

**Analysis Report**  
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## Who are the Billionaires?

### Summary/Abstract

We are interested in finding out the statistical distribution of billionaires around the globe and in the United States. We want to have more insights on relevant features of billionaires such as worth, age, gender, industry, country population, country gdp etc. We would also like to predict the worth of billionaires. Using Billionaires Statistics Dataset 2023, we created bar plots, scatter plots, linear regression lines, and a multi linear regression model to predict the worth of billionaires. As a conclusion, we find out that most billionaires are from the United States. The mean and median of age distribution are around 65 to 68 years old. The male to female ratio of billionaires is 7 to 1. The technology industry dominates under 50-year-old groups, whereas the finance industry dominates above 50-year-old groups. Country GDP, population, as well as age and gender have positive correlation to the number of billionaires. With four input factors, we can predict the worth of a billionaire.

### Introduction

Elon Musk has become the wealthiest billionaire according to Forbes Real Time Billionaires List. Nine out of ten top billionaires are from the United States and most of them are from the technology industry. We talk about billionaires all the time, but most of us don't have statistical insights on billionaires around the world. In this report, we are analyzing the distributions and correlations of some of the key factors relevant to billionaires and at the end, presenting a demo of a prediction model that calculates one's worth if one were a billionaire.

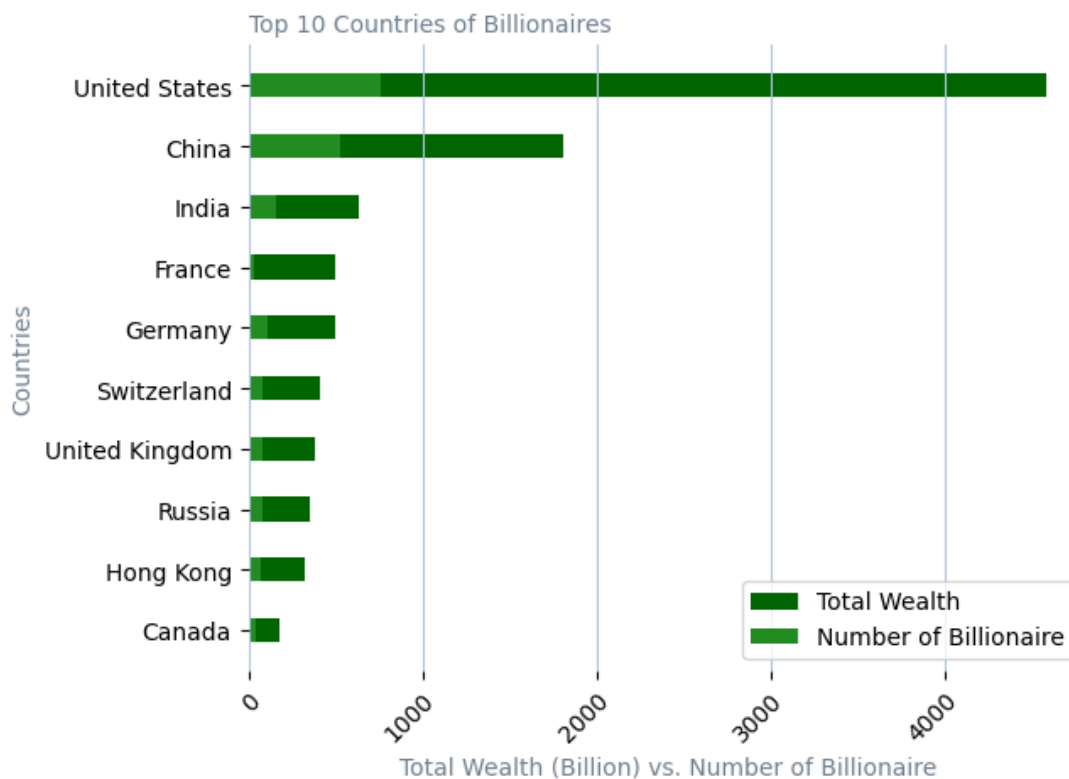
## Methods

Methods used in this project include cleaning and completing missing data, creating bar charts and scatter plots, linear regression analysis, and multi-linear regression analysis. We used pandas, matplotlib, numpy, scipy, hvplot, sklearn, json file requests from geoapify, etc.

## Results, conclusions and prediction

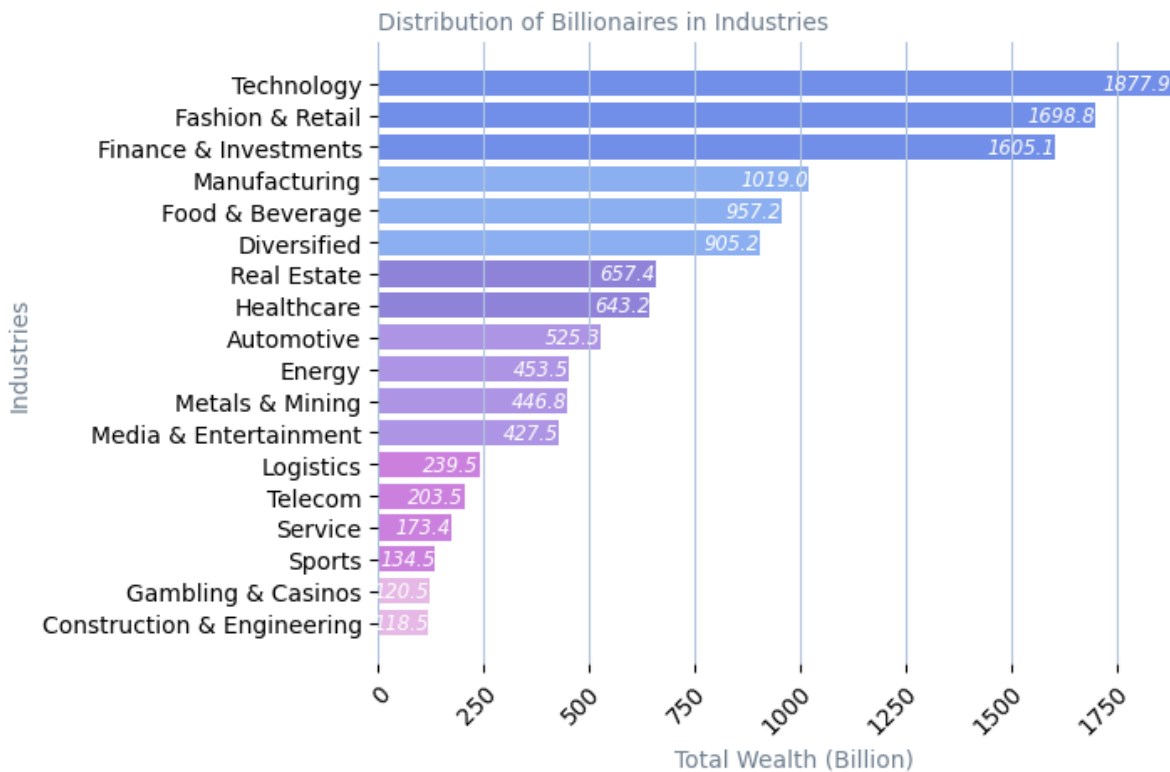
### The Distribution Of Billionaires Around The Globe

