Report Overview

This project focuses on exploring **Lewis Hamilton's** race history in Formula 1 (2007-First quarter of 2024) using Python's data analysis libraries. The goal is to analyze and visualize important metrics such as grid positions, wins per year, cars used, and the countries where Hamilton competed in Formula 1 races. This analysis aims to uncover patterns and insights into Hamilton's performance over the years.

The dataset includes the year, grid position, race result, car model, and Grand Prix locations. Using Python's powerful tools, we visualized trends that shed light on Hamilton's remarkable Formula 1 career.

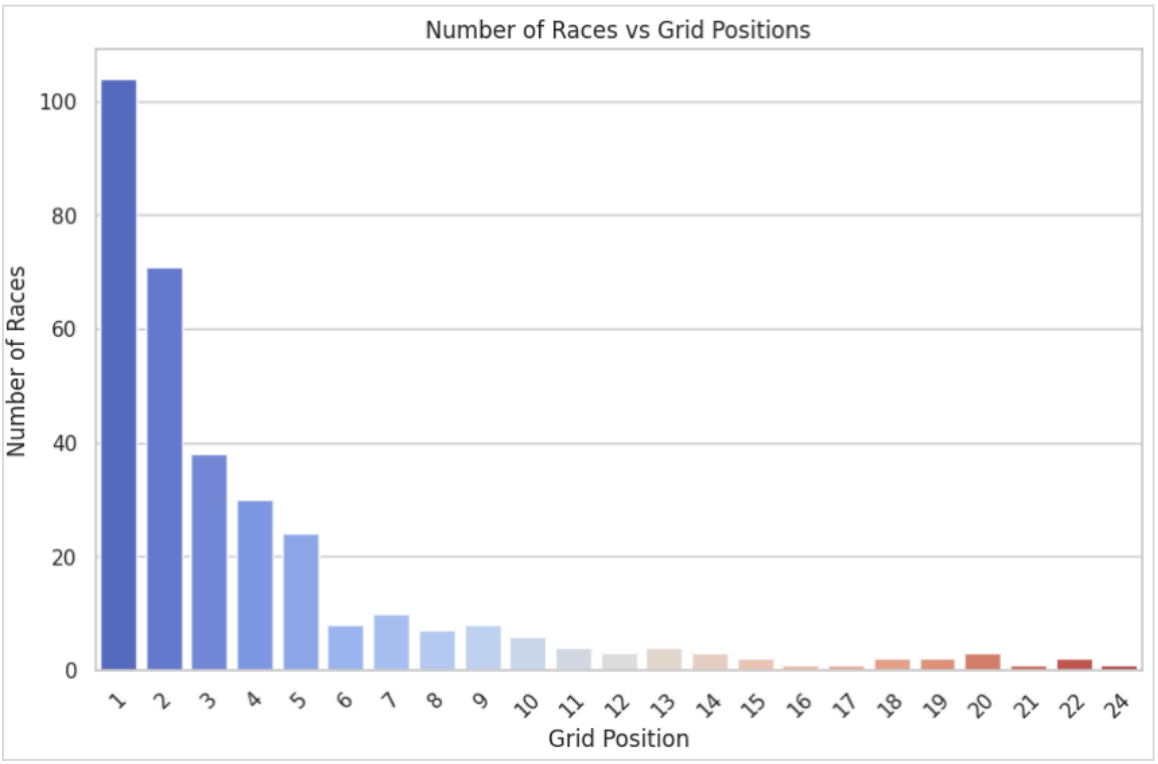
How We Did It

1. Loading and Cleaning the Data

We start by loading the dataset and making sure everything is clean and ready for analysis. For instance, race results were converted to numeric format so it's easy to analyze his finishing positions.

```
import pandas as pd
data = pd.read_csv('lewishamilton.csv')
data['race_position'] = pd.to_numeric(data['race_position'],
errors='coerce')
```

