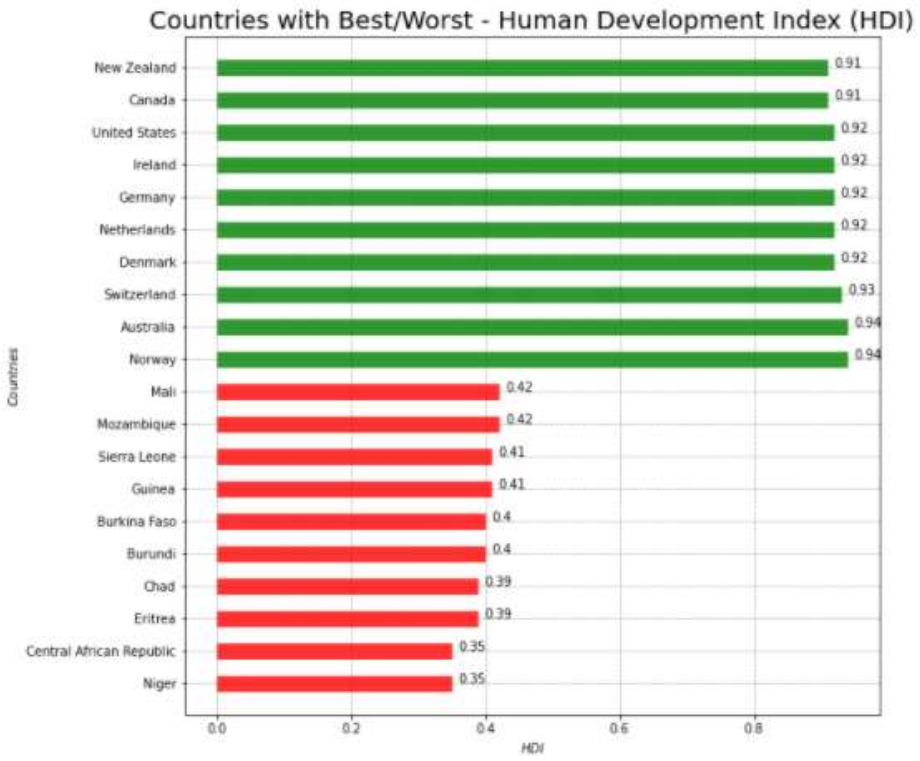
- Interactive 3d scatter plot
- Interactive sunburst chart
- Interactive bar chart and scatter plot
- HLines Chart

Human Development:

The Human development is the summary of key factors like education, living standards, life expectancy and morality. When we collect and compare all these dimensions, we can conclude a Human Development Index (HDI) for each country. The higher this rate the country can be categorized to a developed nation. The methodology of calculating HDI has been devised by collaboration many leading International organization, comprising of scientists and economists.

