Lewis Hamilton: The Greatest Formula 1 Driver

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Introduction & Thesis

Formula One (F1) Racing is a single-seat, open-wheel, open-cockpit, international motor racing contest. The objective of the race is to determine a winner based on a driver completing a predetermined number of laps. From these races, Constructors acquire metrics like speed, aerodynamics, pit time, tire exhaustion, and use these data points to make real technical changes that enhance the engineering of F1 Race cars year after year. F1 Racing is a sport of data, that leads us to ask the question, is it the car or the driver that makes the sport? Utilizing this data set from Kaggle, which observes F1 Racing from 1950 to 2020, we will demonstrate that the driver, moreover, that a driver, makes the sport of F1 Racing.

Before cleaning the data set, we had to first observe it and ask ourselves how can we use this data to come to our conclusion? How could we observe the change in cars over a driver's career? Were there any drivers and/or constructors that were more successful than others? And finally, what metrics define the best drivers?

From these beginning questions and observations, it became clear that Lewis Hamilton, a British F1 Driver, accounted for most of the wins and points. From our research, we determined that he holds 6 outright F1 Racing records and is tied in F1 World Championships, although he has driven for two major car constructors, McLaren and Mercedes. Following his career switch from McLaren 2007-2013 to Mercedes (2013-Present), we will observe Hamilton's success and demonstrate why he is the greatest F1 Driver.

The Data

The dataset from Kaggle consisted of information pertaining to Formula 1 Racing from 1950 to the end of the 2020 season. The data included csv. 's of race information, driver demographics, Constructor demographics, qualifying times, circuits, lap times, pit times, points, wins, and championships.

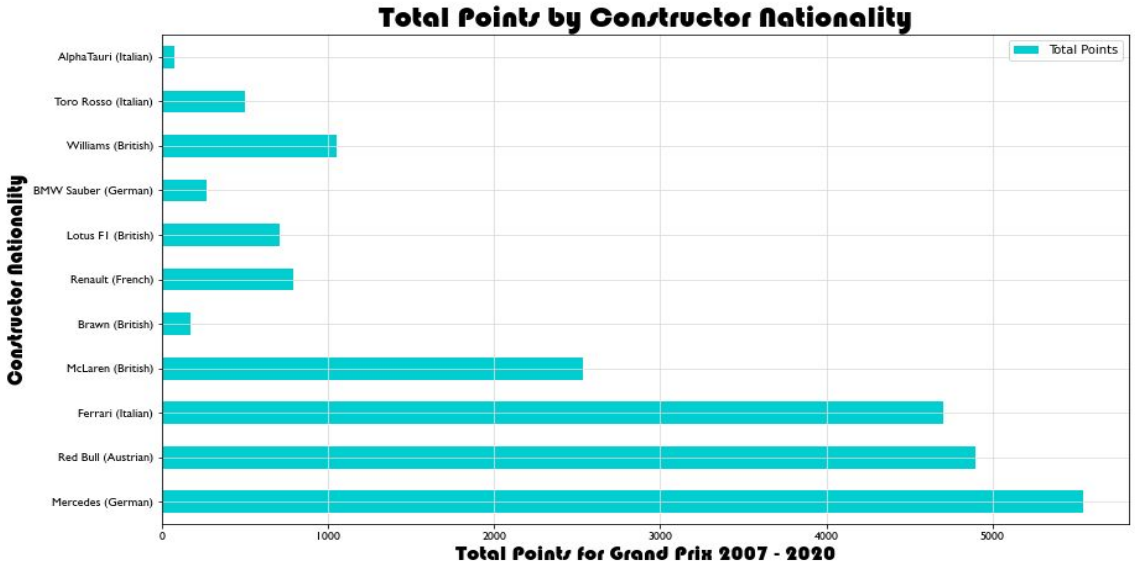
Races, drivers, and Constructors were all assigned a unique ID number which allowed us to join the csv. by that ID and make further analysis. After joining the datasets together, we decided to limit our scope of time. Because Lewis Hamilton began his driving career in 2007, we first filtered our dataset from 2007 to 2020 to eliminate any outliers.