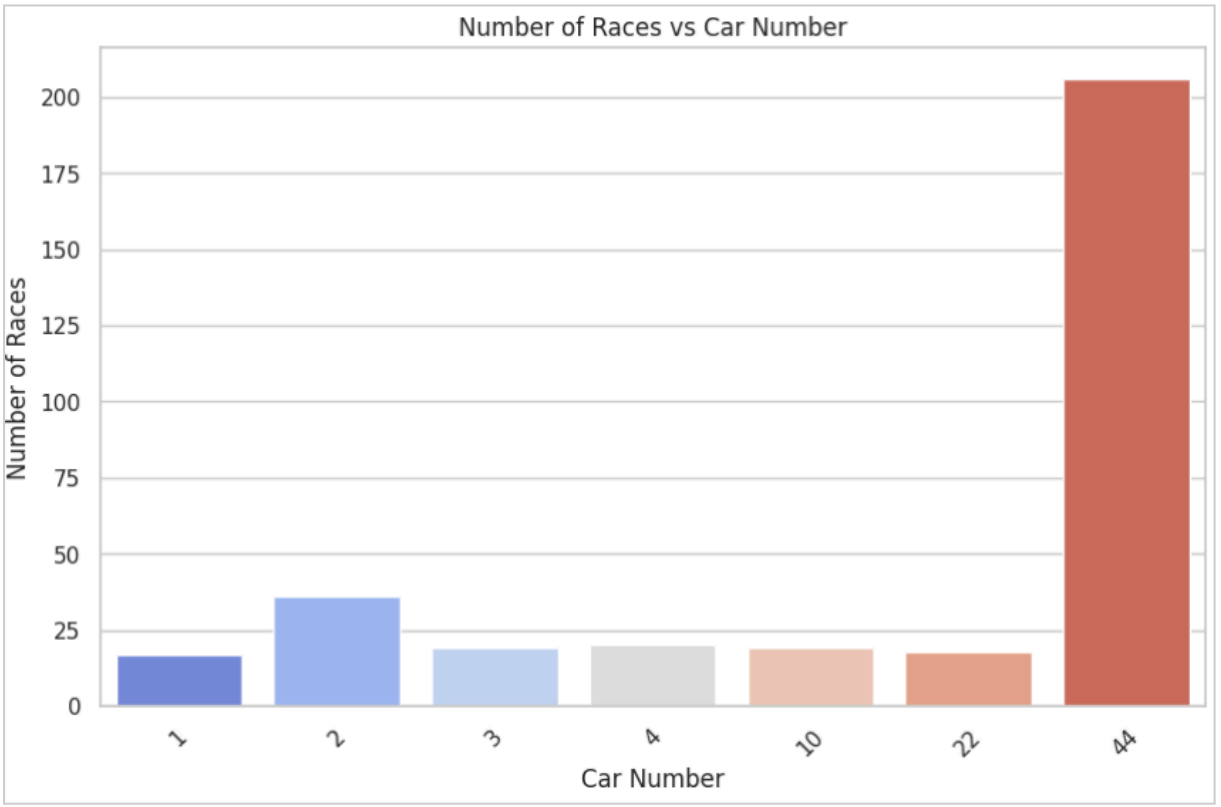
2. Visualizing the Number of Races by Grid Position



This chart shows how many times Hamilton started from various grid positions, helping us analyze his qualifying performance.

