



Modern Olympic Games Data Analysis



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Problem Statement

- How have Olympic athletes changed over time?
- How have the Olympic Games changed over time?
- How do the Olympic Games reflect international relations, with regards to politics, economics, and human rights?

Business Value

How do the Olympic Games affect our society?

- Catalyst for social and political change
- Develop policies to realize full potential of Olympic
- Foundation for future predictive work in detecting anomalies in athlete performance

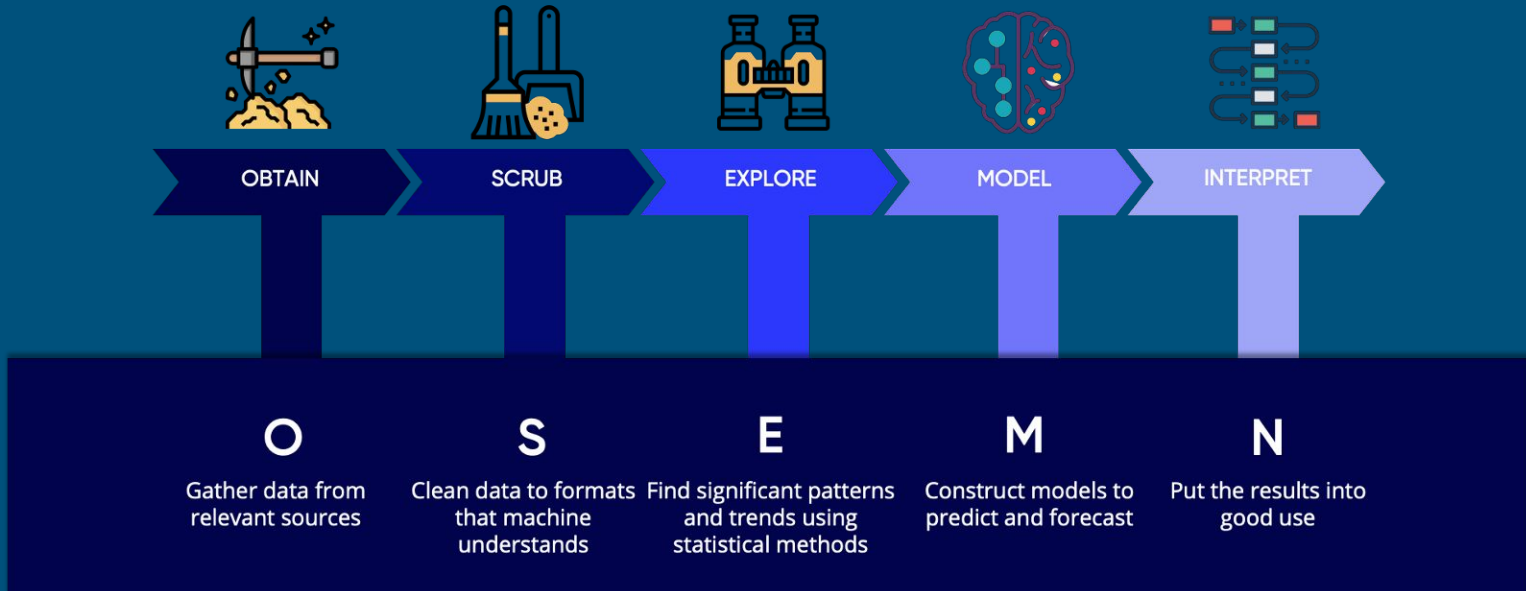


Olympic Games

- International Olympics Committee founded 1894
- Inaugural modern games in Athens, Greece in 1896
- Introduction of winter games in 1924
- Separation of summer and winter games in 1992
- Over 200 countries now participate in summer games

Data Science Framework

Data Science Process

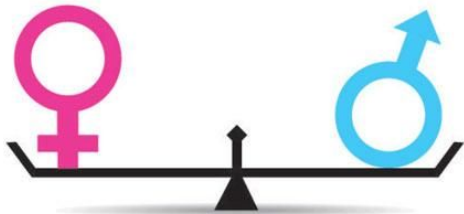


Exploratory Data - Subtopics

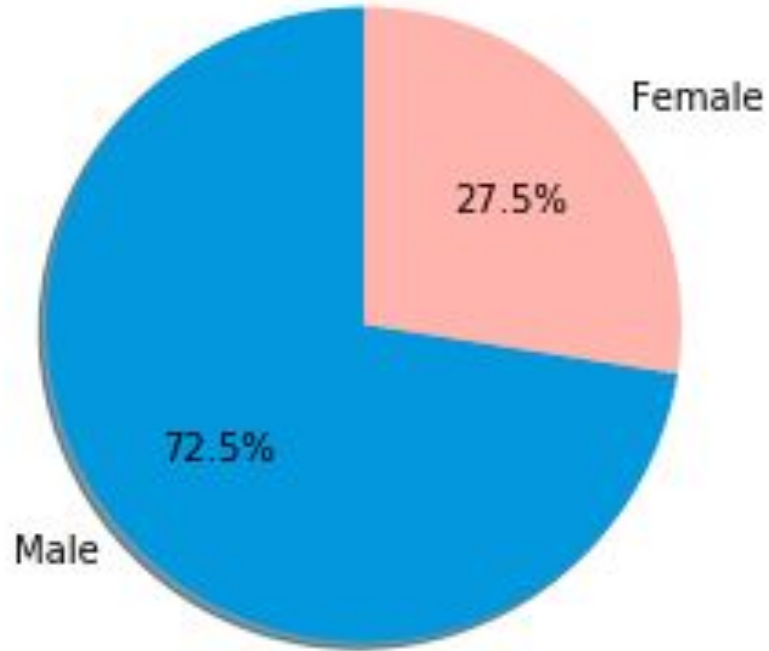
1. Gender
2. Types of Athletes
3. Olympic Medalists
4. Exploring Countries
5. Seasonal Athletes
6. Additional Trends Over Time