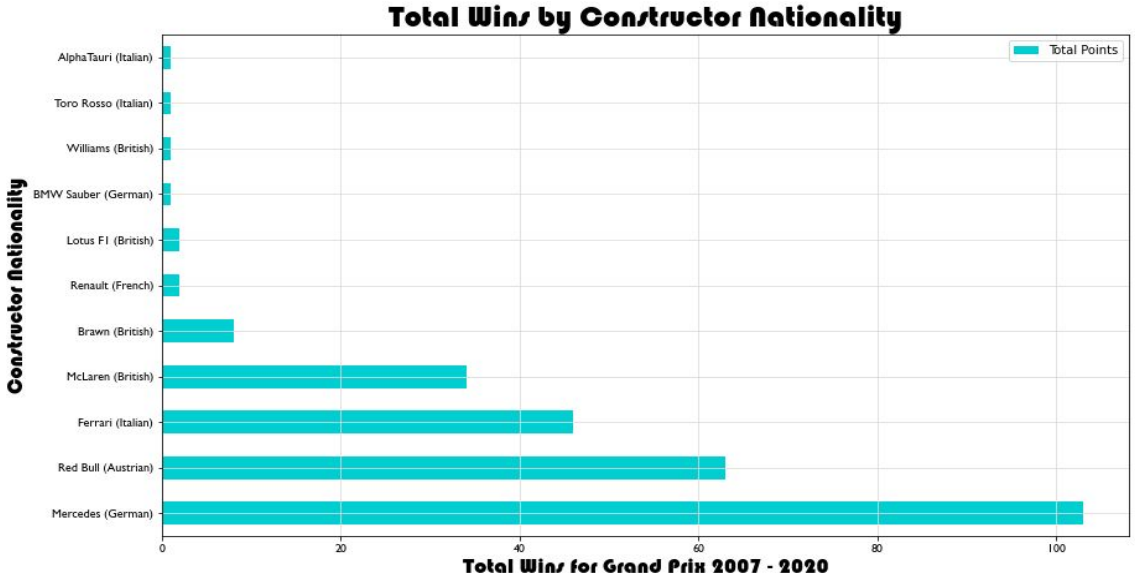
From here, we each began individual analysis, all hoping to come to the same conclusion, that each of our observations would cement our theory that Lewis Hamilton is the greatest Formula 1 Driver. Comparing his success as he transferred from McLaren to Mercedes, did the car or his age (or both) contribute to his success, comparing his qualifying times to his competitors, and comparing his pit stop times to his competitors. We explored all these points, collaborating on how to group information and even discussing whether our findings demonstrated any point of view at all.

In the end, not all the data points demonstrated Lewis Hamilton's success. While his wins and points clearly demonstrate his mastery of the sport; his pit stop times lend themselves to his mastery; but we found little correlation in qualifying round time. Nevertheless, our data does prove that Lewis Hamilton is the greatest Formula 1 Driver and there is something to be said about pit stop time as he switched from McLaren to Mercedes.