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.countplot(x='grid_position', data=data, palette='coolwarm')
plt.title('Number of Races vs Grid Positions')
plt.xlabel('Grid Position')
plt.ylabel('Number of Races')
plt.show()
```

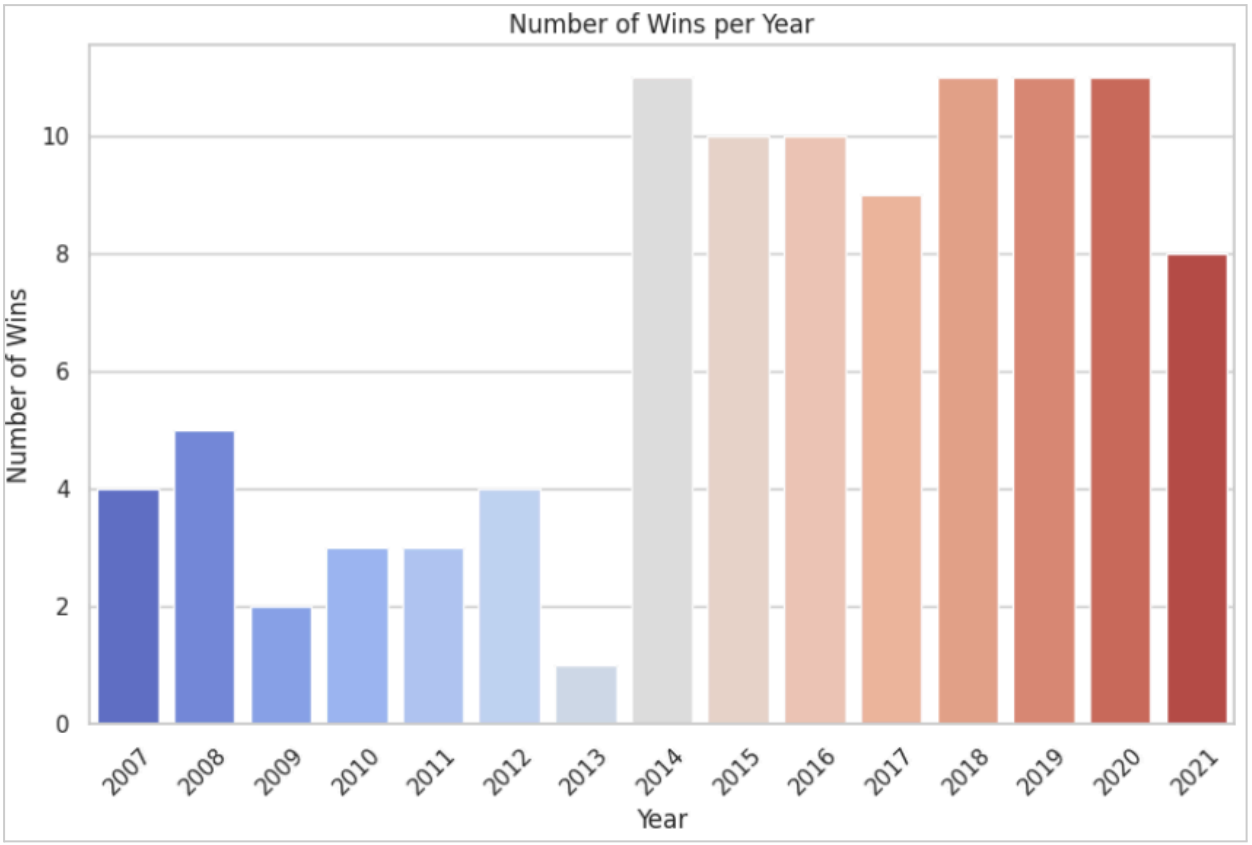
3. Races by Car Number



This chart highlights how many races Hamilton participated in with different car numbers during his career.