Gender

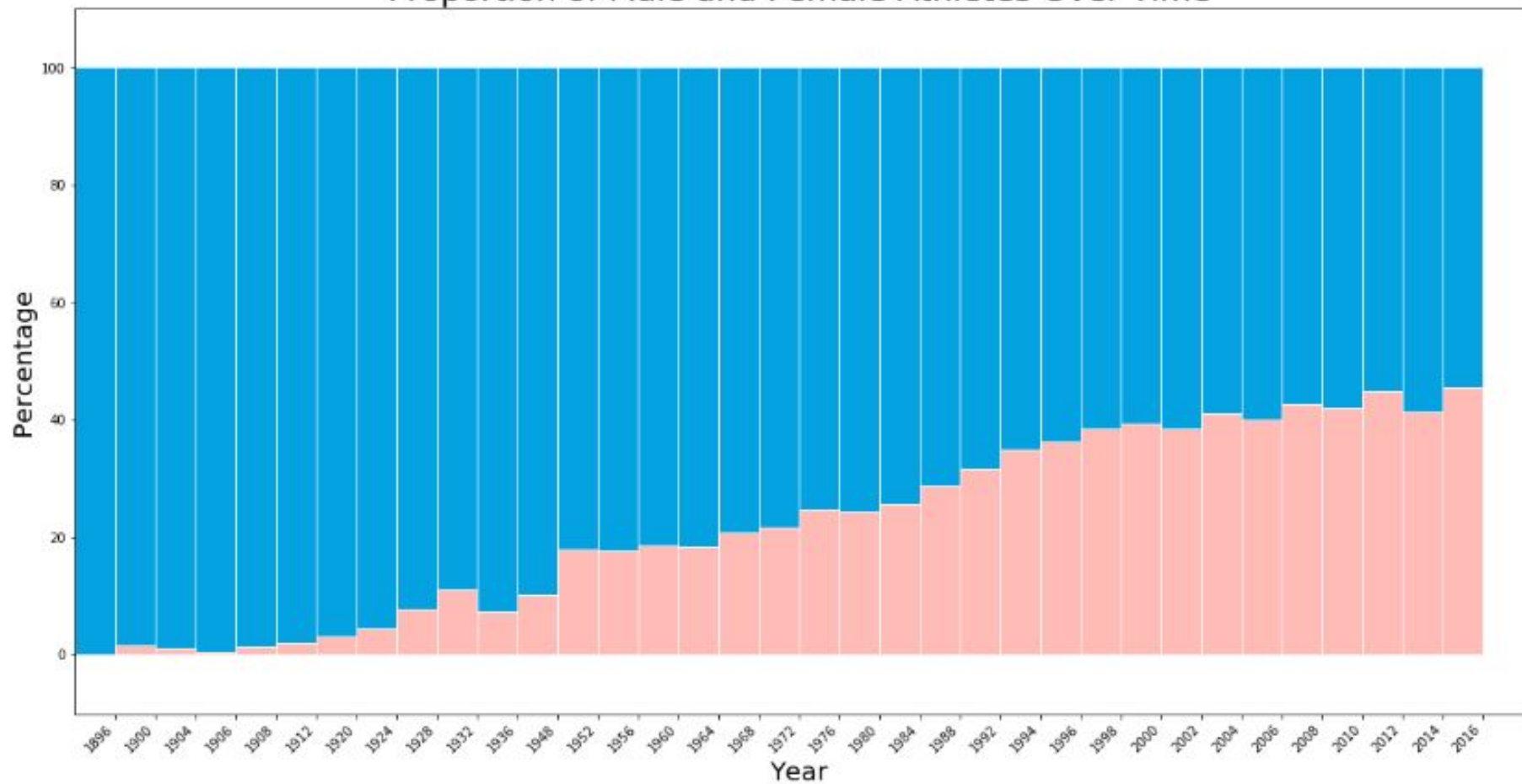
Analysis focused on
gender equality at the
Olympic Games