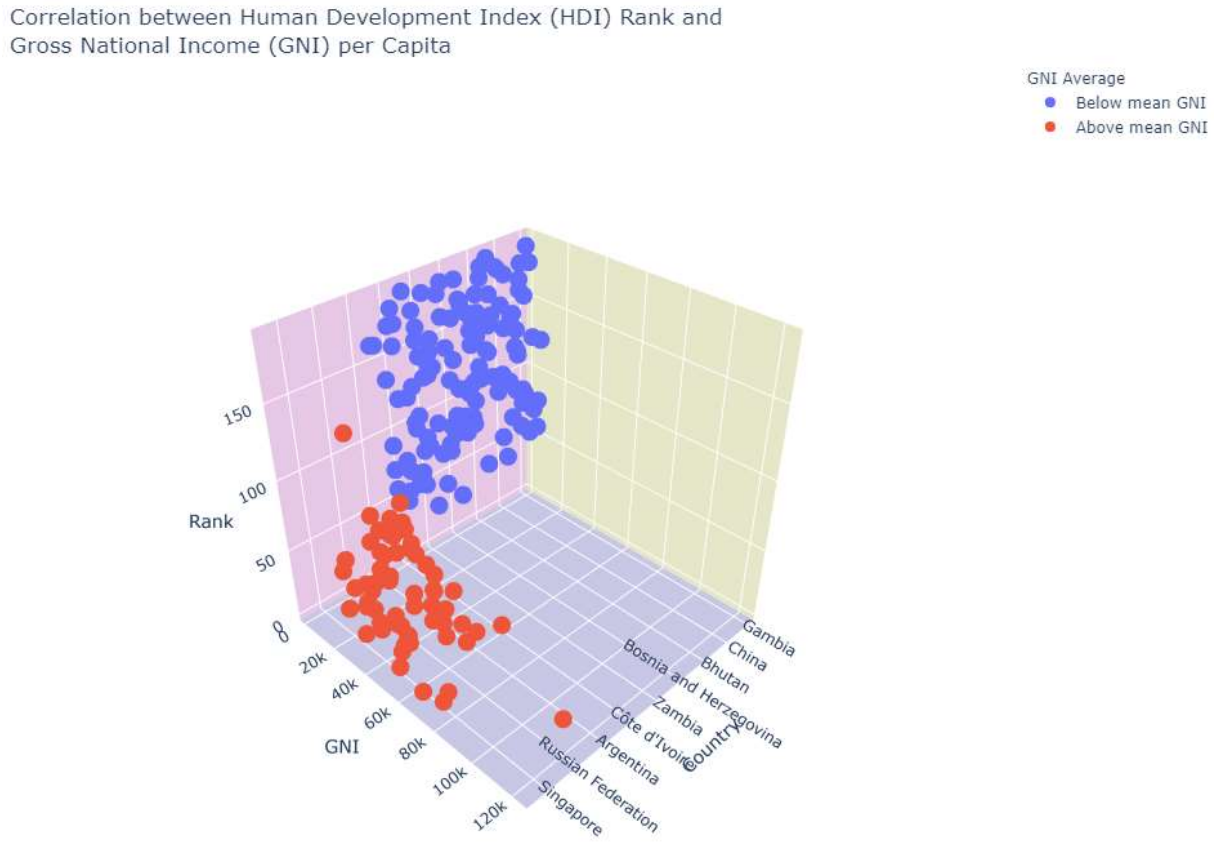


Our first graph contains the sub list of countries with good HDI values and least HDI values. As we can see from the below illustration, the countries with high HDI value tend to be the most developed nation like Norway, Australia, and Switzerland with advancements in almost every field and key aspects of human life. However, the countries with least HDI values are the considered as the under developed nations which primarily comprises the numerous African nations.