Hamilton v. The Car

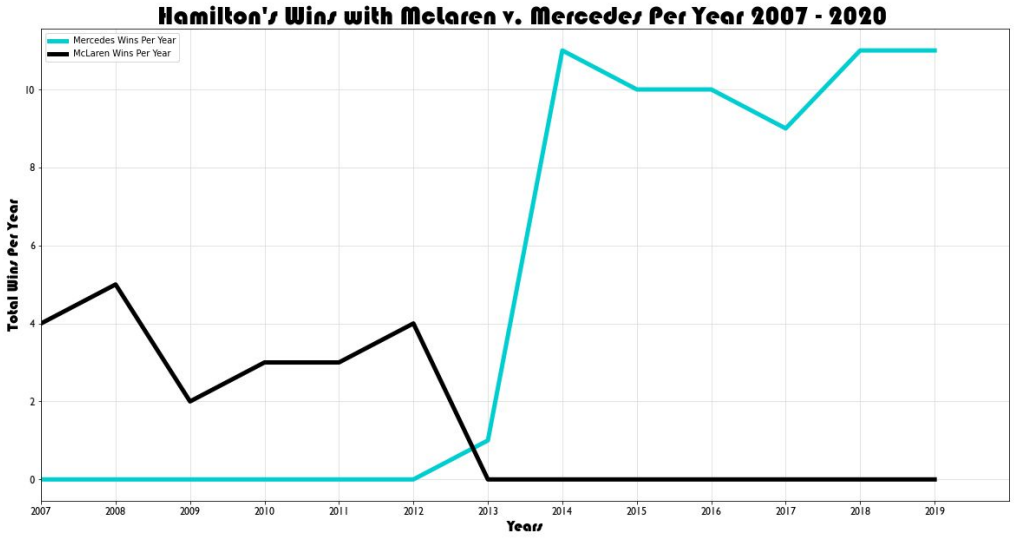
Prior to understanding Hamilton's success, it was pertinent to understand the Constructor success. From the below analysis, it became clear that German Constructors, particularly Mercedes, are leaders in the F1 Industry. German Constructors lead in total points per Grand Prix and in total wins per Grand Prix.





While the national data would suggest that driving a car from a German constructor, particularly Mercedes, would make a driver more successful, Mercedes had not won a world title since 1998. This led to the review of Mercedes v McLaren, homing in on Lewis Hamilton's career between 2007-2020 and the Grand Prix wins of the two constructors.

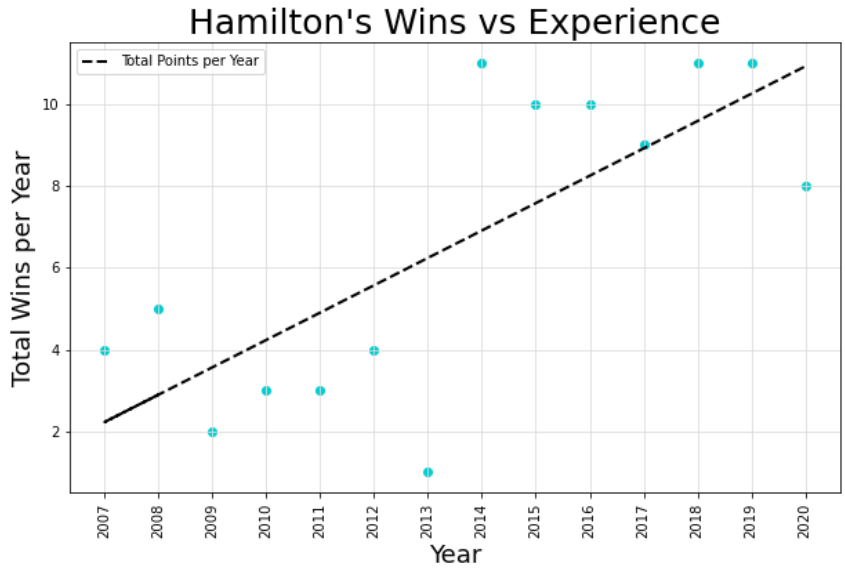
The crossing of the two lines in 2013 is Hamilton's switch to Mercedes, what is now considered to be one of the greatest constructors in the world. This data demonstrates that while all the data mining in the world can be done on the engineering of a car, it is the driver, rather Lewis Hamilton, that makes the sport.