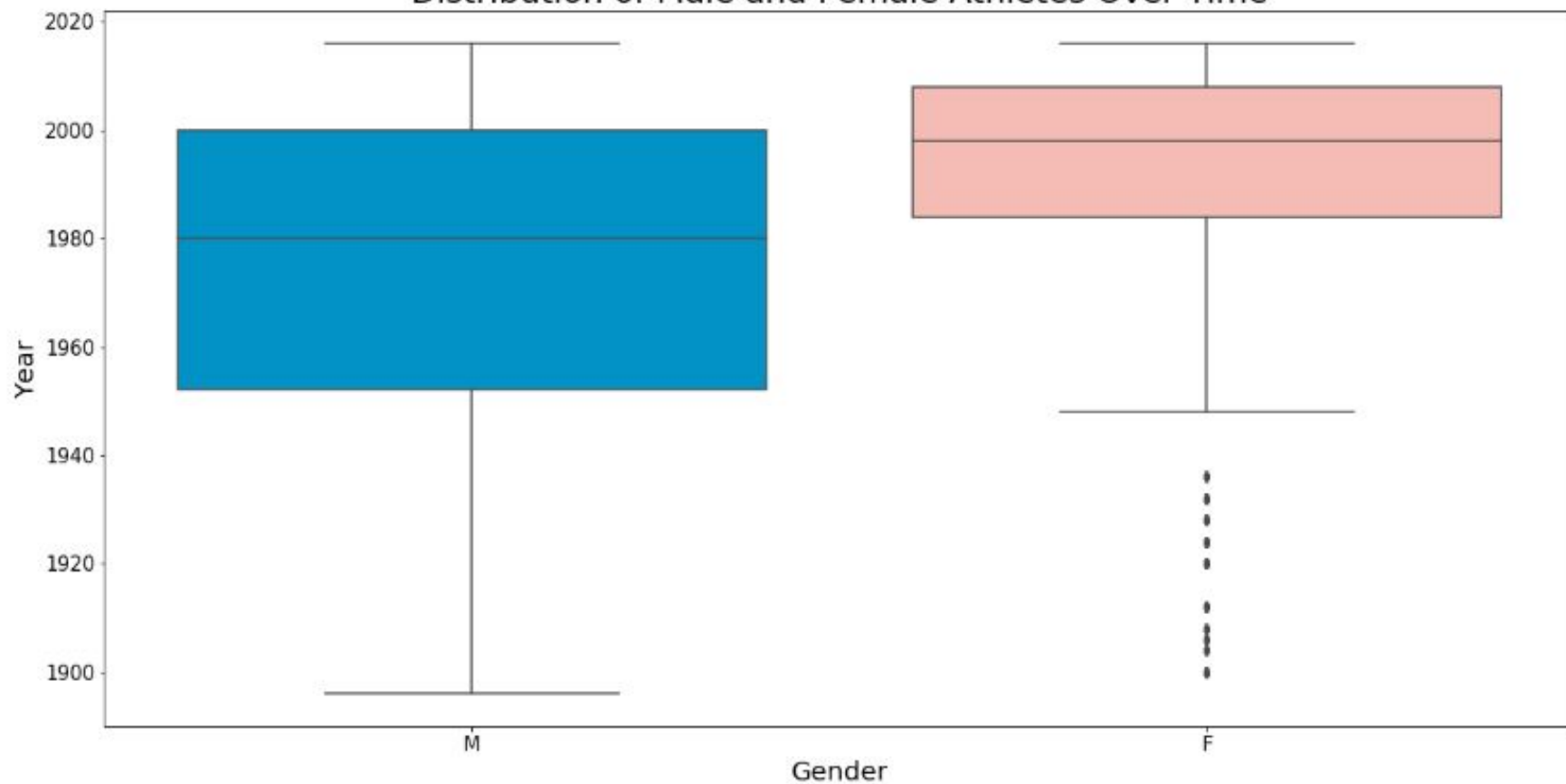
Gender Composition of Olympic Games



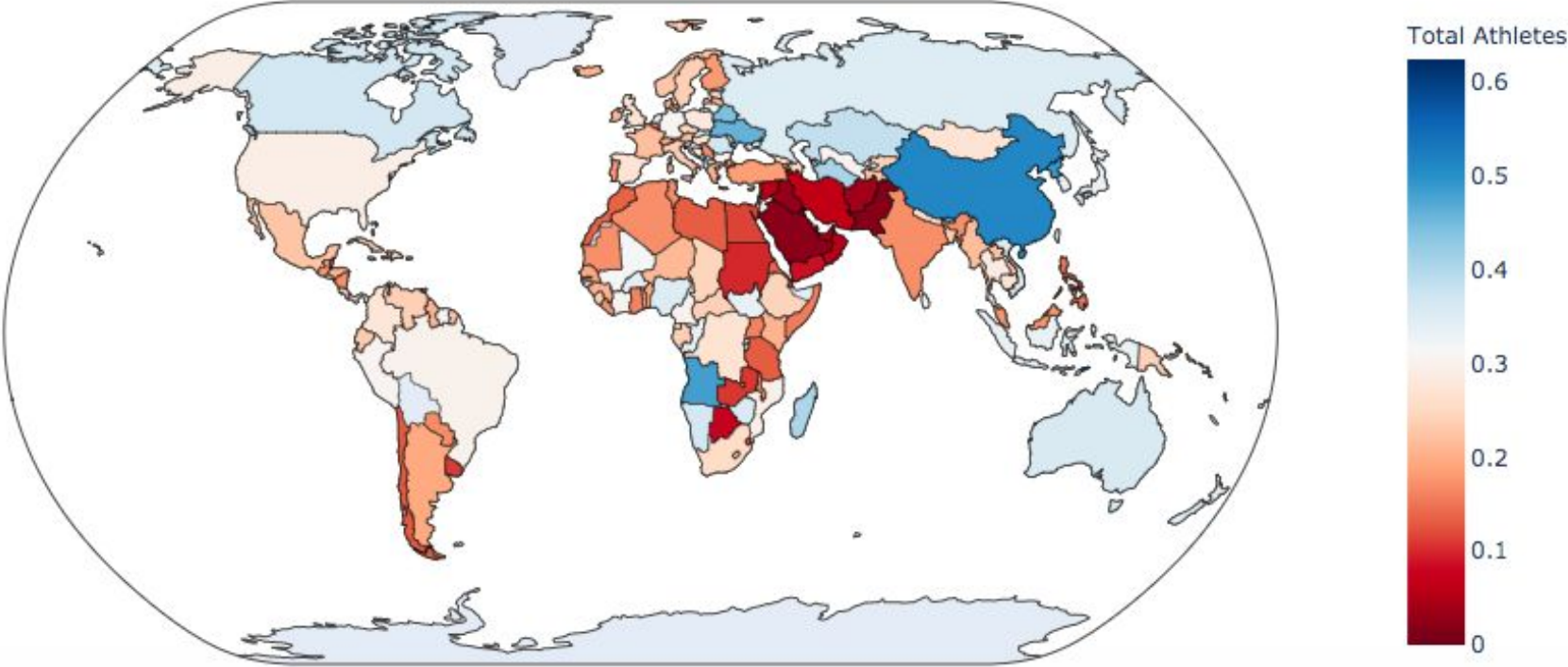
Proportion of Male and Female Athletes Over Time



Distribution of Male and Female Athletes Over Time



Total Proportion Female Athletes by Country Over All Olympic Competitions



Types of Athletes

Oldest Athletes: roque, art competitions (both discontinued)

Youngest Athletes: Rhythmic gymnastics, swimming

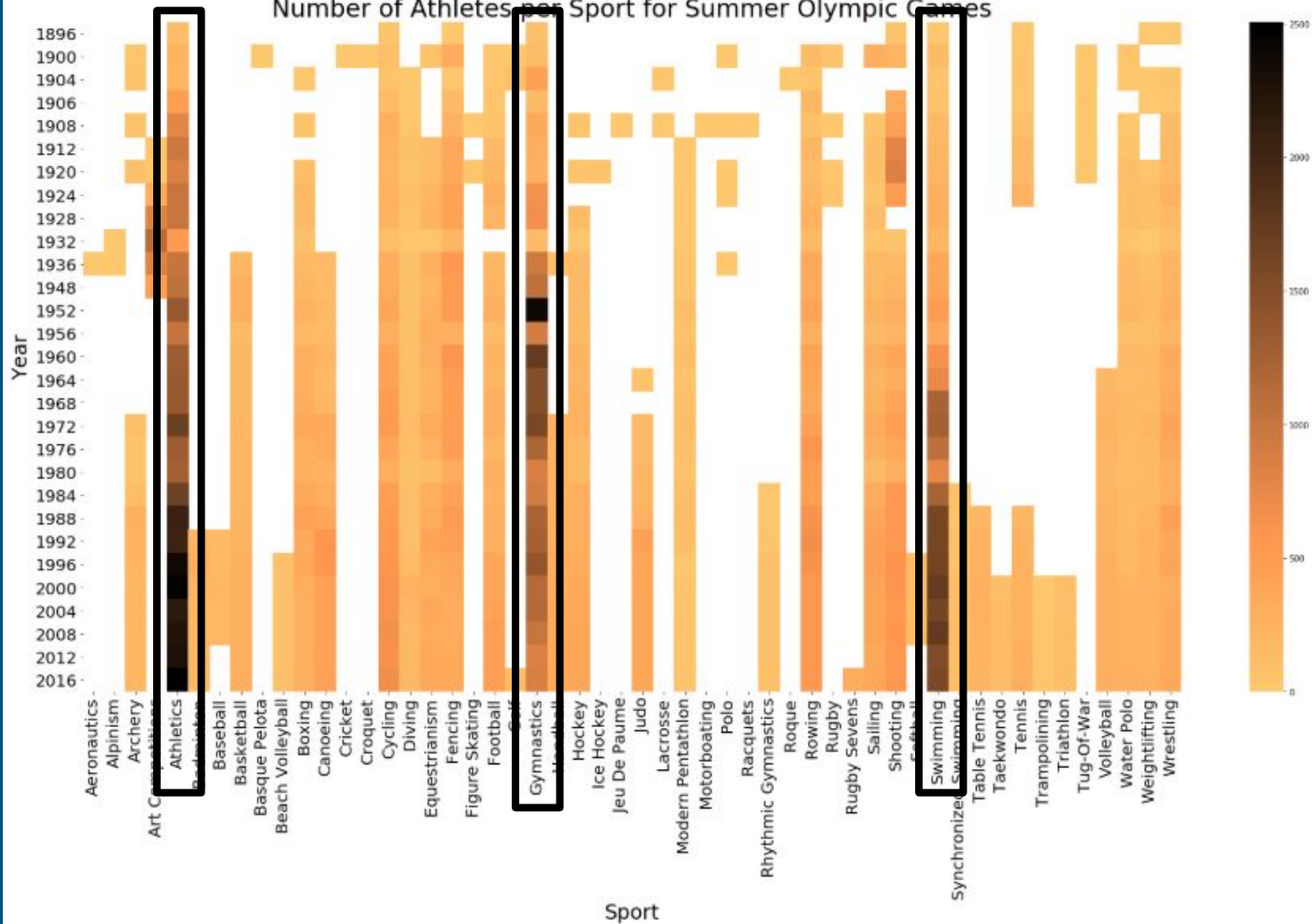
Tallest Athletes: Basketball, volleyball

