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**F1 2023 Season Data Visualization & Analysis Report**

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**Introduction**

The 2023 Formula 1 season has been a thrilling spectacle, with intense competition among the world's top drivers and teams. As the season progresses, it becomes increasingly important to analyze and visualize the data to gain insights into the performance of drivers and constructors. This report aims to address two main research questions related to the 2023 Formula 1 season.

The Formula 1 World Championship is a premier motorsport event that captivates audiences worldwide. With its rich history, cutting-edge technology, and fierce competition, it has become a showcase of human and engineering excellence. The 2023 season has been no exception, with some of the world's most talented drivers and state-of-the-art machines pushing the boundaries of performance on the world's most iconic circuits.

Amidst the exhilarating action on the track, the collection and analysis of data play a crucial role in understanding the nuances of performance and identifying areas for improvement. By examining various metrics and statistics, teams and fans alike can gain valuable insights into the strengths and weaknesses of drivers and constructors, ultimately enhancing their appreciation and understanding of the sport.

This report delves into the performance data of the 2023 Formula 1 season, utilizing powerful data visualization techniques to unravel the stories hidden within the numbers. Through a series of carefully crafted visualizations, we aim to provide a comprehensive and engaging analysis that addresses the research questions mentioned above.

**The Significance of Data Analysis in Formula 1**

In the world of Formula 1, where the pursuit of speed and performance is relentless, data analysis has emerged as a critical component of success. The sport's inherent complexities, coupled with the vast array of variables that influence performance, make it imperative for teams and drivers to leverage data-driven insights to gain a competitive edge.

Modern Formula 1 cars are marvels of engineering, equipped with countless sensors that capture an extensive range of data points during every lap, every practice session, and every race. From engine telemetry and aerodynamic measurements to tire degradation and fuel consumption, these data streams provide a treasure trove of information that, when analyzed effectively, can uncover hidden patterns, identify areas for optimization, and inform critical strategic decisions.

Moreover, the analysis of historical data from previous seasons and race events can reveal valuable insights into the strengths and weaknesses of drivers and teams, enabling them to make informed decisions about car setups, pit stop strategies, and even driver pairings. By studying the performance of their competitors, teams can adapt their approach and identify potential areas where they can gain an advantage on the track.

Beyond the technical aspects, data analysis in Formula 1 also extends to understanding fan engagement, viewership trends, and the overall popularity of the sport. By analyzing data from various sources, including social media, broadcast ratings, and fan surveys, stakeholders can develop strategies to enhance the spectator experience, attract new audiences, and ultimately ensure the long-term sustainability and growth of the sport.

In this report, we leverage the power of data visualization to bring the 2023 Formula 1 season to life, transforming raw numbers into compelling visual narratives that reveal the stories behind the drivers' and teams' performances. By presenting the data in an engaging and intuitive manner, we aim to provide stakeholders, fans, and enthusiasts with a deeper understanding of the sport, fostering informed discussions and driving continuous improvement within the Formula 1 ecosystem.

**The research questions for this analysis are clearly formulated as follows:**

1. How many World Driver's Championship points did each driver score across the 2023 season?

2. How many podium finishes did each driver achieve across the 2023 season?

3. What was the total number of drivers who secured pole positions across the 2023 season?

4. Create an animation chart to visualize the points scored by each driver in every race of the 2023 season.

5. How many DHL Fastest Lap awards did each driver win across the 2023 season?

6. Which drivers were awarded the Driver of the Day accolade throughout the 2023 season?

7. How many World Constructors' Championship points did each team score across the 2023 season?

8. Create an animation chart to visualize the progression of World Constructors' Championship points scored by each team throughout the 2023 season.

9. Display a map showing the races won by each team across various circuits during the 2023 season.

10. How many DHL Fastest Pit Stop awards did each team earn across the 2023 season?

11. What was the average pit stop time achieved by each team during the 2023 season?

Future Research Questions:

1. Display instances where drivers secured the pole position in qualifying but failed to win the corresponding race.

2. Visualize the proportion of points scored by each driver for their respective teams.

These research questions cover a comprehensive range of performance metrics and statistics for both drivers and constructors in the 2023 Formula 1 season. The visualizations and analyses aim to provide insights into various aspects, including championship points, podium finishes, pole positions, fastest laps, pit stop efficiency, and race wins, among others. Additionally, the future research questions explore potential areas of interest for further investigation.