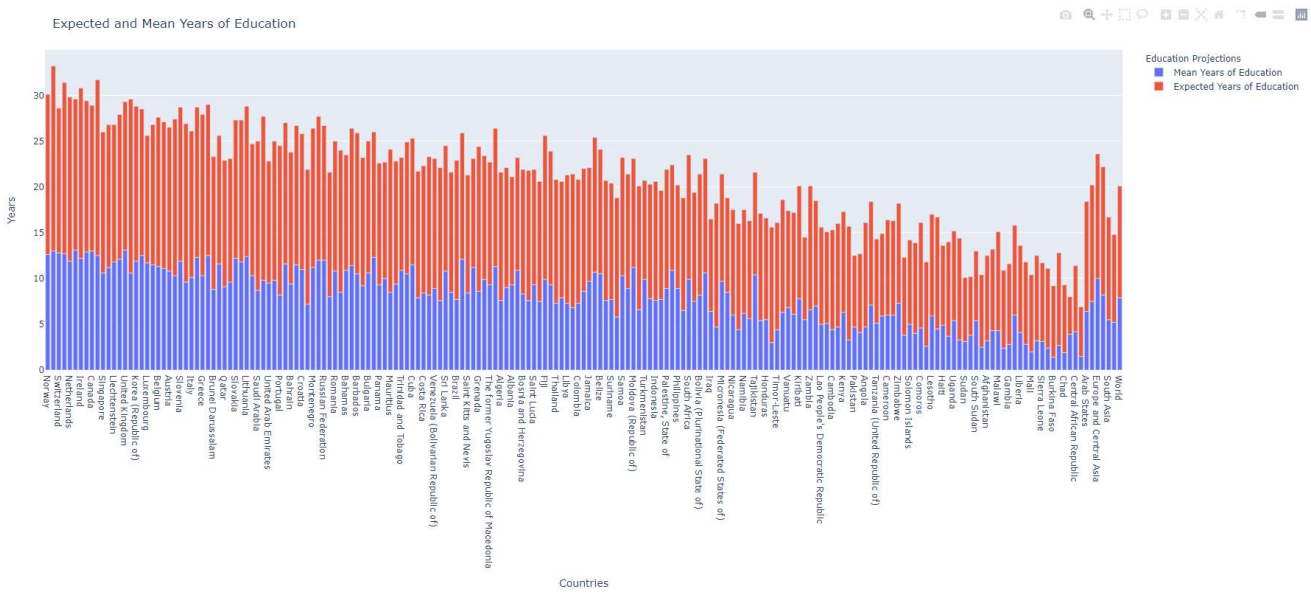


We further explored on this dataset by illustrating the correlation between the Human Development Index (HDI) and Gross National Income (GNI) in an interactive multidimensional(3d) scatter plot graph. This tells us that the counties with above average Gross National Income and earning potential tends to in the top ranks in the human development report, while the countries with below average Gross national Income tends to be the bottom ranks of human development report. The average GNI value is calculated by taking the aggregate mean of all the countries for that specific column and comparing it their individual GNI value. As we can see below, most developed countries which lies in the above average region while

the underdeveloped countries tend to be below average. This illustrates that a country's cumulation potential of earning is significantly important for the Human development Index.

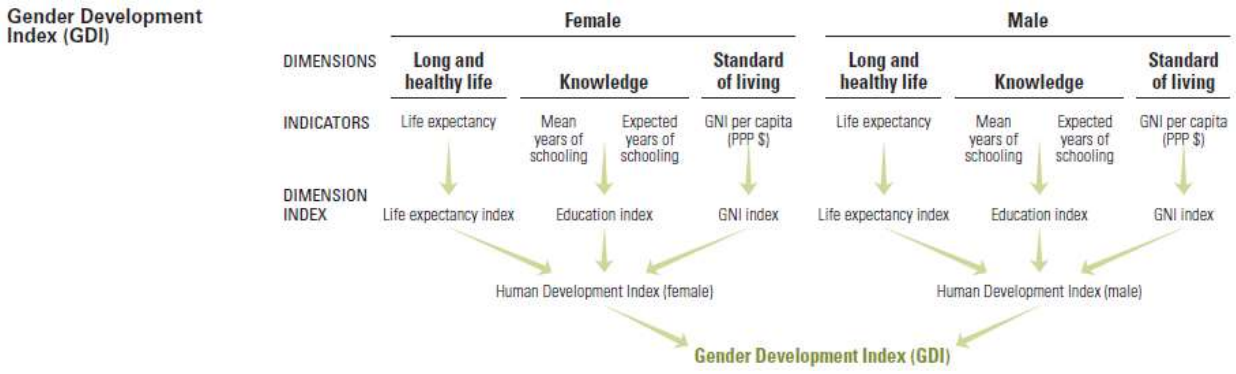


Finally, we wanted to explore on more key aspect which pertain to the education factor's impact on the Human Development. We visualized this by plotting interactive bar graphs for the education data available on the Human development dataset. Every country has a good, expected years of education, however only countries that can be considered developed or developing has a good mean year of education. Thus, we can say for certain that education plays a big role in a country's Human development Index and its ranking among all the countries in the world. We can see from the below graph that Countries like Switzerland and New Zealand has good ration on expected to mean years of education which puts them in the higher HDI rank. However, there are few outliers to this particular criterion like Arab states which has a significantly lower expected/mean years of education despite being one of the richest regions in the world.