Shortest Athletes: Trampolining, gymnastics

Heaviest Athletes: Baseball, bobsleigh

Lightest Athletes: Rhythmic gymnastics, synchronized swimming

Number of Athletes per Sport for Summer Olympic Games



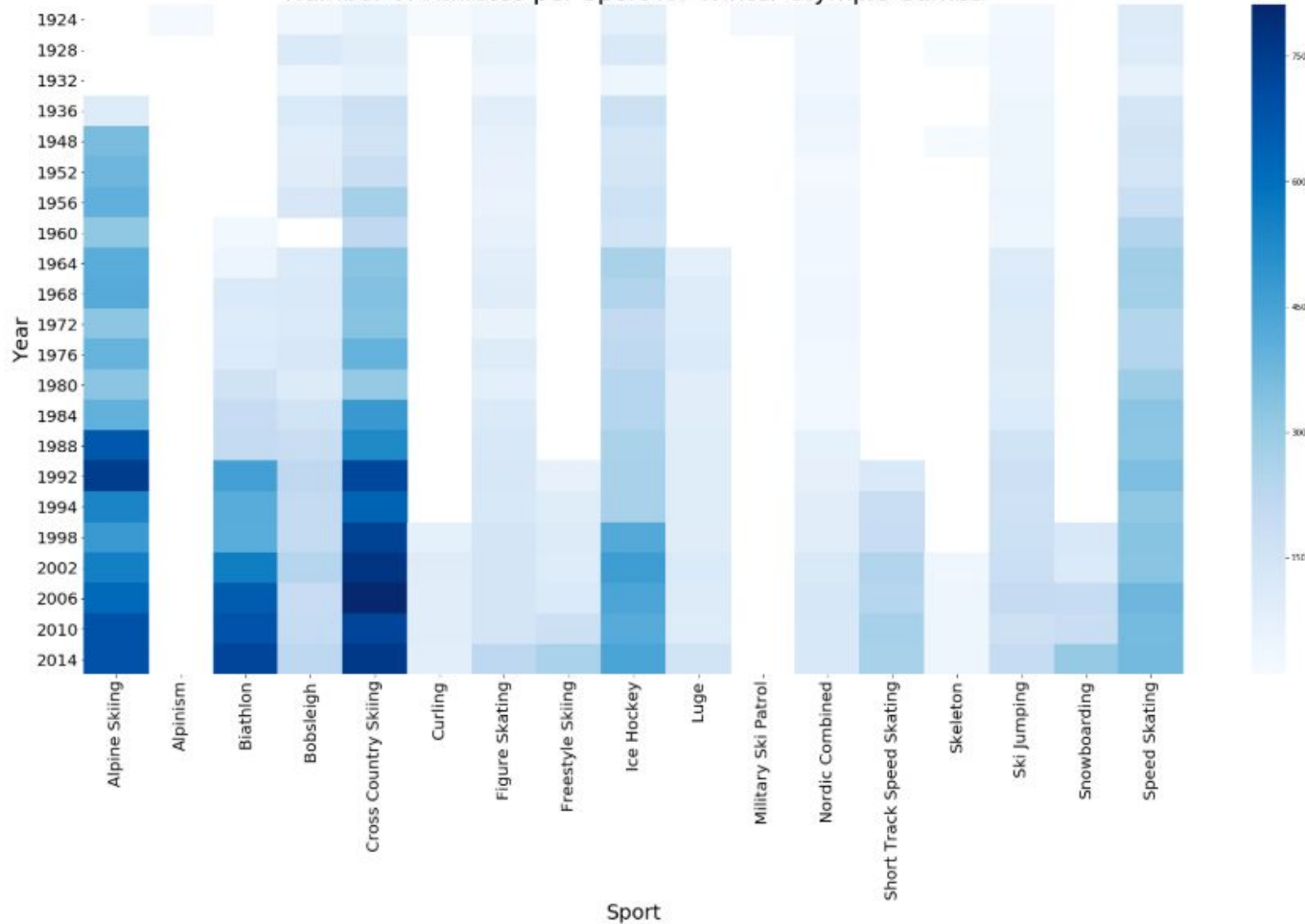
Top Sports:

- Athletics
- Gymnastics
- Swimming

Sports in Every Edition of Games:

- Athletics
- Cycling
- Fencing
- Gymnastics
- Swimming

Number of Athletes per Sport for Winter Olympic Games



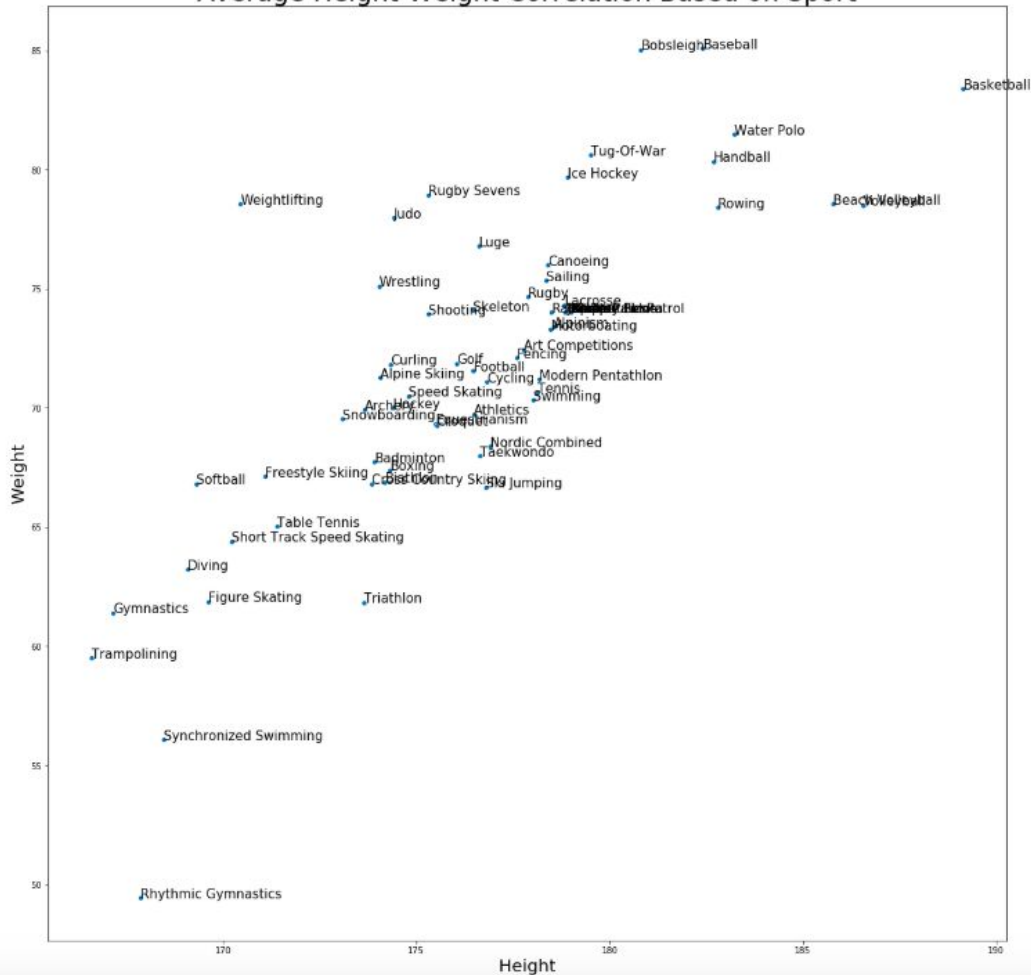
Top Sports:

- Alpine skiing
- Cross country skiing
- Biathlon (ski shooting)

Sports in Every Edition of Games:

- Cross country skiing
- Figure skating
- Ice hockey
- Nordic combined
- Ski jumping
- Speed skating

Average Height-Weight Correlation Based on Sport



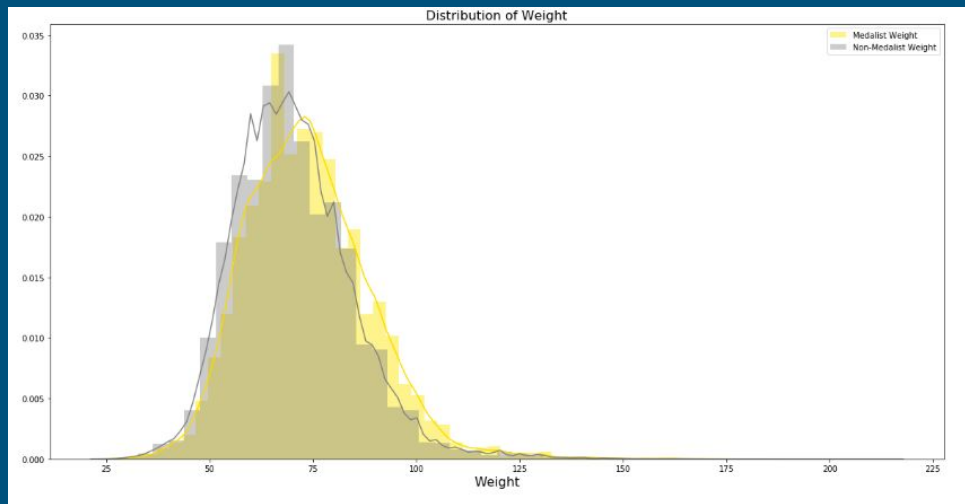
Notable deviations from the general trend:

- Weightlifting
- Rhythmic gymnastics
- Synchronized swimming
- Bobsleigh
- Baseball

Olympic Medalists

Little to no statistically significant difference between medalists and non-medalists with regards to height, weight, and age.

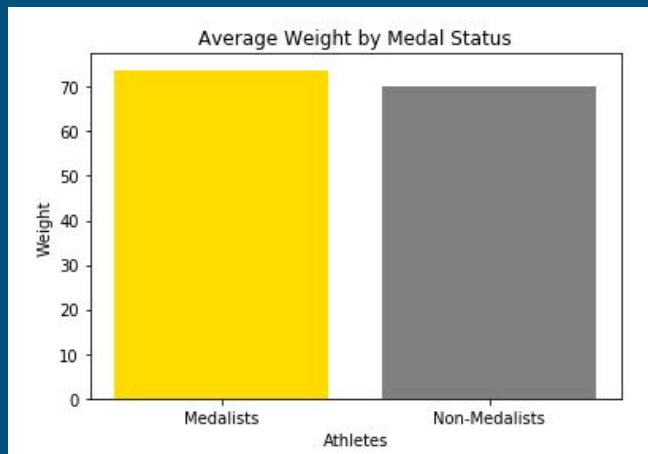
Other factors that need to be explored for more definitive insights.