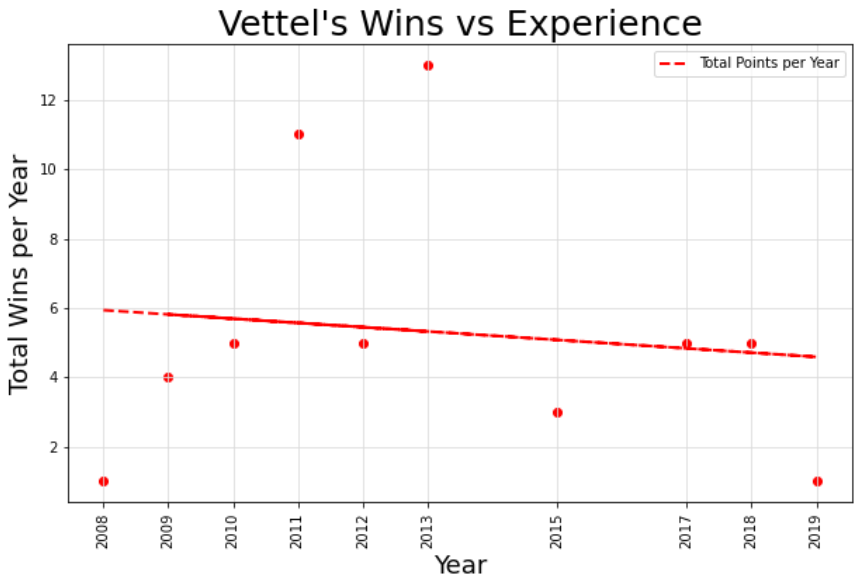


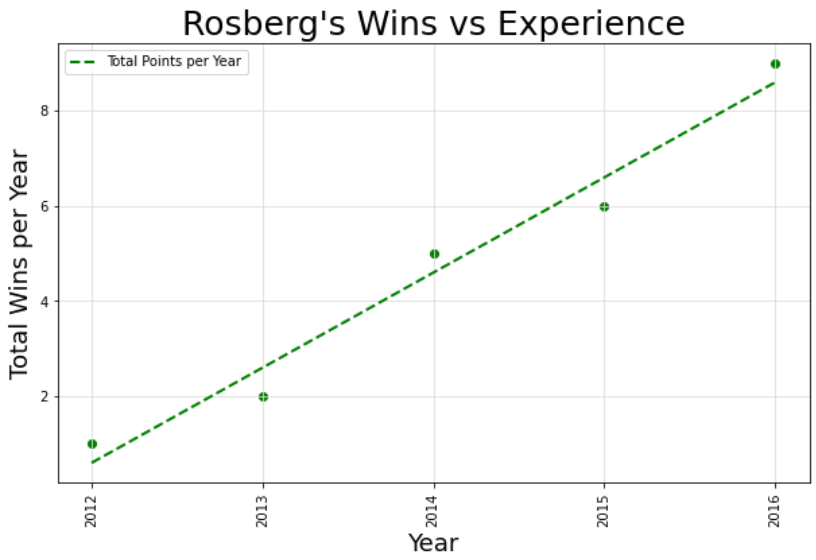
Hamilton v. The Experience

The initial theory was that Hamilton had been the best Formula 1 driver during his entire career. However, after further analysis it became clear that Hamilton's success began after seven years of driving. Just as we examined his change from McClaren to Mercedes, we wanted to observe the data and determine if Hamilton's experience is what propelled him to win or was it the change in vehicle.