```
sns.countplot(x='driver_number', data=data, palette='coolwarm')
plt.title('Number of Races vs Car Number')
plt.xlabel('Car Number')
plt.ylabel('Number of Races')
plt.show()
```

4. Wins by Year



This visualization shows the number of races Hamilton won each year. We track his dominance season by season by focusing on race results, where he finished first.

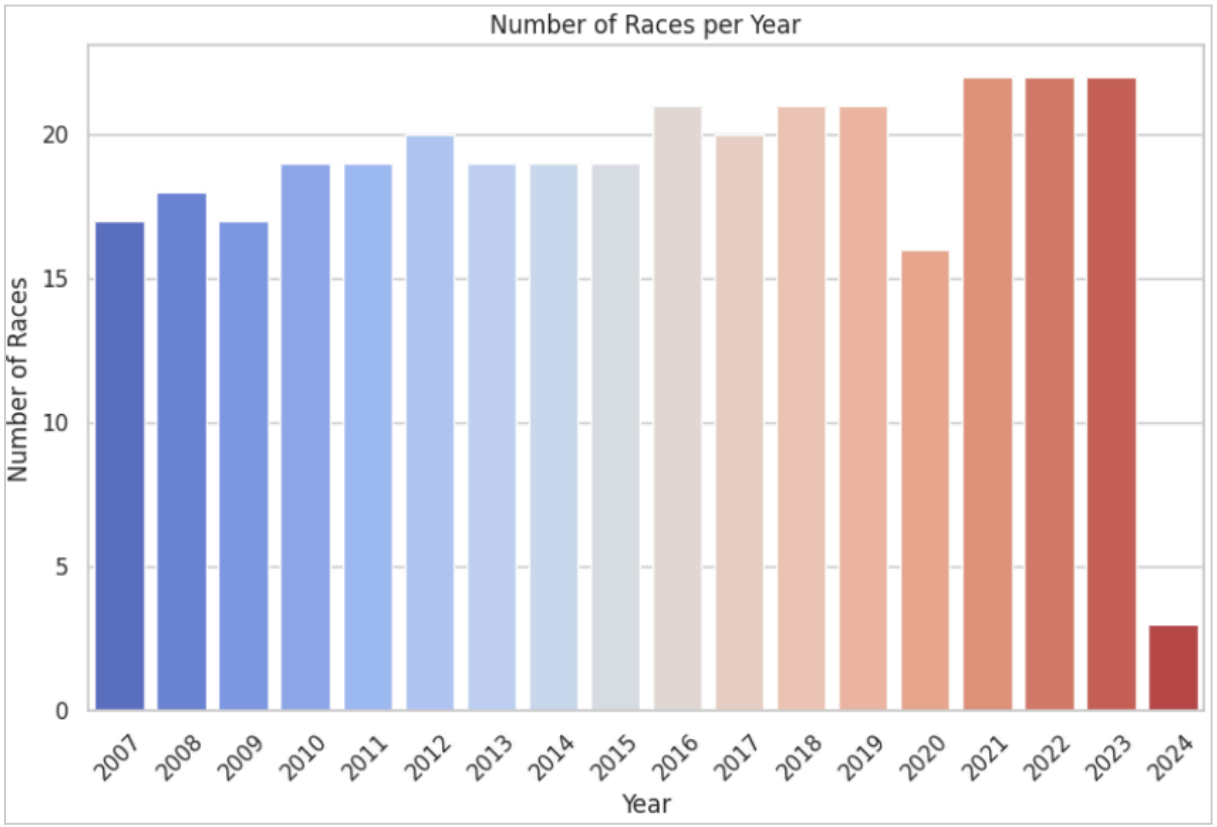
```
wins_per_year = data[data['race_position'] ==
1].groupby('Year').size().reset_index(name='Wins')
sns.barplot(x='Year', y='Wins', data=wins_per_year,
palette='coolwarm')
plt.title('Number of Wins per Year')
plt.xlabel('Year')
plt.ylabel('Number of Wins')
plt.show()
```

5. Races per Year

This chart shows how many races Hamilton participated in each season, giving us a clear idea of his race activity across different years.

```
races_per_year =
data.groupby('Year').size().reset_index(name='Number of Races')
```