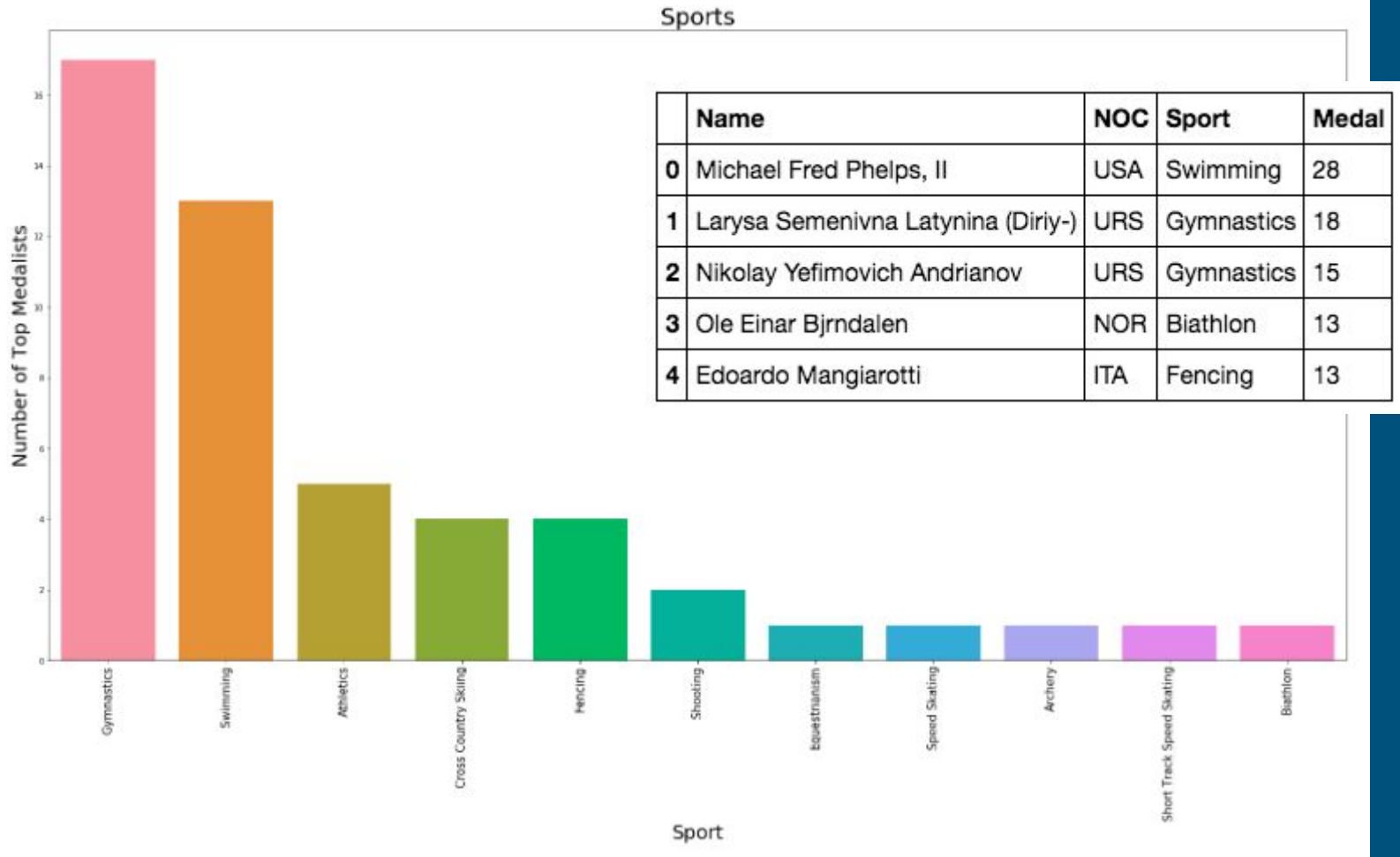
```
Cohen_d(np.array(non  
0.2514687657204241
```

```
Average Medalist Weight 73.77068010682076  
Average Non-Medalist Weight 70.17677063119311  
Difference in Means 3.5939094756276546
```

```
Ttest_indResult(statistic=38.908414694280225, pvalue=0.0)
```



Top Medalists



Exploring Countries

- Olympics cancelled 1940 and 1944 due to World War II
- Political boycotts imposed in:
 - 1976: African nations boycotted Montreal games
 - 1980: USA called for boycott (joined by 29 nations) on the Soviet Union games
 - 1984: The Soviet Union called for boycott (joined by 16 nations) on the Los Angeles games
- Division between success of developed and developing nations

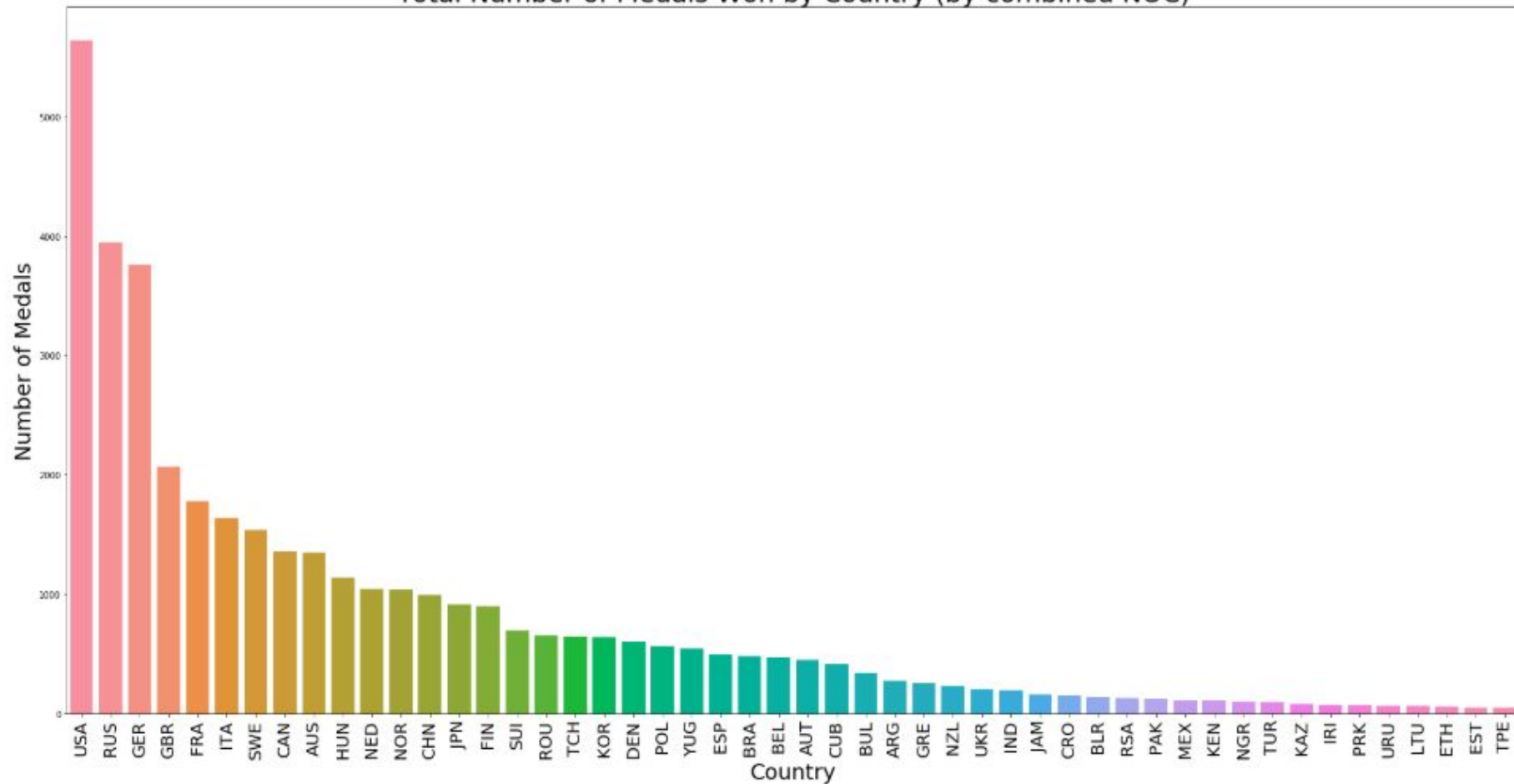
Measuring Country Success?