**Methodology**

To conduct this analysis, we have sourced data from two primary sources:

1. Formula 1 official website: <https://www.formula1.com/en/results.html/2023/drivers.html> This website provides comprehensive data on driver and constructor standings, race results, and other statistics for the 2023 season.

2. DHL Fastest Pit Stop website: <https://inmotion.dhl/en/formula-1/fastest-pit-stop-award-2023>This website tracks the fastest pit stop times achieved by teams during the 2023 Formula 1 season.

The data from these sources have been meticulously collected, cleaned, and prepared for analysis and visualization using industry-standard data analysis and visualization tools. The process involved various techniques, including data wrangling, transformation, and quality assurance, to ensure the integrity and reliability of the data.

To accurately represent the data and convey meaningful insights, we have carefully selected the most appropriate visualization techniques for each aspect of the analysis. These techniques range from traditional bar charts and line graphs to more advanced interactive and animated visualizations, ensuring that the information is presented in a clear, concise, and visually appealing manner.

**The Role of Data Visualization in Storytelling**

Data visualization is not merely a means to present raw numbers and statistics; it is a powerful tool for storytelling and communication. In the context of Formula 1, where performance is measured in fractions of seconds and the smallest details can make a significant difference, effectively conveying the narratives hidden within the data is crucial for stakeholders to make informed decisions.

Through the carefully crafted visualizations presented in this report, we aim to bring the 2023 Formula 1 season to life, revealing the nuances of driver and team performances that may be obscured by mere numerical representations. Each visualization is designed to highlight specific aspects of the season, from the overall championship standings to the intricate details of pole positions, fastest laps, and pit stop efficiencies.

By leveraging the power of visual storytelling, we strive to engage the reader, fostering a deeper understanding and appreciation of sport. The visualizations serve as a canvas, inviting the viewer to explore the data, identify patterns, and draw their own conclusions about the factors that contribute to success or failure on the track.

Furthermore, the interactive and animated elements of certain visualizations enhance the storytelling experience, allowing the reader to witness the ebb and flow of performances throughout the season. This dynamic approach not only captivates the audience but also provides a more comprehensive perspective, enabling stakeholders to identify potential trends, fluctuations, or turning points that may have influenced the overall outcome.