Among the top ten countries of billionaires in the world, the United States rank the first, with a cumulated worth of billionaires at 4,577 billion dollars, followed by China, with a cumulated worth of billionaires at 1,805 billion dollars, then India, with a number of 637 billion dollars.



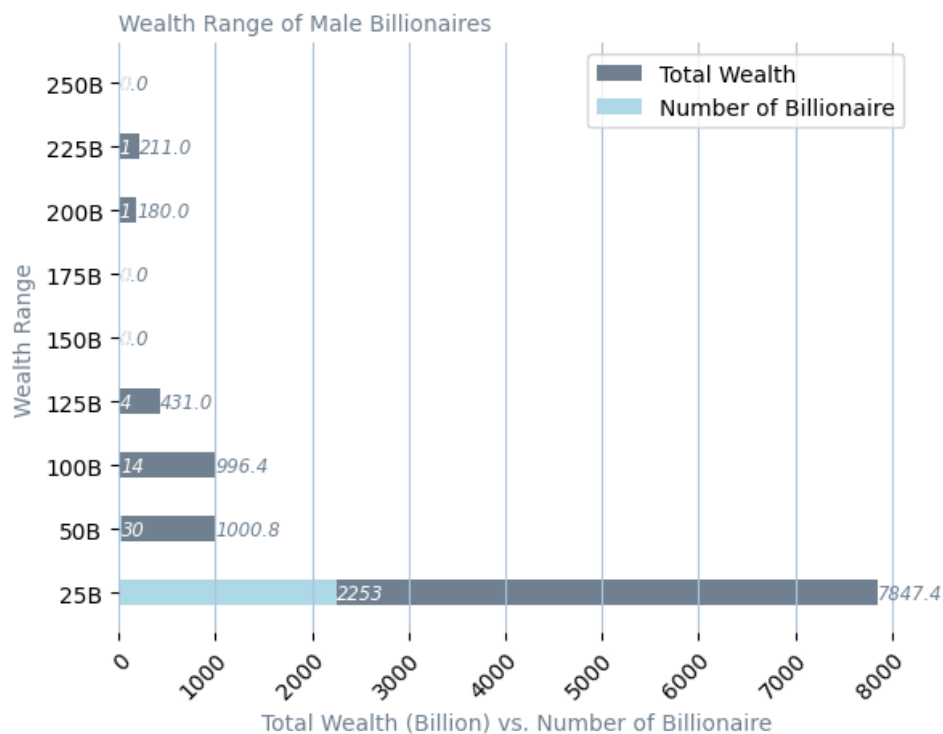
Graph 1. Total Wealth (Billion) vs. Number of Billionaire

From an industry perspective, billionaire wealth is most concentrated in the Technology sector, followed by Fashion and Retail, and Finance and Investment. Graph 2 illustrates a substantial increase from manufacturing to finance, highlighting the significant disparity in the wealth of billionaires across various industries.

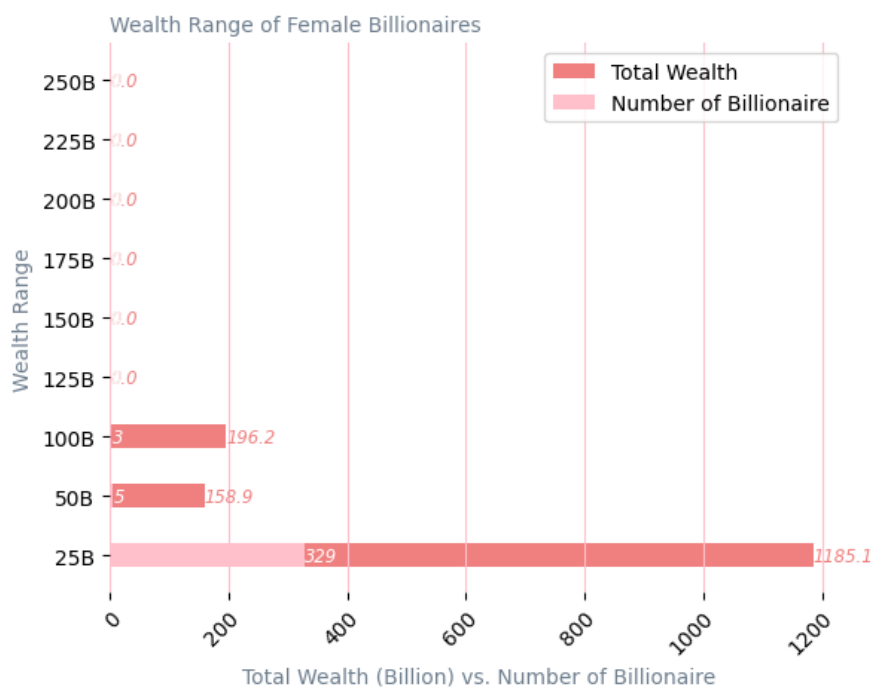


Graph 2. Total Wealth (Billion) Distribution In Industries

Graph 3 and 4 shows that most billionaires are within the wealth range of 0 to 25 billion dollars. The gender ratio of male to female is 7, and there are no female billionaires in the wealth range of 100 billion and above.