Plot the number of medals attained over time:

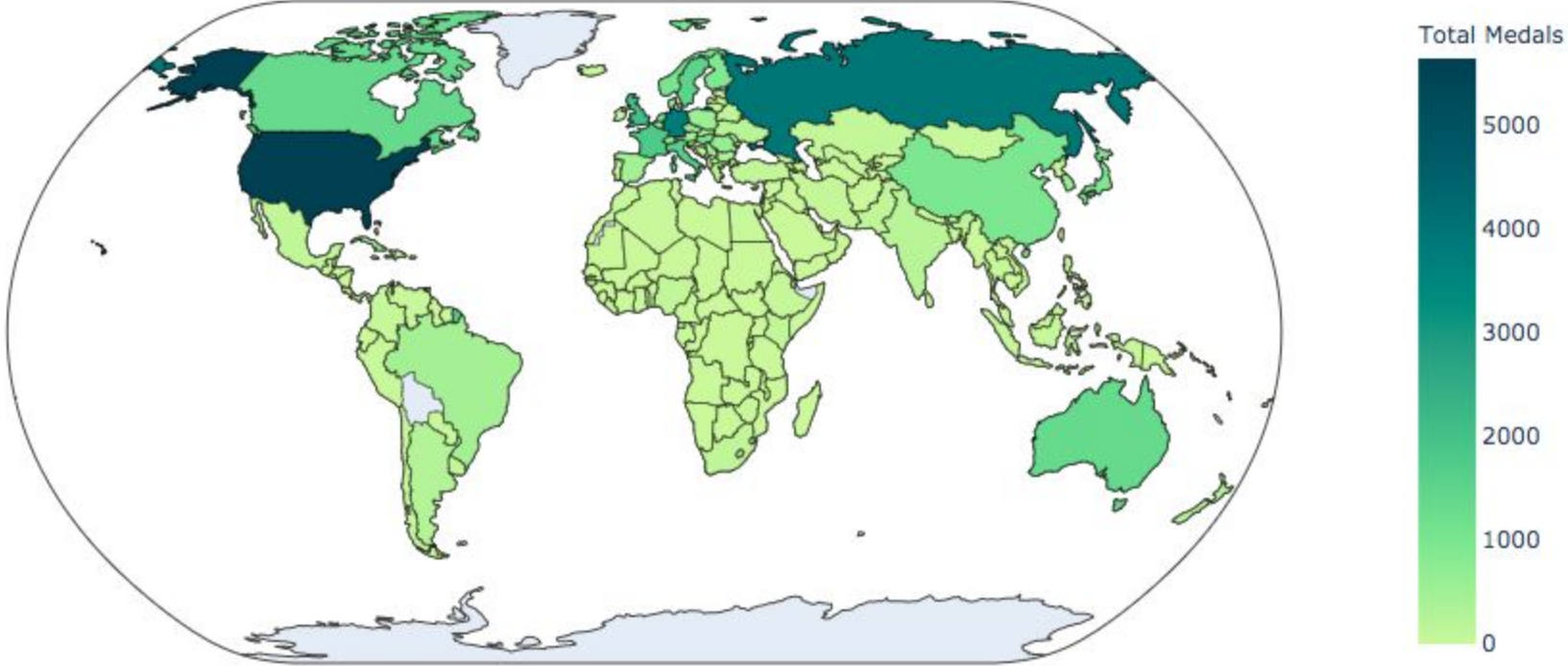
- Account for countries with multiple NOC codes
- Measure total number versus proportion of medals