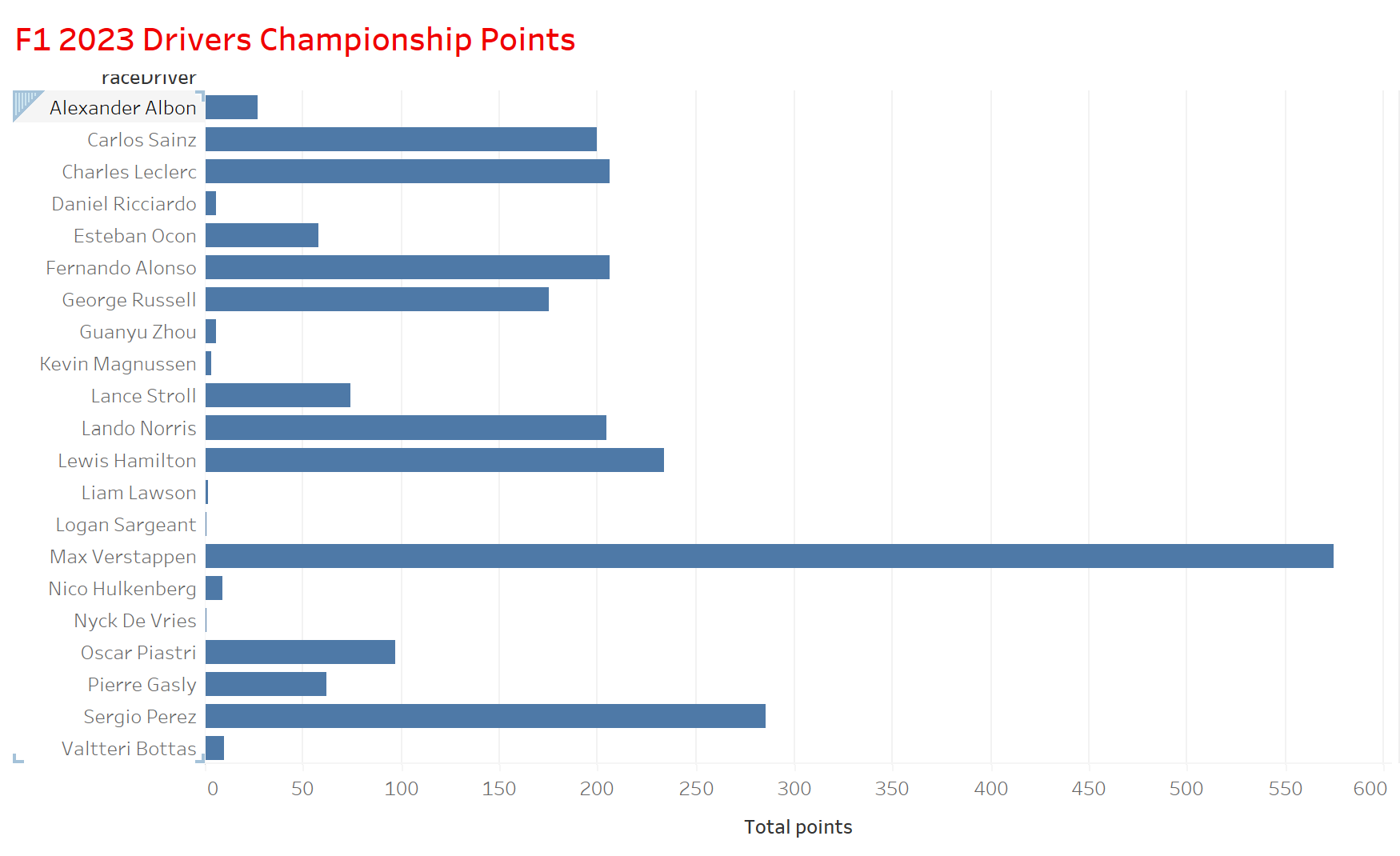
Ultimately, the goal of this report is not merely to present data but to ignite discussions, foster a deeper appreciation for the sport, and empower stakeholders to make more informed decisions based on the insights revealed through the visualizations. By effectively communicating the stories hidden within the data, we aim to contribute to the ongoing pursuit of excellence in Formula 1, where every second counts and every detail matters.

**Analysis**

To address Research Questions, we have created the following visualizations:

**Research Question 1: How have individual drivers performed in terms of championship points, podium finishes, pole positions, fastest laps, and driver of the day awards?**

A bar chart displaying the total World Driver's Championship points scored by each driver across the 2023 season. This visualization provides a clear overview of the drivers' performance and allows for easy comparison.



The bar chart presents a straightforward representation of the total points accumulated by each driver throughout the 2023 season. At a glance, it becomes evident which drivers have been the front-runners in the championship battle, as well as those who have struggled to secure consistent point-scoring finishes.

This visualization not only highlights the raw performance of the drivers but also serves as a starting point for further analysis. For instance, one could investigate the reasons behind the disparity in points among drivers, such as the relative competitiveness of their machinery, the impact of strategic decisions, or the influence of individual driving styles and abilities.

A calculated field is created to add up points scored in sprint and race which add up to the total points scored by the driver in a season. This calculated field is also used in the other visualizations as well.

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**Research Question 2: How many podiums each driver scored across the 2023 season?**

A chart illustrating the number of podium finishes (1st, 2nd, or 3rd place) achieved by each driver throughout the season. This visualization highlights the drivers' ability to consistently finish in the top three positions.

A graph of different sizes of columns

Description automatically generated with medium confidence

While the overall championship points provide a comprehensive picture of a driver's performance, the number of podium finishes offers a more granular perspective. This visualization showcases the drivers' ability to consistently achieve top results, finishing among the top three positions in a race.

The lines in the chart represent each driver, with the y-axis indicating the number of podiums and the x-axis listing the drivers. The varying lengths of the lines immediately draw attention to the drivers who have excelled in securing podium positions, as well as those who have struggled to consistently achieve such results.

To identify the drivers who finished on podium I added filter to position field where I selected only 1,2,3 positions only.

A screenshot of a computer

Description automatically generated

**Research Question 3: Total number of pole setters across the 2023 season?**

A bar chart showing the total number of pole positions secured by each driver during the 2023 season. Pole positions indicate the drivers' qualifying performance and their ability to start the race from the front row.