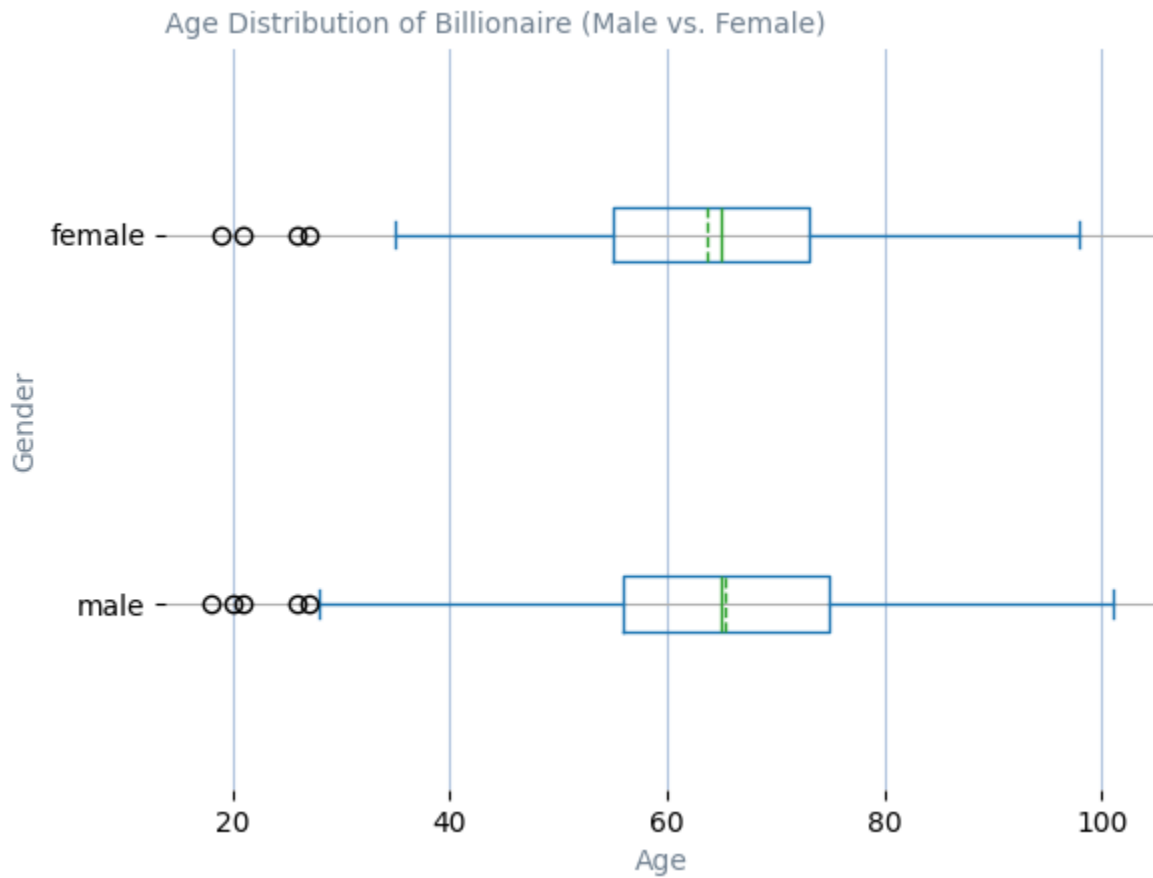


Graph 3. Total Wealth (Billion) vs. Number of Billionaire (Count)



Graph 4. Total Wealth (Billion) vs. Number of Billionaire (Count)

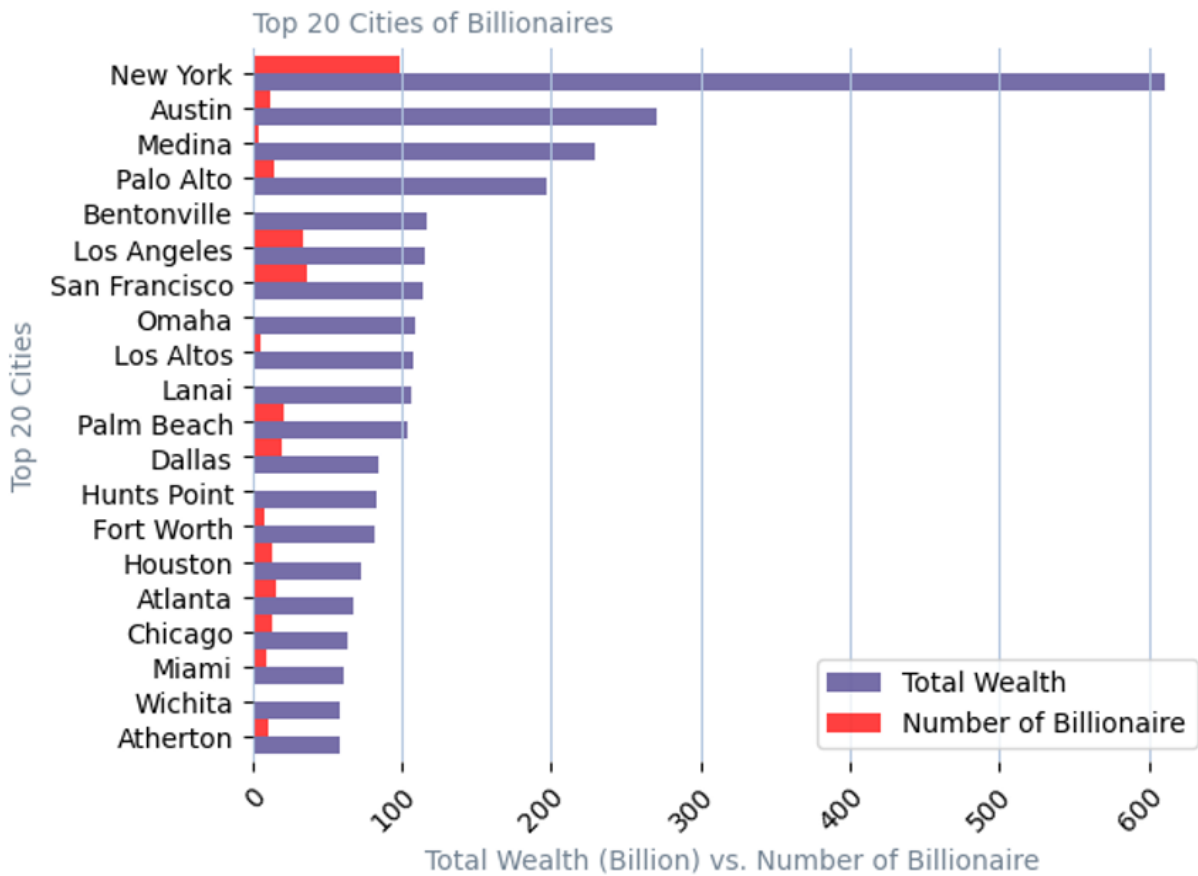
The mean and median ages for males are 67.05 and 67, respectively, while the mean and median ages for female billionaires are 69 and 65, respectively. Graph 5 illustrates the age distribution of male and female billionaires, with outliers indicating the presence of some exceptionally young billionaires.