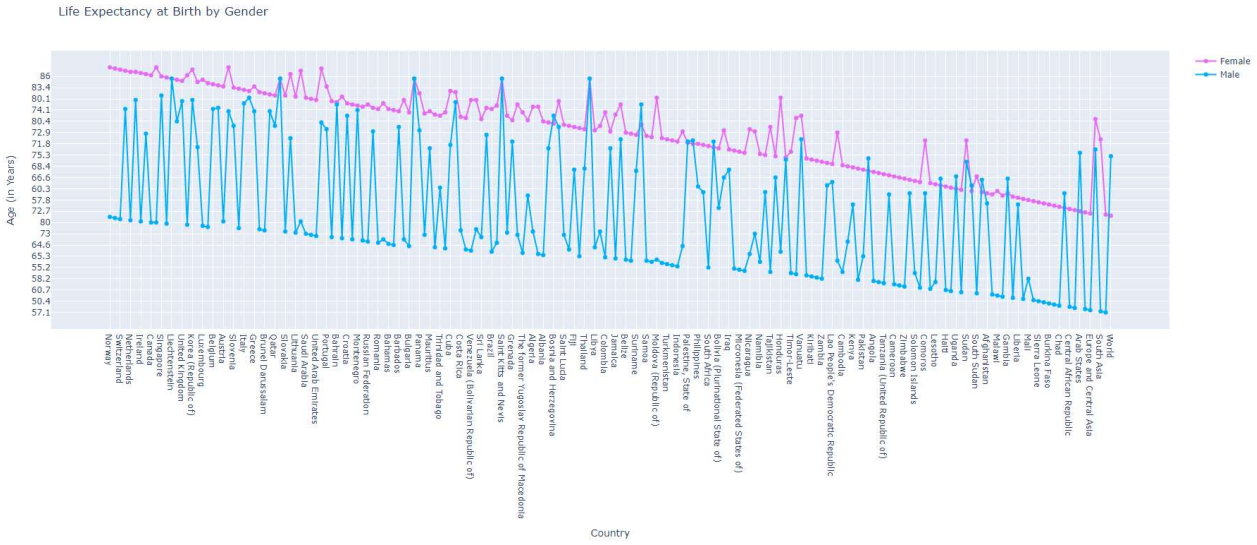


Gender Development:

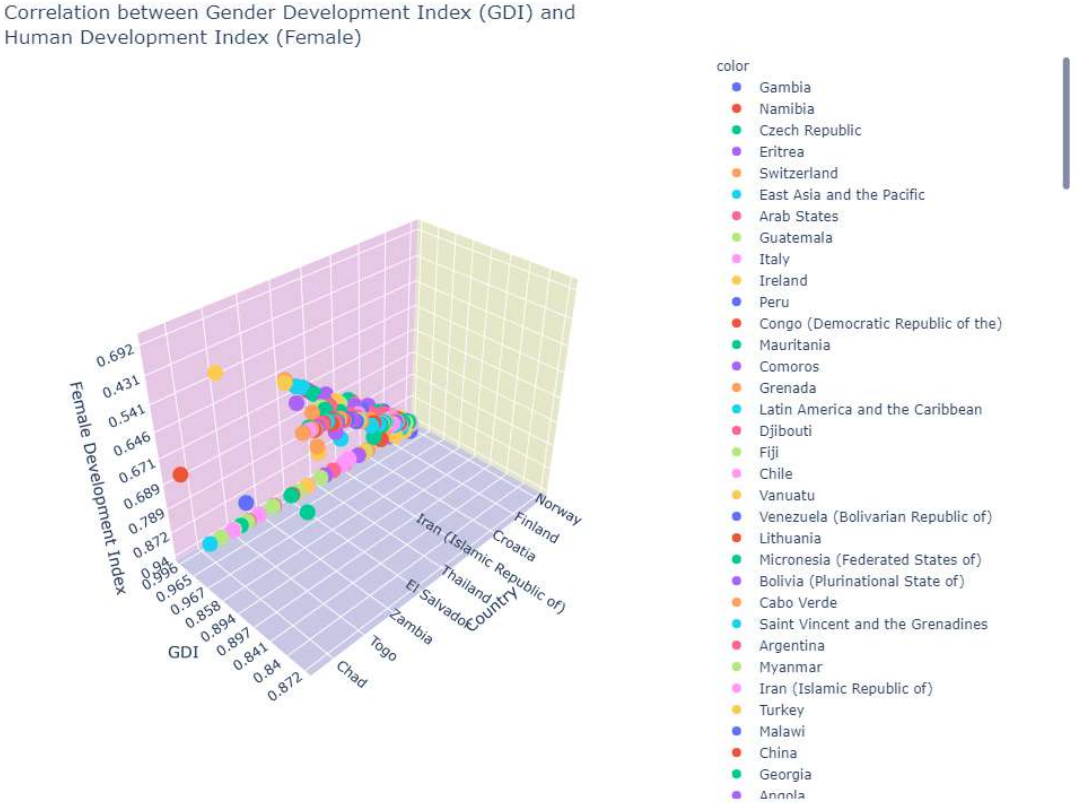
The gender development was measured based on three key factors to both male and female, economic resources, life expectancy at birth and education. When we compare, analyze and illustrate these areas, we can see male has better factors on certain developments aspects, while females have better factors on other development aspects. The data contains value for all the countries in the world so that we can analyze and make better inferences.