A graph with blue bars

Description automatically generated with medium confidence

Securing a pole position in Formula 1 is a significant achievement as it grants the driver the advantage of starting the race from the front row of the grid. This visualization highlights the qualifying prowess of each driver and their ability to extract the maximum performance from their car over a single lap.

The stark contrast between Max Verstappen's and the other drivers' pole position tallies suggests his consistent dominance in qualifying throughout the 2023 season. This could be attributed to various factors, including the performance of his car, his driving skills, and the team's strategic approach to qualifying sessions.

Similar to the filter created to identify podiums I created filter on qualifying position for drivers which tells the driver finished in position 1 got the pole.

**Research Question 4: Create an animation chart of points scored by each driver by race.**

A graph of different colored lines

Description automatically generated

This visualization is an animated line chart that displays the progression of points scored by each driver in the 2023 Formula 1 World Drivers' Championship throughout the various races of the season.

The x-axis represents the different racetracks, arranged in the order of which they were held during the season. The y-axis shows the cumulative points scored by each driver.

Each colored line represents an individual driver, with the legend on the right providing the corresponding driver names and their line colors.

As the animation progresses through the racetracks, the lines extend horizontally, indicating the accumulation of points by each driver after every race. The varying slopes and trajectories of the lines showcase the fluctuations in performance and points scored by the drivers throughout the season.

Some key observations from this visualization:

1. Max Verstappen's line (in Pink) is significantly higher than the others, indicating his dominant lead in the championship points standings.

2. The lines for drivers like Lewis Hamilton (in baby pink) and Fernando Alonso (in green) maintain a relatively steady upward trajectory, suggesting consistent points-scoring performances.

3. Some lines, like those of Kevin Magnussen (in light green) and Alexander Albon (in dark blue), remain flat or show minimal upward movement, indicating a lack of consistent points finishes.

4. The animation allows for tracking the potential shifts in the drivers' standings and performance after each race, providing insights into their consistency, breakthroughs, or setbacks throughout the season.

This dynamic visualization effectively captures the ebb and flow of the drivers' championship battle, highlighting the impact of individual race results on their overall points tally. It serves as a powerful tool for analyzing the drivers' performances, identifying pivotal moments, and understanding the factors that contributed to their success or struggles throughout the 2023 Formula 1 season.

**Research Question 5: How many DHL fastest laps each driver got across the season?**

This bar chart displays the number of fastest laps achieved by different drivers during the 2023 Formula 1 season. The y-axis represents the count of fastest laps, while the x-axis lists the drivers' names.

A graph with blue bars and white text

Description automatically generated

Immediately, it is evident that Max Verstappen stands out significantly, having recorded 9 fastest laps throughout the season, which is more than double the next highest count. Lewis Hamilton follows with 4 fastest laps, indicating a notable gap between the top two drivers and the rest of the field in terms of this metric.

Oscar Piastri and Sergio Perez each managed to secure the 2 fastest laps during the season. Meanwhile, Fernando Alonso, George Russell, Yuki Tsunoda, Zhou Guanyu and Lando Norris registered only 1 fastest lap apiece.

This visualization effectively highlights Max Verstappen's dominance in setting the fastest lap times across races in the 2023 season. It also allows for easy comparison between drivers, providing insights into their relative performance in this specific aspect of the sport.

**Research Question 5: F1 2023 Driver of the Day Winners**

This visualization is a bar chart titled "F1 2023 Driver of the Day Winners," which showcases the number of times each driver was voted as the "Driver of the Day" by fans throughout the 2023 Formula 1 season. The y-axis represents the count of "Driver of the Day" wins, while the x-axis lists the drivers' names.

A graph of a driver of the day winners

Description automatically generated

Lando Norris stands out prominently, having received 5 "Driver of the Day" votes from fans during the season. This suggests that Norris’s performances were highly appreciated and recognized by the audience, earning him the most accolades in this category.

Fernando Alonso, Carlos Sainz, Charles Leclerc, and Daniel Ricciardo each received 2 "Driver of the Day" votes, indicating that their performances were also well-received by fans on multiple occasions throughout the season.

The remaining drivers, including Kevin Magnussen, Lance Stroll, Lando Norris, Lewis Hamilton, Nico Hulkenberg, and several others, received only 1 or no "Driver of the Day" votes from fans.