Graph 5. Age Distributions of Male and Female Billionaires

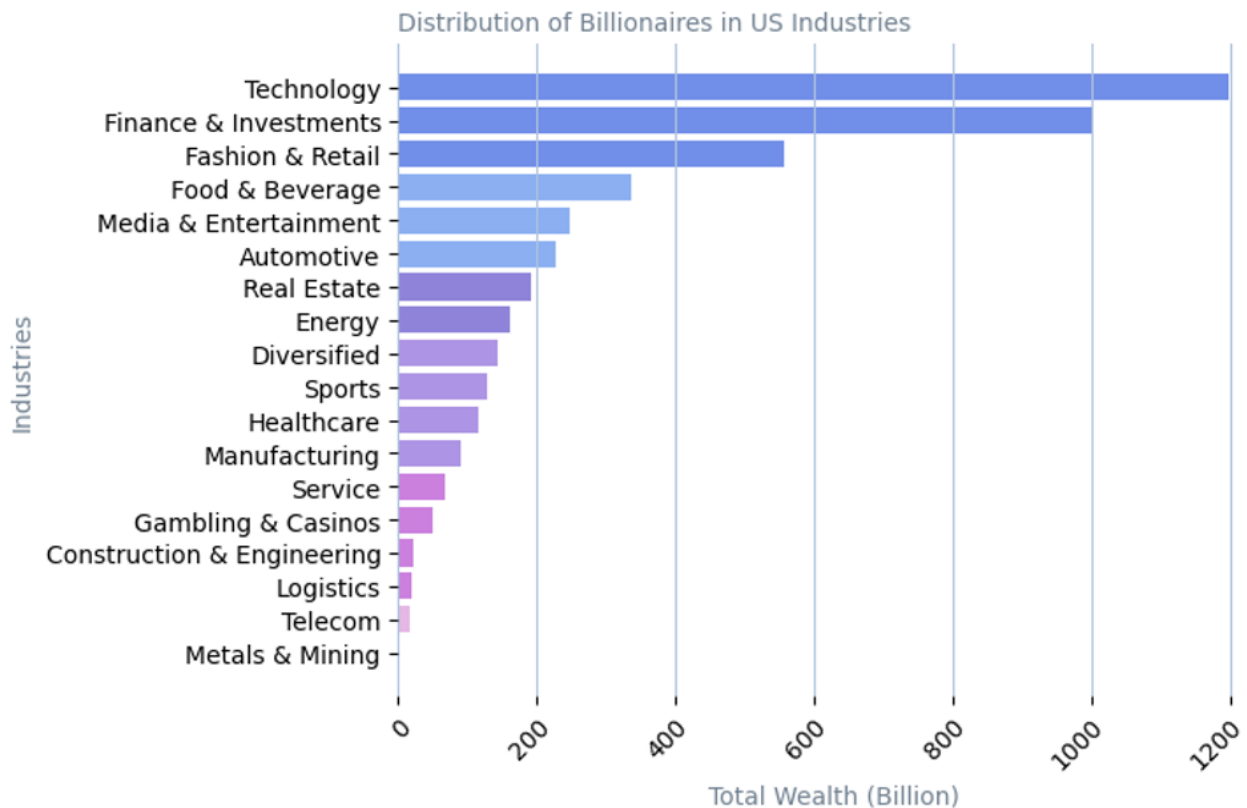
## The Distribution Of Billionaires In the United States

Among the top 20 cities of billionaires, six of them are in California. However, New York City is on top of the list with cumulated worth of billionaires of more than 600 billion dollars (Graph 6).



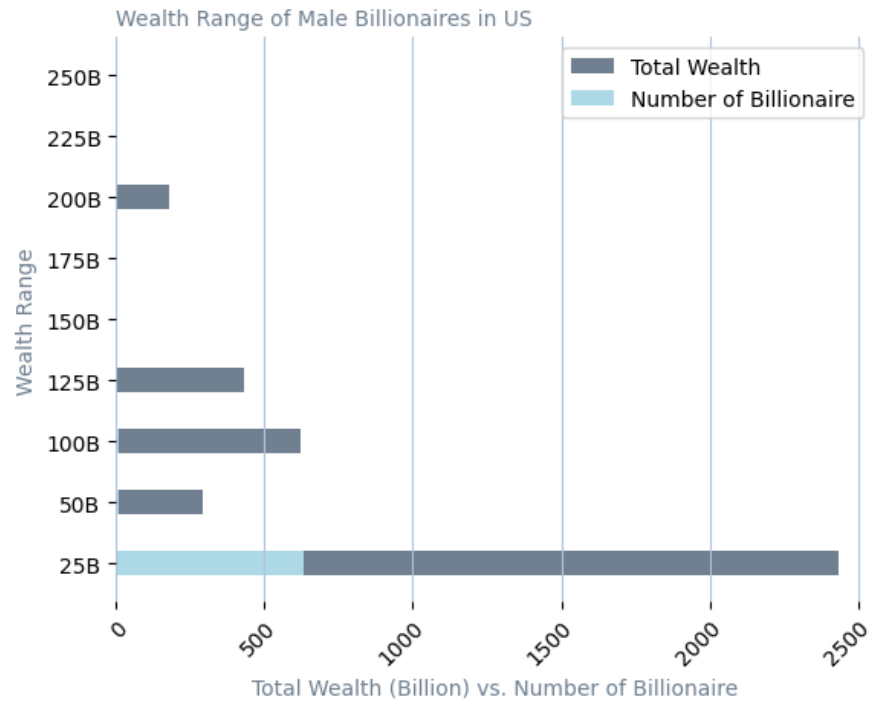
Graph 6. Total Wealth (Billion) vs. Number of Billionaire (Count) in Top 20 US Cities