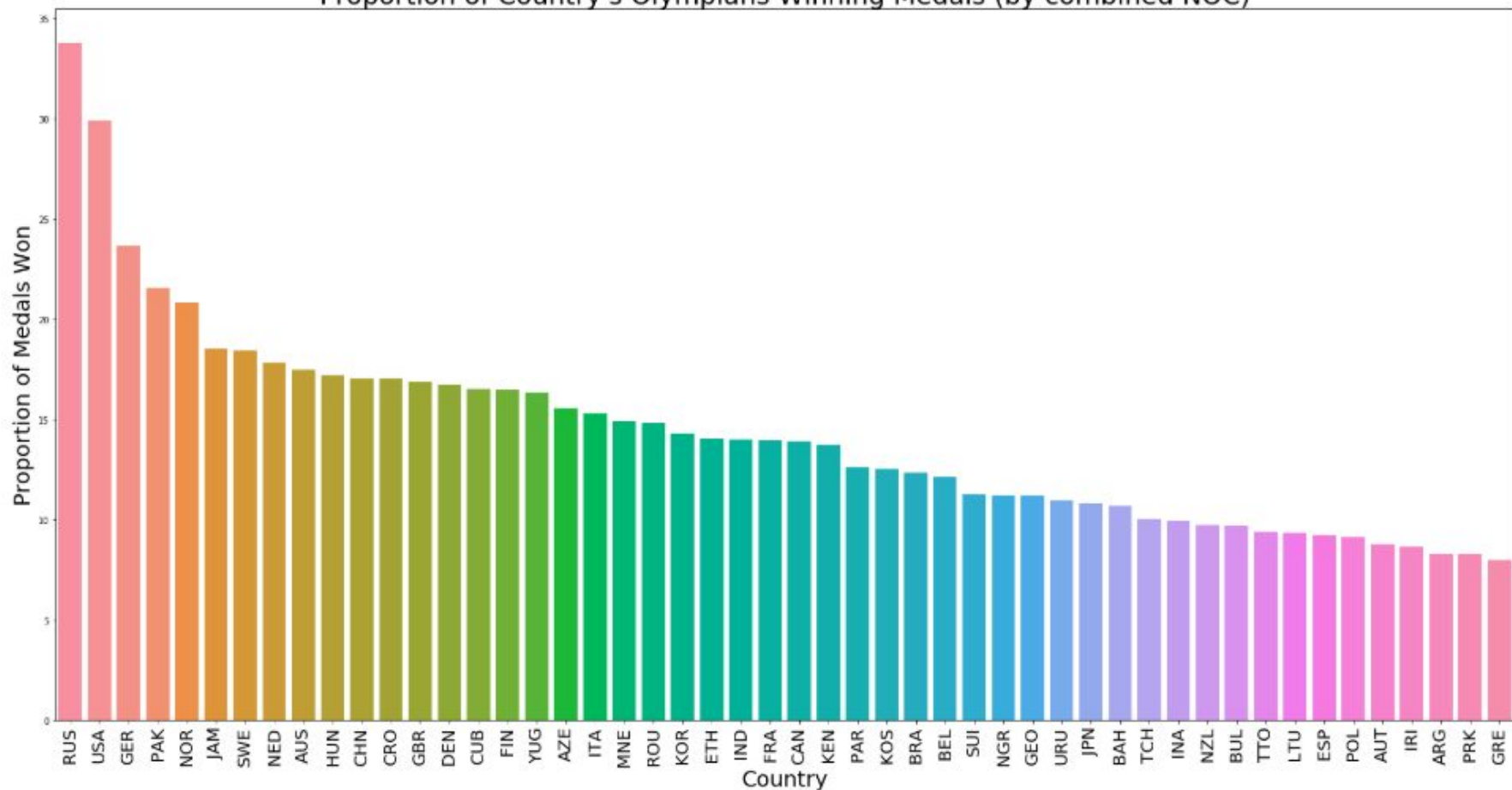
Total Number of Medals Won by Country (by combined NOC)



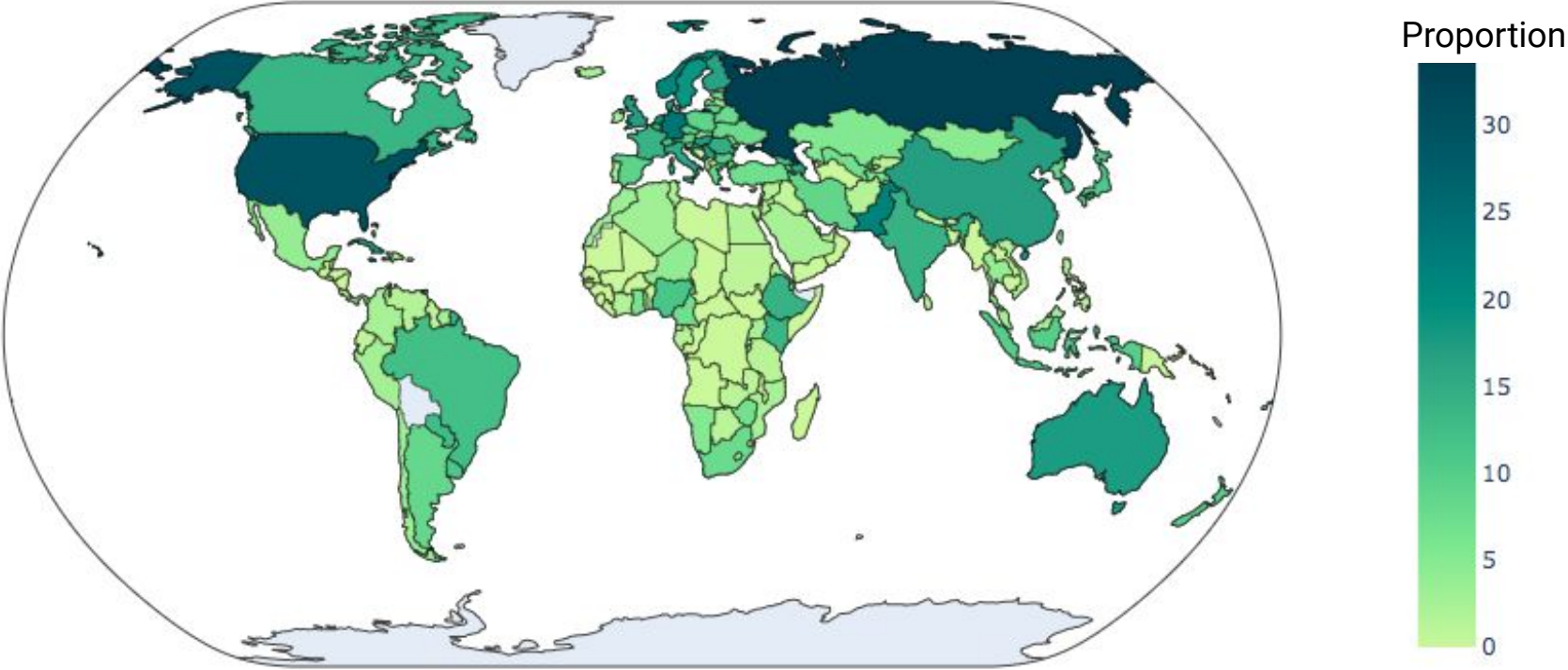
Total Medals Won by Country Over All Olympic Competitions



Proportion of Country's Olympians Winning Medals (by combined NOC)



Proportion of Medals Won by Country Over All Olympic Competitions



Summary

Since the Olympics' origin in 1896...

With over 200,000 total athletes...



- Gender composition is approaching equality!
- Nearly every nation now competes in the summer games
- USA, Germany, and Russia typically dominate the competition
- Clear divide between developed and developing nations

Recommendations

- Enact measures for greater gender equity in athletes from **all** countries
- Restructure competition to increase access for all nations, both developed and developing → increase socioeconomic equity internationally!
- Continue to utilize the games as catalyst for social and political change.



Future Work

1. Train models that can differentiate types of athletes and likelihood of achieving a medal
2. Detect the presence of anomalous performances to catch athletes who use performance-enhancing tactics
3. Further explore the impact of economic status on a country's ability to compete in the Olympic Games
4. Explore differences between medalists and non-medalists of specific sports