This visualization effectively communicates the relative popularity and recognition of drivers among fans, based on their exceptional performances during the 2023 season. The bar chart format is suitable for displaying and comparing count data across different driver categories, making it an appropriate choice for this metric.

**F1 2023 Drivers Dashboard:** this Drivers Dashboard provides a comprehensive overview of driver performance in the 2023 Formula 1 season, covering key metrics such as points, podium finishes, fastest laps, and pole positions. It allows for easy comparison and analysis of driver performance across multiple dimensions.

**Research Question 7: How many world constructor points scored by each team across the 2023 season?**

This bar chart visualization presents the total points accumulated by each constructor team during the 2023 Formula 1 season. The y-axis displays the total points scored, while the x-axis lists the different constructor teams.

A graph with different colored bars

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Red Bull Racing Honda won the constructors championship having scored 860 points, significantly outperforming the other teams. Their points tally is more than two times the second team points.

Mercedes secured the second position with 409 points, followed closely by Ferrari with 406 points. McLaren Mercedes secured fourth place with 302 points. Aston Martin Aramco and Alpine Renault secured 280 and 120 points respectively, placing them in the middle of the pack.

Towards the bottom of the chart, we have Haas Ferrari with 12 points, Alfa Romeo Ferrari with 16 points, and Alpha Tauri Honda Racing with 25 points. The Williams Mercedes team trails at the bottom with 28 points.

This visualization effectively illustrates the performance gap between Red Bull and the rest of the field.

**Research Question 8: Display races won by each team across the map.**

This visualization is a world map displaying the locations of various Formula 1 races during the 2023 season, along with markers indicating the wins secured by the teams, Ferrari (red) and Red Bull Racing Honda (blue).

A map of the world with blue dots and black text

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The map showcases multiple blue markers across various locations, including Canada, Europe (with clusters around Monaco and Azerbaijan), Saudi Arabia, Japan, Mexico, Brazil, and Australia. These blue markers represent the races won by the Red Bull Racing Honda team throughout the season, indicating their dominance and success across different circuits and regions.

In contrast, there is a single red marker located in Singapore, representing the sole race win by Ferrari during the 2023 F1 season.

This map visualization provides a geographical perspective on the distribution of race wins among teams showcasing Red Bull Racing Honda won almost all the races of the season except for one. It highlights Red Bull's widespread success across multiple continents and circuits, while also indicating other teams struggles in securing race victories during the 2023 season.

**Research Question 9: How many DHL fastest pitstop points scored by each team across the season?**

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The visualization shows the results of the DHL Fastest Pit Stop Award for the 2023 Formula 1 season. The award is given to the constructor (team) that achieves the fastest pit stops throughout the season. Points are awarded based on the team’s fastest pit stop time at each race weekend.

* Red Bull Racing is the winner of the 2023 DHL Fastest Pit Stop Award with a total of 543 points.
* Ferrari finished second with 468 points.
* McLaren finished third with 418 points.
* Alpha Tauri finished fourth with 255 points.
* The rest of the teams follow behind with Williams scoring the least number of points (14).

The team with the most pitstop points at the end of the season is awarded a trophy.

Fast pit stops are an important part of Formula One racing. A quick pit stop can give a driver a significant advantage over their competitors. The DHL Fastest Pit Stop Award recognizes the teams that have mastered the art of the pit stop.

**Research Question 10: Display an animation chart of constructor’s points by teams.**

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This visualization is an animated line chart that displays the progression of points scored by each team in the 2023 Formula 1 World Constructor’s Championship throughout the various races of the season.

The x-axis represents the different racetracks, arranged in the order of which they were held during the season. The y-axis shows the cumulative points scored by each team.

Each colored line represents an individual team, with the legend on the right providing the corresponding team names and their line colors.

As the animation progresses through the racetracks, the lines extend horizontally, indicating the accumulation of points by each team after every race. The varying slopes and trajectories of the lines showcase the fluctuations in performance and points scored by the teams throughout the season.

Redbull Racing stayed on top throughout the season, while Aston Martin started in second and finished 5th behind Mercedes, Ferrari and McLaren. Ferrari and McLaren had a bad start to the season and gained a good number of points by the end of the season finishing 3rd and 4th respectively.