If we examine the distribution of billionaires across industries, we find that the majority of billionaires are in the Technology sector, followed closely by Finance and Investment, with a wealth difference of only \$200 billion. Fashion and Retail ranks third but possesses only about half the wealth of the billionaires in the Technology sector.

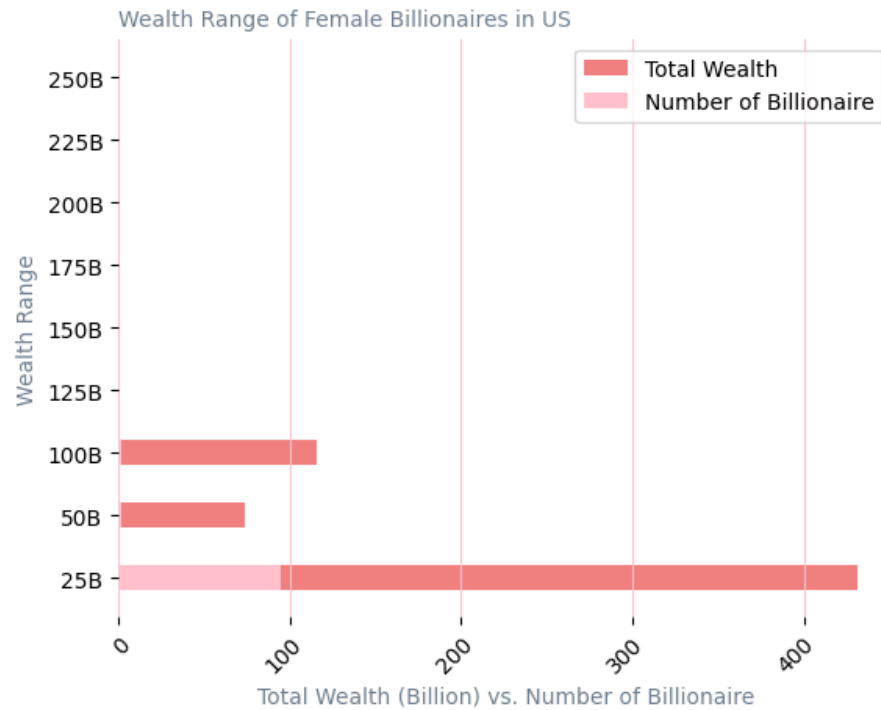


Graph 7. Total Worth Of Billionaires Across Industries

The ratio of male to female billionaires in the United States is 7 to 1, mirroring the global ratio. Most billionaires fall within the wealth range of less than 25 billion dollars, indicating that the average net worth of the majority of billionaires is below 5 billion dollars.



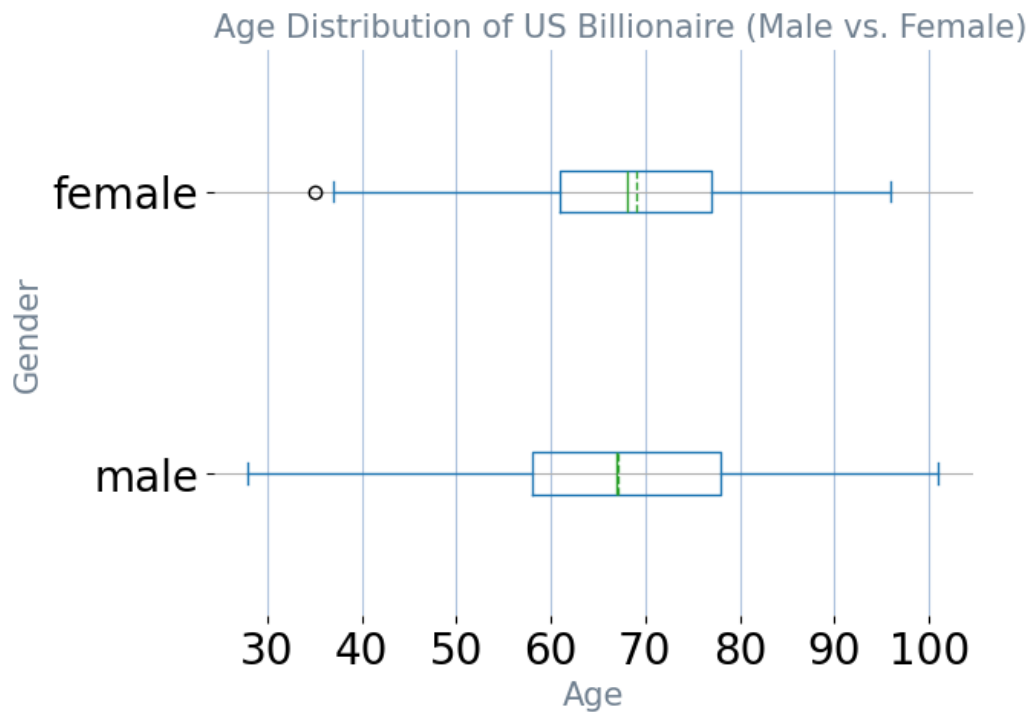
Graph 8. Wealth Range Distribution Of Male Billionaires In US