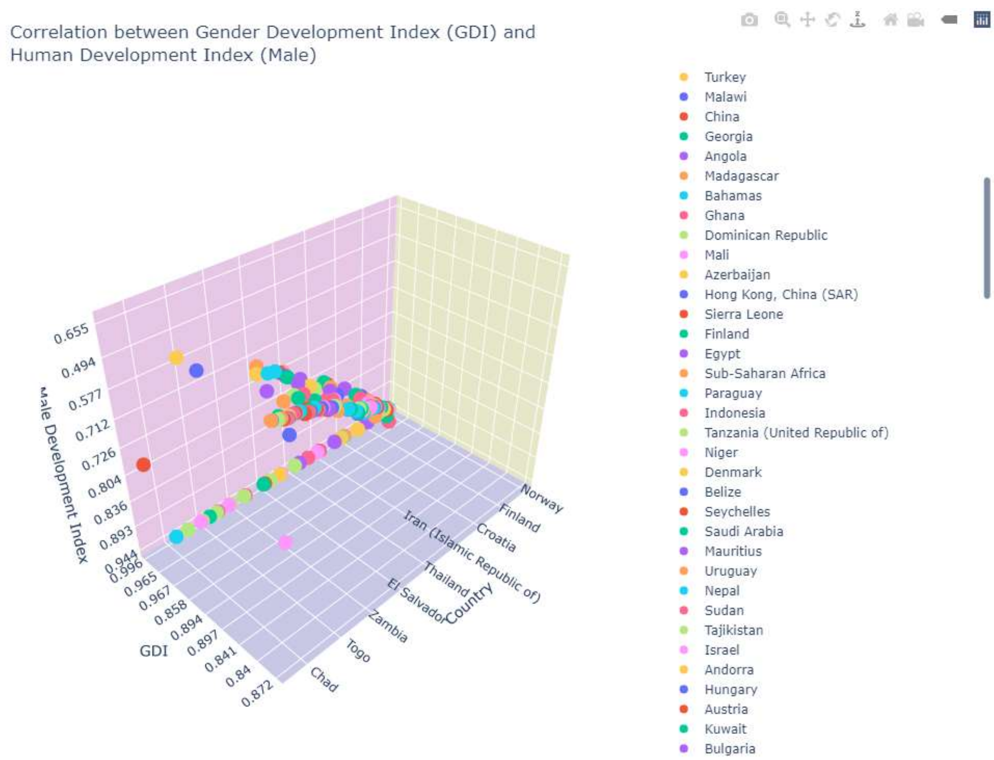


First, we choose to illustrate the life expectancy of the male and female for all the countries in an interactive scatter plot graph. The graph gives us an interesting pattern that females have significantly higher life expectancy rates over male in almost all the countries as can be seen below. This pertains to the discrepancy among developed and underdeveloped nations as they vary. The life expectancy sems to have little impact on the overall Gender development index.