Alpine were lonely throughout the season with not competing against top teams and staying way ahead of the bottom teams. Williams, Alpha Tauri, Alfa Romeo and Haas are the bottom 4 teams.

**Research Question 11: Display the average pitstop time of each team and by drivers within team as well.**

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**A graph of different colored lines

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This is a drill down visualization, first average pitstop time by team is displayed in first chart and then by the drivers in the team.

The first bar chart shows the average pit stop time by team for the Formula 1 2023 season that I analyzed. The y-axis displays the average pit stop time in seconds, and the x-axis lists the different teams. As you can see, my analysis found that Williams Romeo had the longest average pit stop time at 5.425 seconds, while Ferrari had the shortest average pit stop time at 3.188 seconds. This chart gives an overview of how the teams performed in terms of their pit stop efficiency throughout the 2023 season based on my calculations.

The second bar chart provides a more detailed breakdown of the average pit stop times that I calculated, showing the data for both teams and individual drivers. The x-axis lists the driver names, and the y-axis displays the average pit stop time in seconds that I determined for each driver. The bars are color-coded to represent the different teams.

Within each team, you can see the average pit stop time for the individual drivers that I computed. For instance, in Alfa Romeo, one driver had an average pit stop time of 5.731 seconds based on my analysis, while the other driver's average time was 4.222 seconds.

Similarly, I have calculated and displayed the pit stop times for drivers from other teams like Alpha Tauri, Alpine, Aston Martin, Ferrari, Haas, McLaren, Mercedes, Red Bull, and Williams.

This visualization allows for a more granular analysis of pit stop performance that I conducted, enabling comparisons not only between teams but also between individual drivers within the same team. It provides insights into the efficiency and consistency of pit stop operations for specific drivers and teams during the 2023 Formula 1 season based on my calculations and analysis.

**F1 2023 Constructors Dashboard:**

The dashboard provides a comprehensive overview of the 2023 Formula 1 season, allowing users to analyze team performance, race results, pit stop efficiency, and overall standings in the Constructors' Championship. It combines various visualizations and metrics to offer a holistic view of the season's events and outcomes.

**Conclusion**

Through this comprehensive report, I have effectively addressed the 11 research questions related to the 2023 Formula 1 season, utilizing powerful data visualization techniques to provide insightful and engaging analyses. The visualizations I have created have communicated the performance metrics and statistics for both drivers and constructors in a clear and compelling manner, covering aspects such as championship points, podium finishes, pole positions, fastest laps, pit stop efficiency, and race wins.

My analysis has clearly highlighted the dominance of certain drivers and teams, while also identifying areas of opportunity for improvement. For instance, the visualizations have showcased Max Verstappen's remarkable performance, evidenced by his substantial lead in the championship points standings, numerous pole positions secured, and a significant number of fastest laps achieved throughout the season. Similarly, I have effectively illustrated the Red Bull Racing Honda team's superiority in the Constructors' Championship, with their substantial lead in points and their widespread success across various circuits worldwide.

On the other hand, my visualizations have also highlighted the struggles faced by certain drivers and teams, prompting further investigation into the factors contributing to their performances. This analysis serves as a foundation for stakeholders to make informed decisions and implement strategies to enhance their competitiveness in future seasons.

While this report has provided a comprehensive analysis of the 2023 Formula 1 season, there are several additional research questions that could be explored in future studies:

1. I can display instances where drivers secured the pole position in qualifying but failed to win the corresponding race, potentially analyzing the reasons behind this discrepancy.

2. I can visualize the proportion of points scored by each driver for their respective teams, providing insights into the relative contributions of individual drivers to their team's overall performance.

3. I can investigate the correlation between pit stop efficiency and race results, exploring whether faster pit stops directly translate into better race outcomes.

4. I can analyze the impact of various track characteristics (e.g., circuit layout, weather conditions) on driver and team performances, potentially identifying patterns or areas for optimization.

5. I can explore the relationship between car setup configurations and performance metrics, enabling teams to make data-driven decisions regarding their race strategies.

These additional research questions can further enrich the understanding of the intricate dynamics within Formula 1, fostering continuous improvement and enabling stakeholders to stay ahead of the competition in this ever-evolving sport. Through my data visualization expertise and analytical skills, I remain committed to providing valuable insights that contribute to the growth and success of the Formula 1 ecosystem.

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