Graph 9. Wealth Range Distribution Of Female Billionaires In US

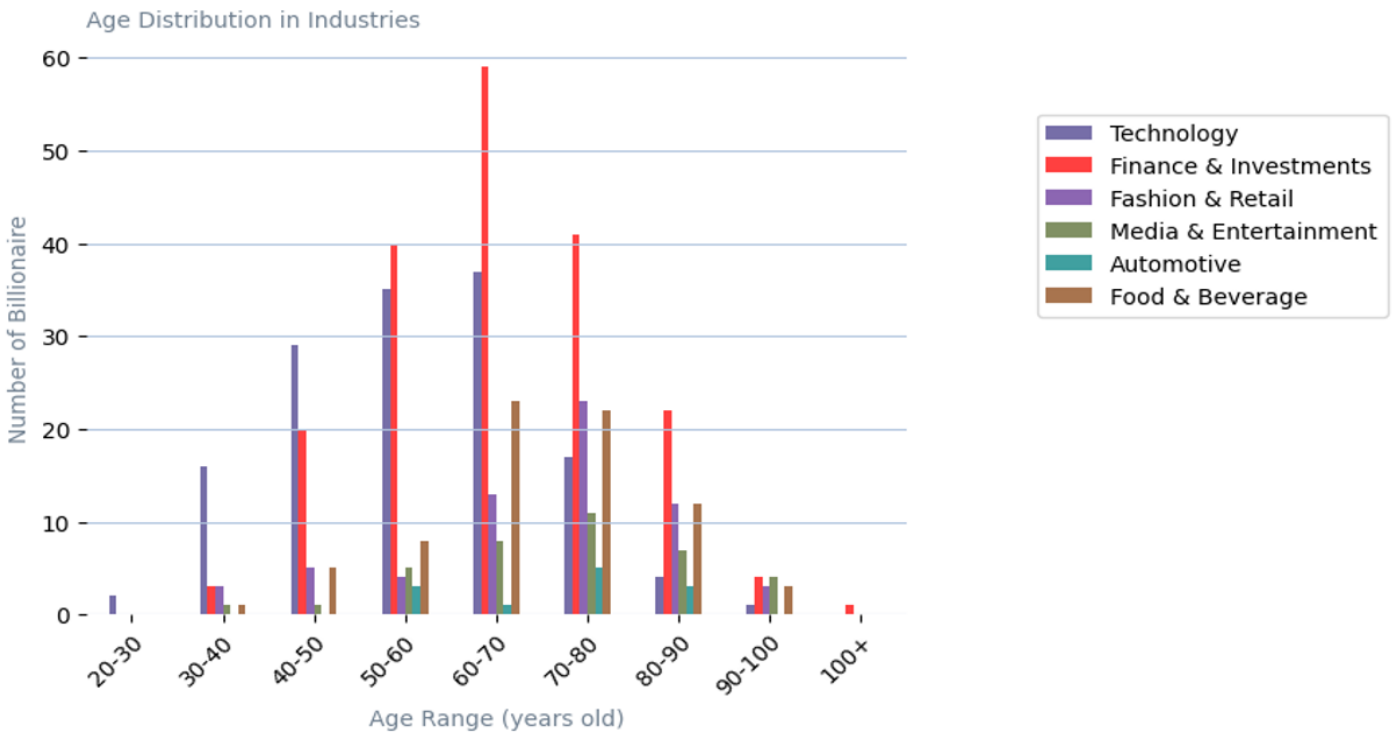


The mean and median ages for males are 67.05 and 67, respectively, while the mean and median ages for female billionaires are 69 and 68, respectively. Graph 10 illustrates the age distribution of male and female billionaires, with outliers in female group indicating the presence of one exceptionally young billionaire.



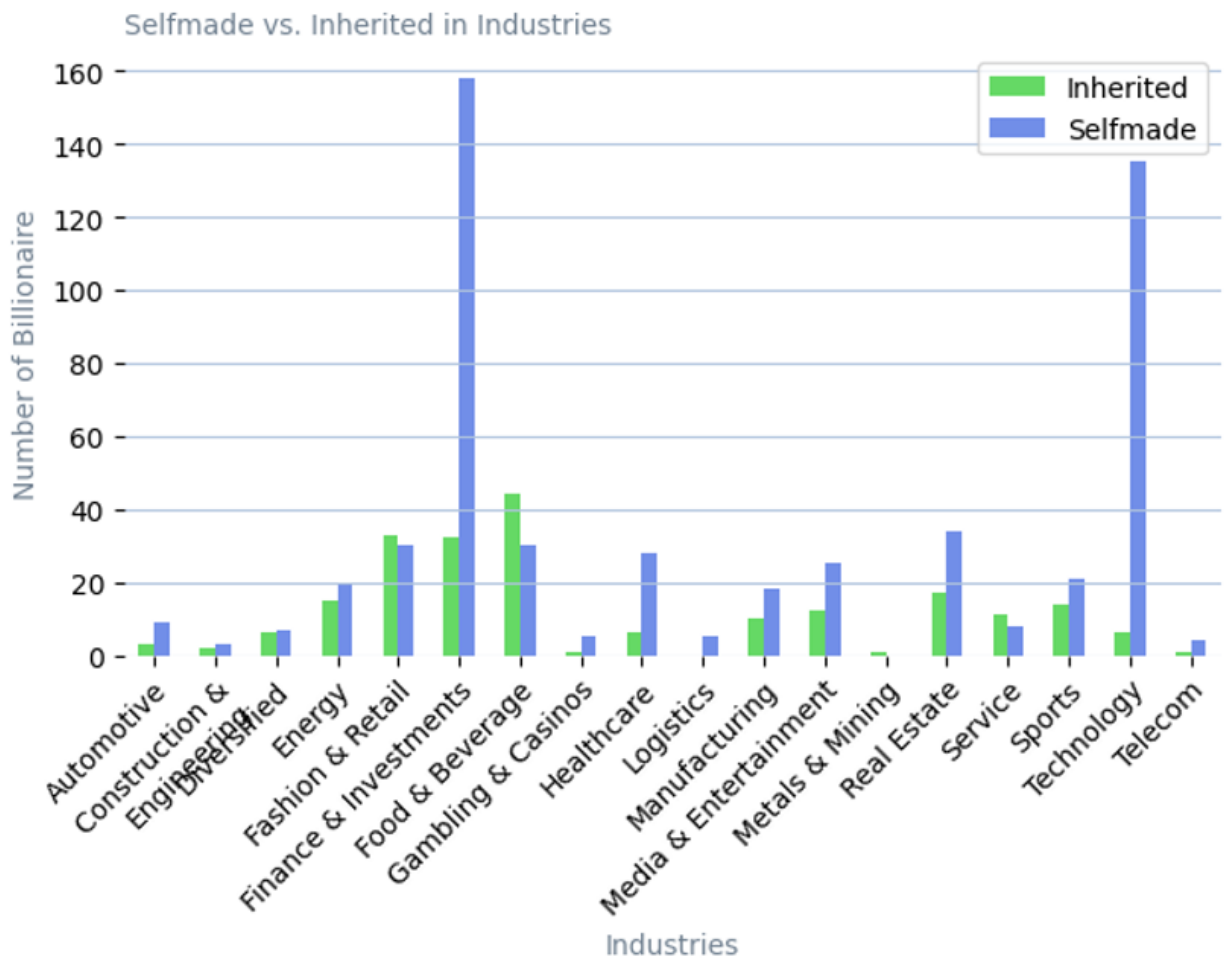
Graph 10. Age Distribution Of Billionaires In US