```
sns.barplot(x='Year', y='Number of Races', data=races_per_year,
palette='coolwarm')
plt.title('Number of Races per Year')
plt.xlabel('Year')
plt.ylabel('Number of Races')
plt.show()
```

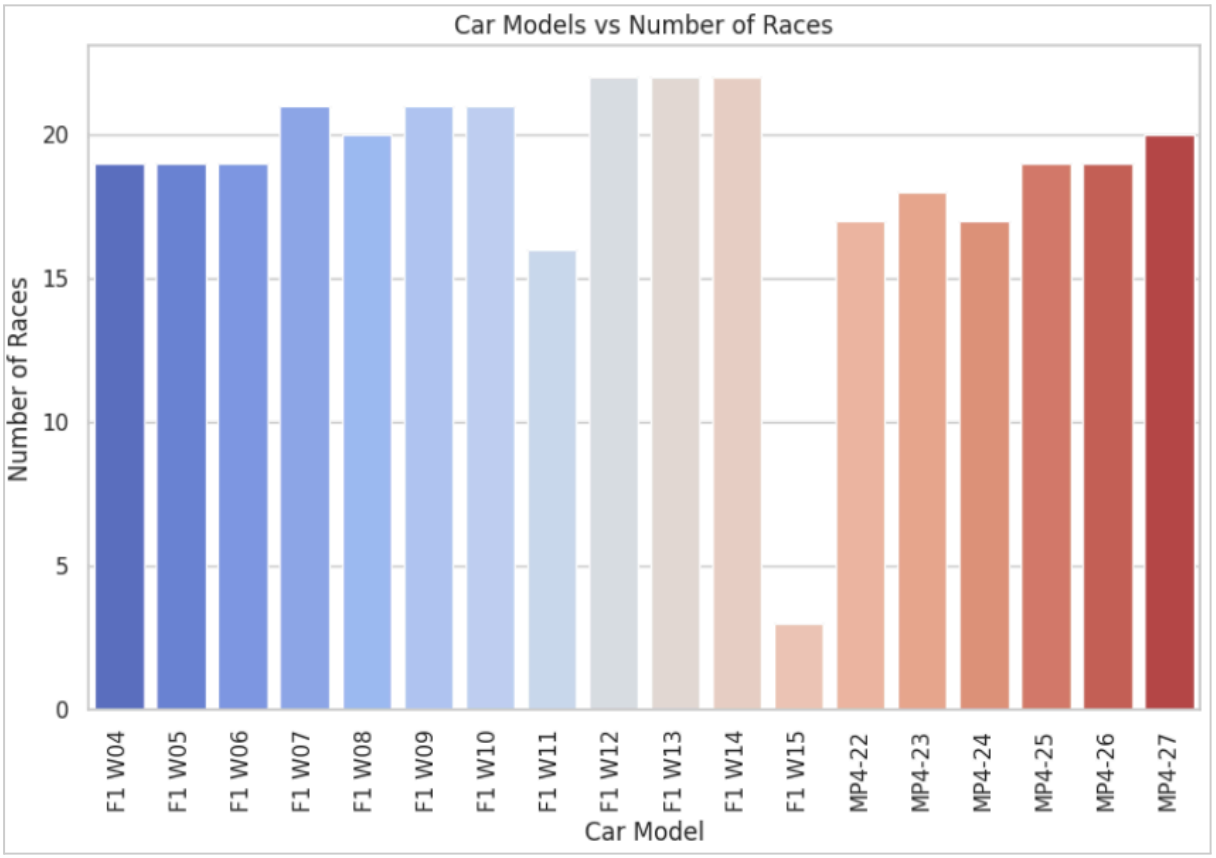


6. Car Models Used

Hamilton drove a range of car models over the years. This analysis reveals how often he raced each model, providing insight into the teams and technology he used throughout his career.