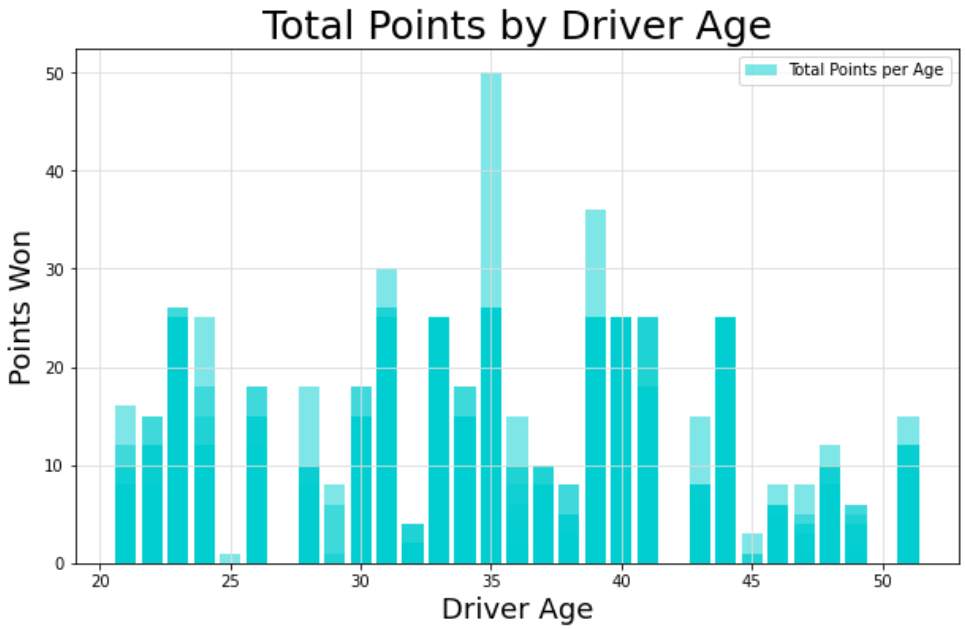
Using a linear regression model, we reviewed Hamilton's career and found a clear trajectory in gaining experience and increasing in wins. For comparison, we completed this analysis for Sebastian Vettle and Nico Rosburg.