As we can observe in Graph 11, Technology and Finance are the two dominant industries. Interestingly, at the age of 50, there is a shift in the industry's dominance between Technology and Finance. This suggests that the majority of billionaires in the Technology industry are younger, while the majority of billionaires in the Finance industry are older.



Graph 11. Age Distribution Of Billionaires In US

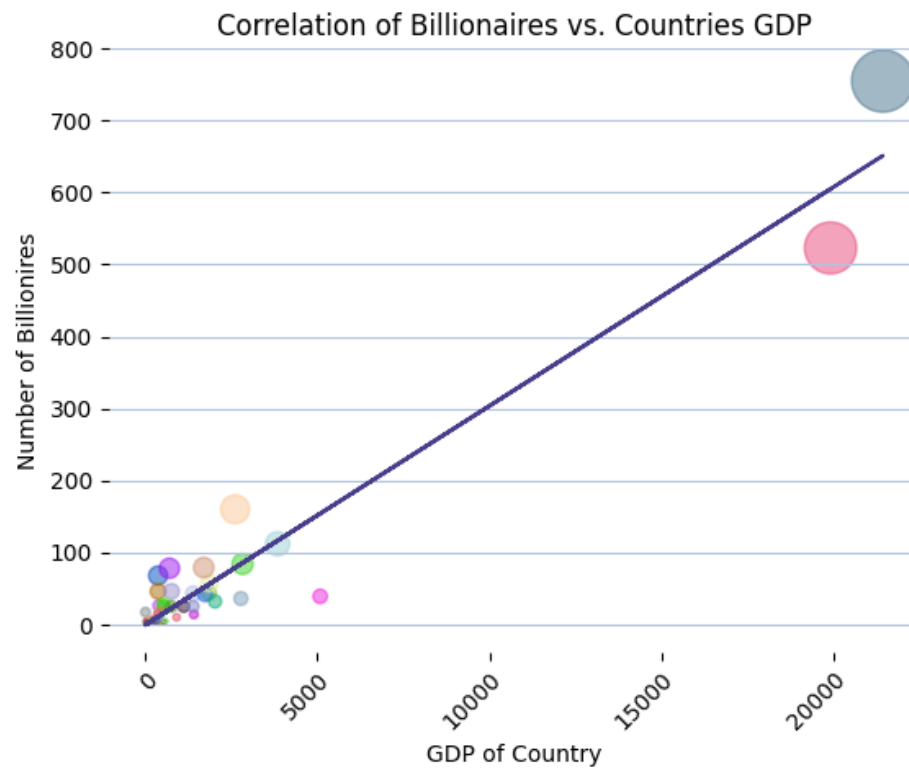
Graph 12 illustrates that in each industry, there are more self-made billionaires than inherited billionaires (including professional managers). However, in Fashion and Retail, Food and Beverage, and Service, the number of inherited billionaires exceeds that of self-made billionaires. This outcome can be attributed to the presence of well-known brands such as LVMH, Nutella, Red Bull, and Marriott, among others.



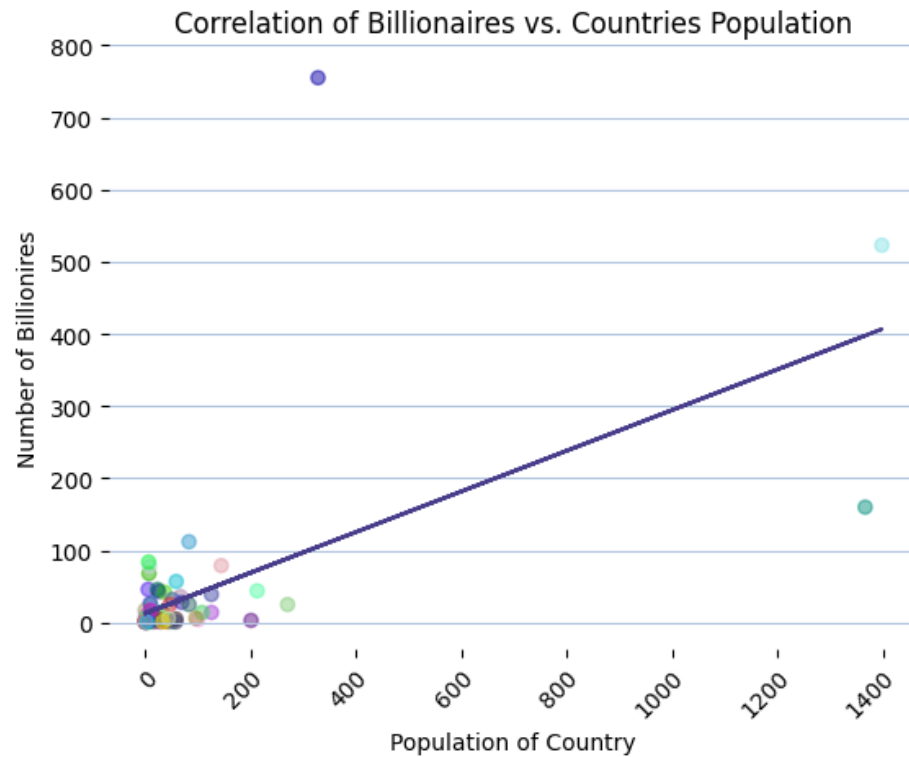
Graph 12. Self-made vs. Inherited Billionaires In US