```
car_models = data.groupby('car').size().reset_index(name='Number of
Races')
sns.barplot(x='car', y='Number of Races', data=car_models,
palette='coolwarm')
plt.title('Car Models vs Number of Races')
plt.xlabel('Car Model')
plt.ylabel('Number of Races')
plt.xticks(rotation=90)
```

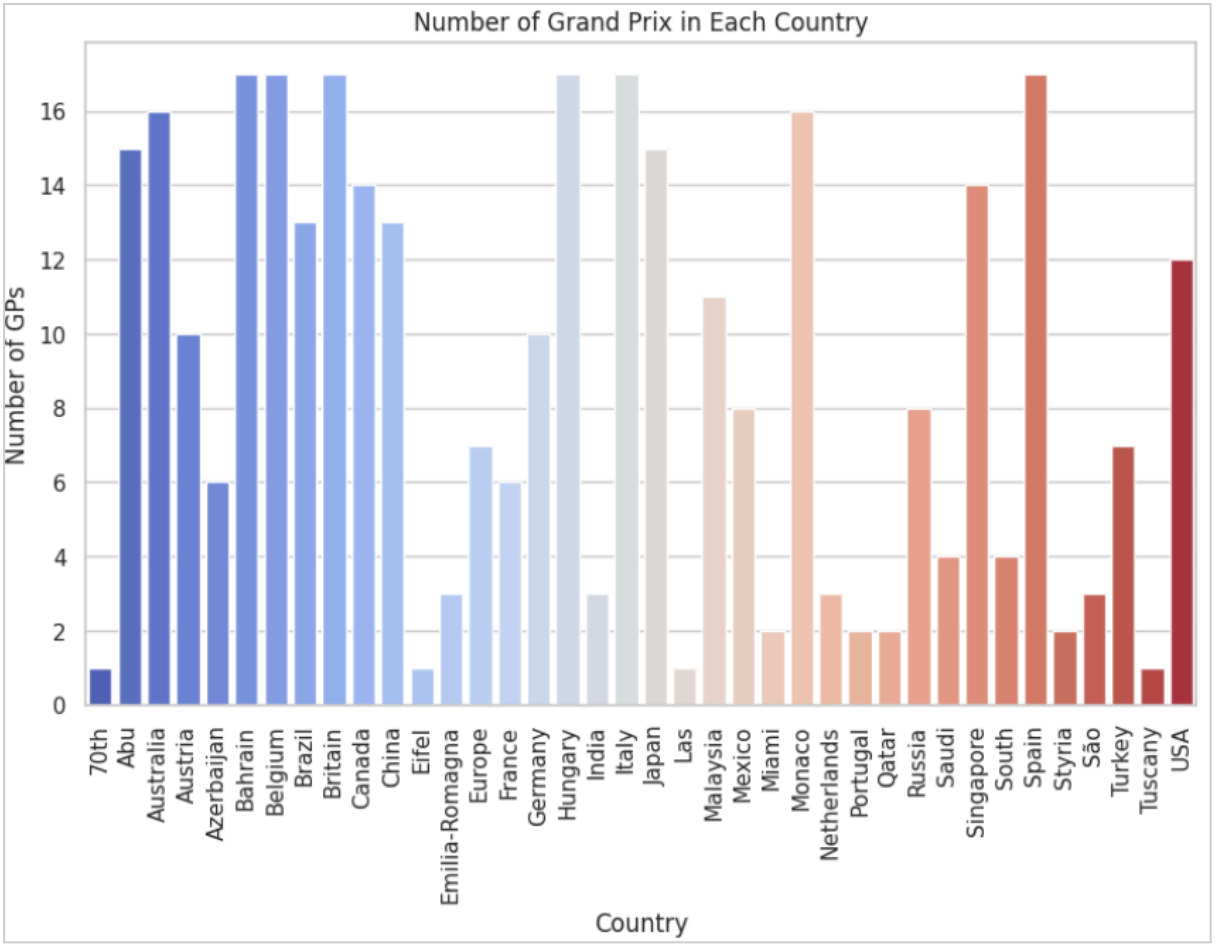
```
plt.show()
```



7. Grand Prix Races by Country

This analysis extracts country names from the Grand Prix names and shows how many races Hamilton participated in across different countries, highlighting where he's raced the most.

```
data['country'] = data['grand_prix'].apply(lambda x: x.split()[0])
races_per_country =
data.groupby('country').size().reset_index(name='Number of GPs')
sns.barplot(x='country', y='Number of GPs', data=races_per_country,
palette='coolwarm')
plt.title('Number of Grand Prix in Each Country')
plt.xlabel('Country')
plt.ylabel('Number of GPs')
plt.xticks(rotation=90)
plt.show()
```



Conclusions and Key Takeaways

This analysis gave us deep insights into Lewis Hamilton's career:

- **Grid Positions**: By visualizing his grid positions, we can understand Hamilton's qualifying performance across various races.
- **Car Numbers and Models**: Insights into the car numbers and models he raced with give us a sense of his consistency and the evolution of his cars.
- **Wins and Races per Year**: Hamilton's winning record is visualized clearly, showing his continued dominance over the years.
- **Countries and Grand Prix Participation**: The global breakdown of where he raced reveals his participation in different countries' Grand Prix.

Technologies Used

- **Python**: The backbone of the analysis.
- **Pandas**: For efficient data manipulation and aggregation.
- **Seaborn/Matplotlib**: Used to create the visualizations, making the data easy to understand.

Resources

Dataset: The dataset used for this analysis is a CSV file [attached in the repo], containing Lewis Hamilton's race data, which includes fields such as year, grid position, race result, car model, and Grand Prix location.