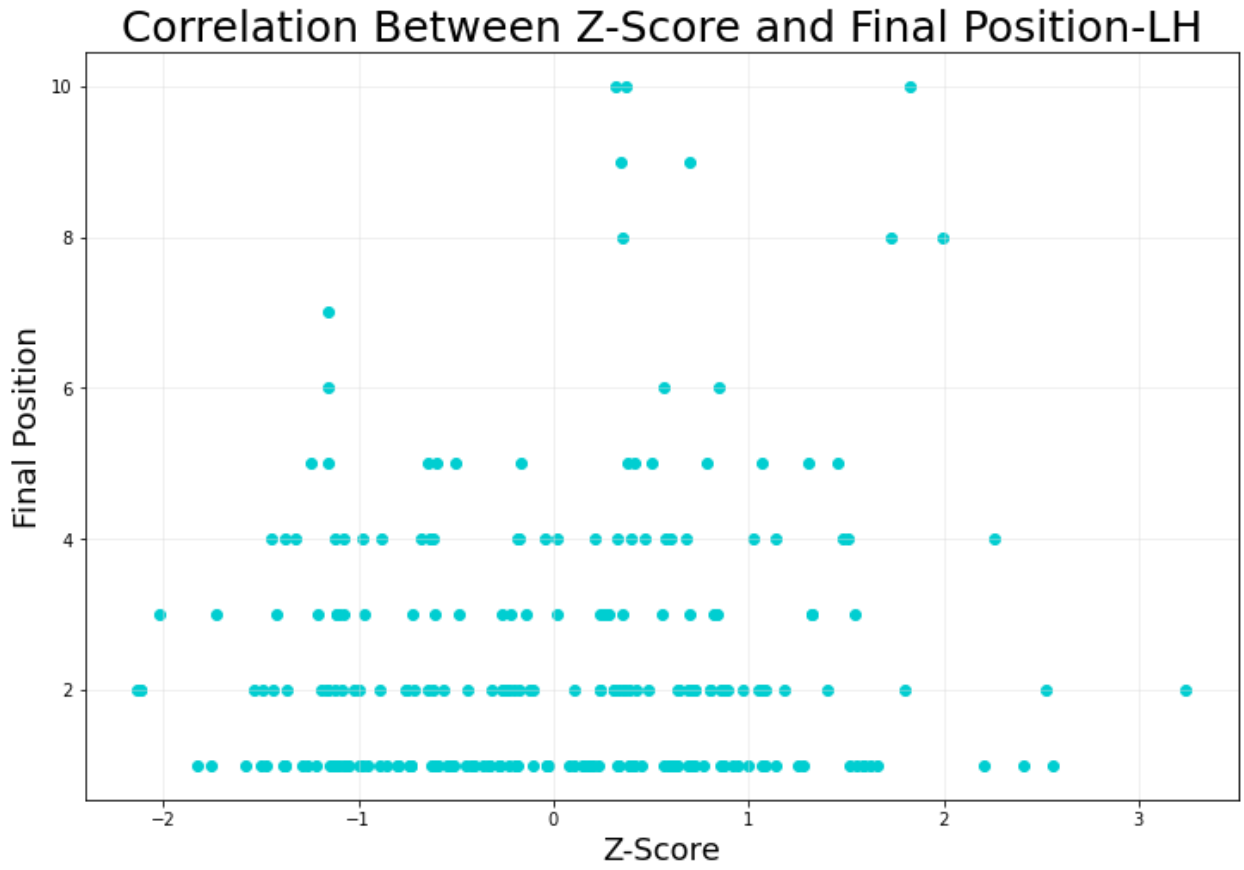


To further emphasize our analysis on age of drivers, we compared the overall points of drivers by age. The data demonstrates that driver's peak at the age of 30 and begin trending back down at the age of 40. Hamilton's points account for age 35.