## The Correlation Analysis Of Billionaires In The United States

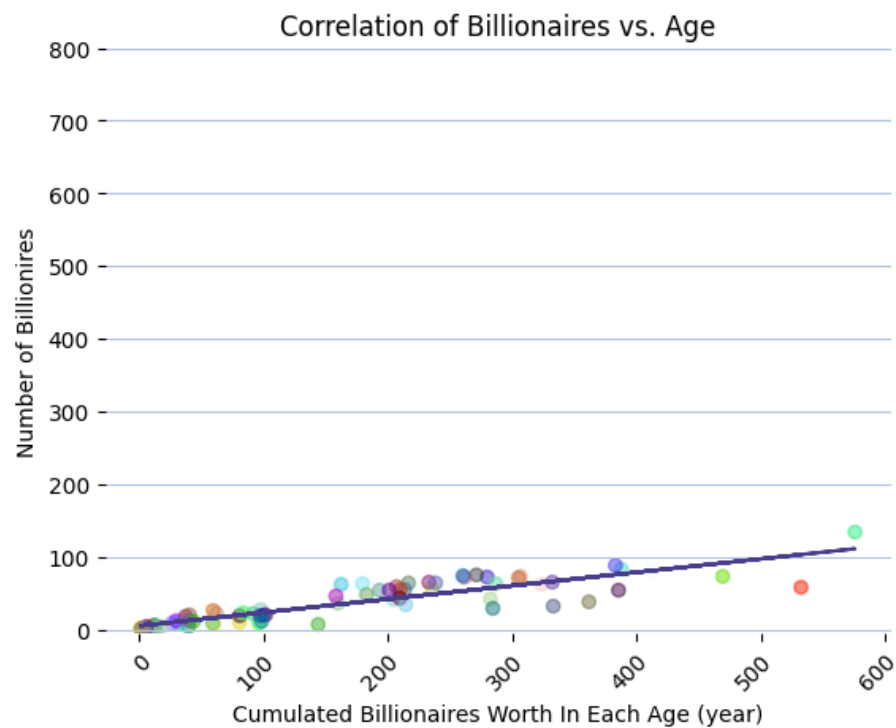
In this section, we select four factors that have moderate to strong positive correlation with the numbers of billionaires. These four factors are countries GDP, countries population, age, and industries.



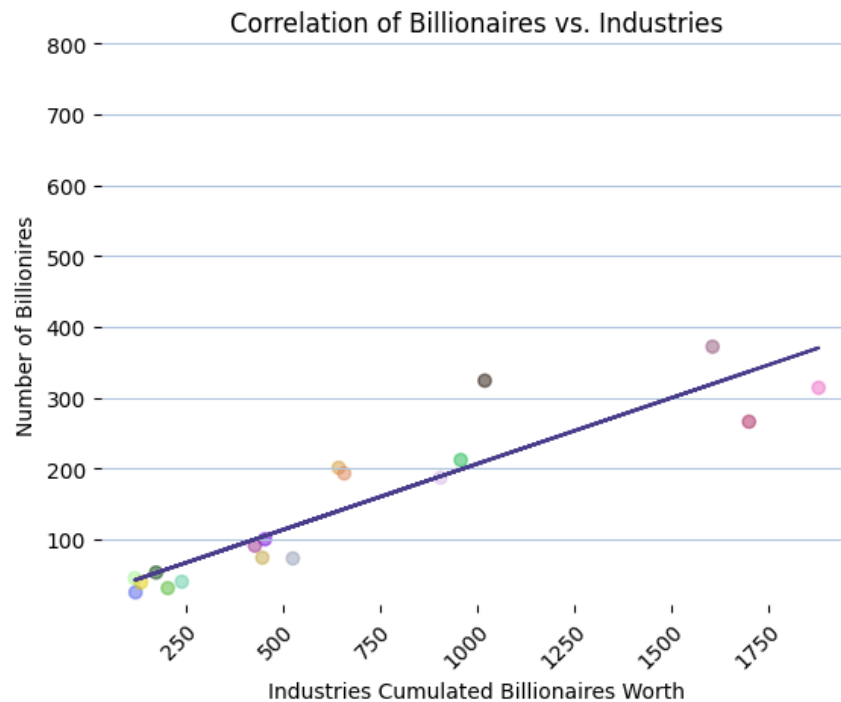
Graph 13. Correlation of Number of Billionaires with Countries GDP



Graph 14. Correlation of Number of Billionaires with Countries Population



Graph 15. Correlation of Number of Billionaires with Age



Graph 16. Correlation of Number of Billionaires with Industries

As observed in Graph 13, there is a strong positive correlation (0.97) between the number of billionaires and a country's GDP. Graph 14 illustrates a moderate positive correlation (0.6) between the number of billionaires and a country's population. In Graph 15, we see a strong positive correlation (0.89) between the number of billionaires and age. Finally, Graph 16 shows a strong positive correlation (0.92) between the number of billionaires and industries.

## Prediction

We employ a multi-linear regression model to estimate a billionaire's net worth, incorporating predictors such as their country's GDP, country's population, age, gender (coded as binary values 0 and 1), and industry. Additionally, we utilize the cumulative net worth of billionaires as an industry dummy variable.

For the demo of our prediction model, please visit Jupyter Notebook for the Bonus section: *How much would you worth, if you were a billionaire?*

## General discussion

To further enhance this project, we plan to conduct a more comprehensive analysis by incorporating additional factors into the prediction model. This will include refining our approach to education levels, considering variables such as university acceptance and completion, as well as distinguishing between the individual's country of residence and the country where they grew up.

## References

Nidula Elgiriye withana. 17.04.2023. Billionaires Statistics Dataset  
(2023). 17.10.2023 <https://www.kaggle.com/datasets/nelgiriye withana/billionaires-statistics-dataset>