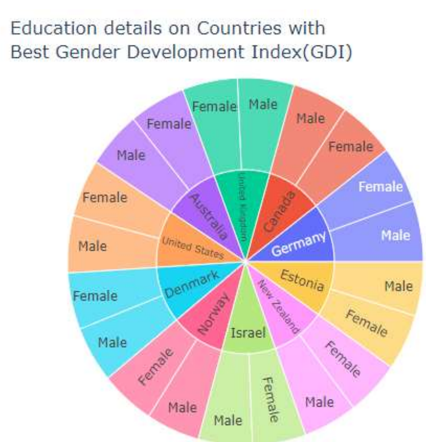


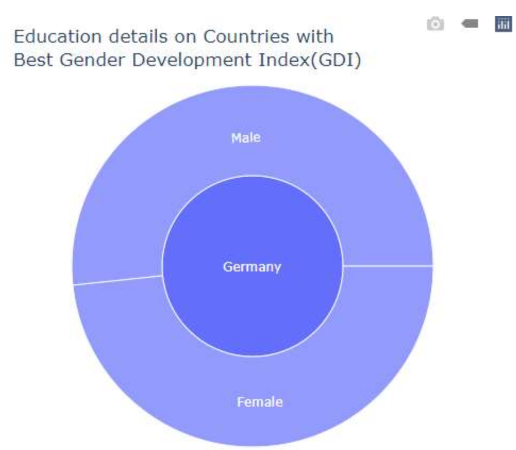
We further explored on this dataset by illustrating the correlation between the Gender Development Index (HDI) and development Index Male/Females in an interactive multidimensional(3d) scatter plot graph. When plotted, we can see that almost all the countries combined occupies the same quadrant in the multidimensional graph space for both male and females. However, regions like Europe and central Asia stands as an outlier as opposed to the other densely packed regions. Almost all the countries have a good correlation between the Gender Development for both male and female as the have been equally plotted and the gap between their development have seemed to be reduced over recent time.

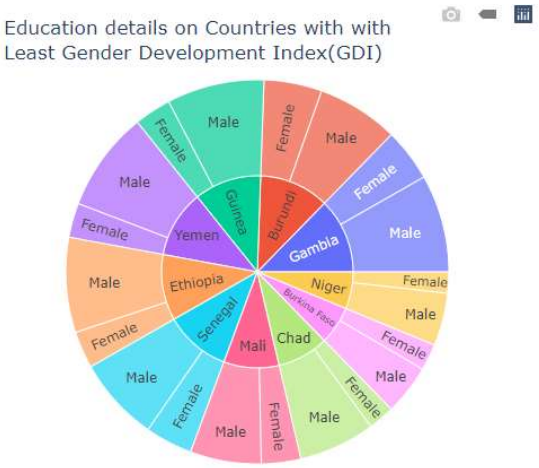


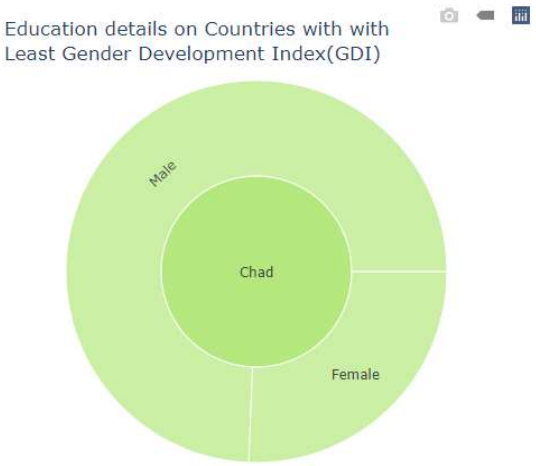


Finally, we wanted to investigate the impact of the education on the countries with a best and least Gender Development Index. This was done by plotting an interactive sunburst graph after taking the top/bottom GDI index values. The parent in the hierarchy field stands as the country and the child was plotted at the comparison between mean education of male and females. We can see that the countries with best GDI value tends to have equal education among the male and female development rate. Although an interesting pattern appears on the countries with Least GDI value, the male has significantly more education development rate than the female in these countries. Thus, we can infer that educational equality is more important to the gender development of a nation.









Inference and Conclusion

Every visualization model offers unique perspective of the dataset, and it gave us insight into the questions we posed during the initial stages of this project. We believe in comparison interactive Multidimensional (3d) plots provides a better visual representation on the key aspects of the Development report datasets provided to us for this project.

Thus, I conclude and infer from the various visualization techniques that development of countries on the front of Human development index and female development index relies on the few key aspects like education, life expectancy and gross earning potential. Based on the observations most of the countries with developed state tend to have better overall factors, while the underdeveloped nations have least overall factors as well as the index rates which place them in the bottom of the world rankings.