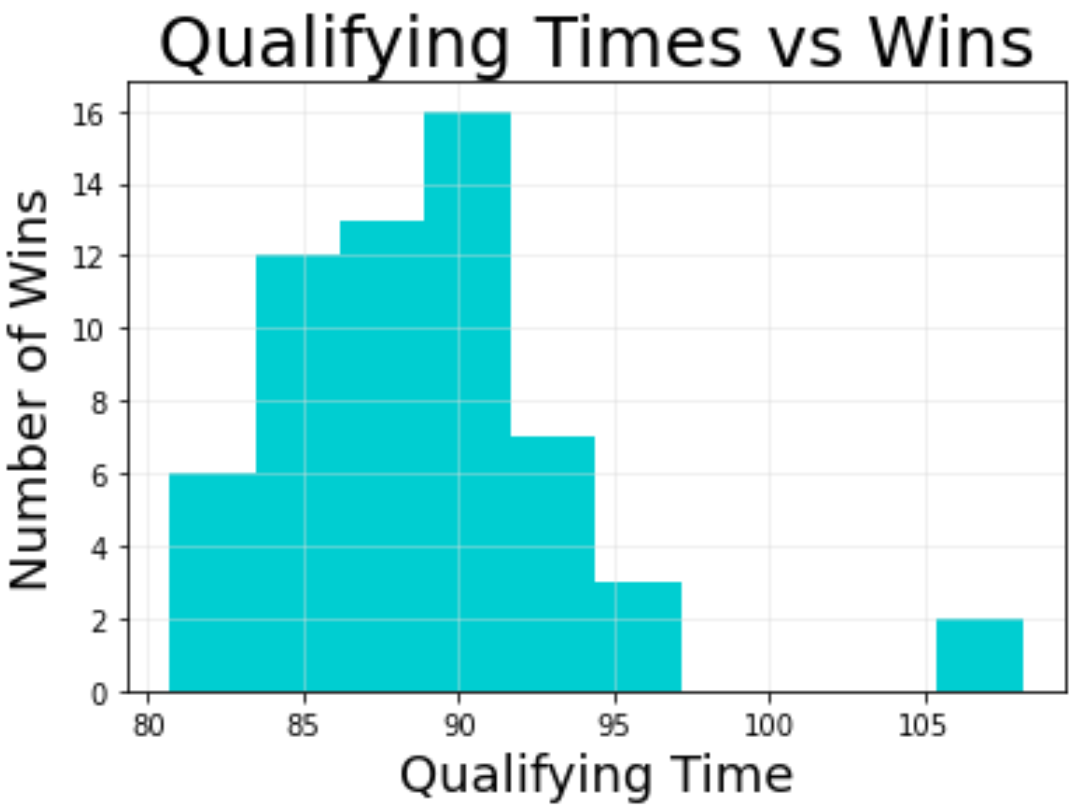


Hamilton v. Qualifying Times

With Formula One being primarily a European sport, there was a lot that we did not understand or expect going into this project. There were many different areas within the sport that we assumed would lead to a positive correlation simply because it seemed like it was common sense. One such thing was the correlation between better qualifying times and the number of wins the drivers have in total. This seemed like a sound assumption because if someone has better qualifying times and is able to start towards the front of the starting grid at the beginning of the race, then we would expect them to win.



This graph is a great way to showcase that our result was the opposite of what we were expecting. This graph shows the final Z-Score of the average qualifying times compared to the wins for Lewis Hamilton exclusively. With the 0 tick mark being the official average of his times, it shows that it does not matter how much faster or slower he is on a given day or track, he is such an advanced and skilled driver that he is able to win consistently.



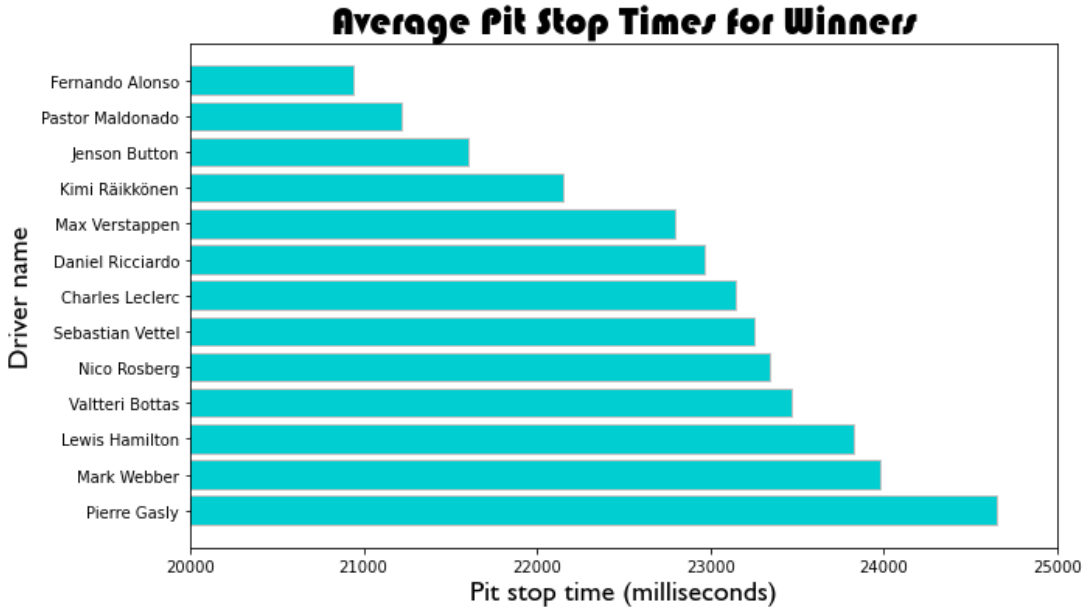
This graph is also a great way to showcase the results in the previous visualizations. This graph, in contrast to the last one, showcases the average qualifying time vs number of wins for all drivers, not just Lewis Hamilton. This paints a similar picture in the sense that even though you may have a great qualifying time, it does not directly correlate to winning every race. Anything could happen during the course of that race, and anyone could win.

Hamilton v. Pit Stop Times

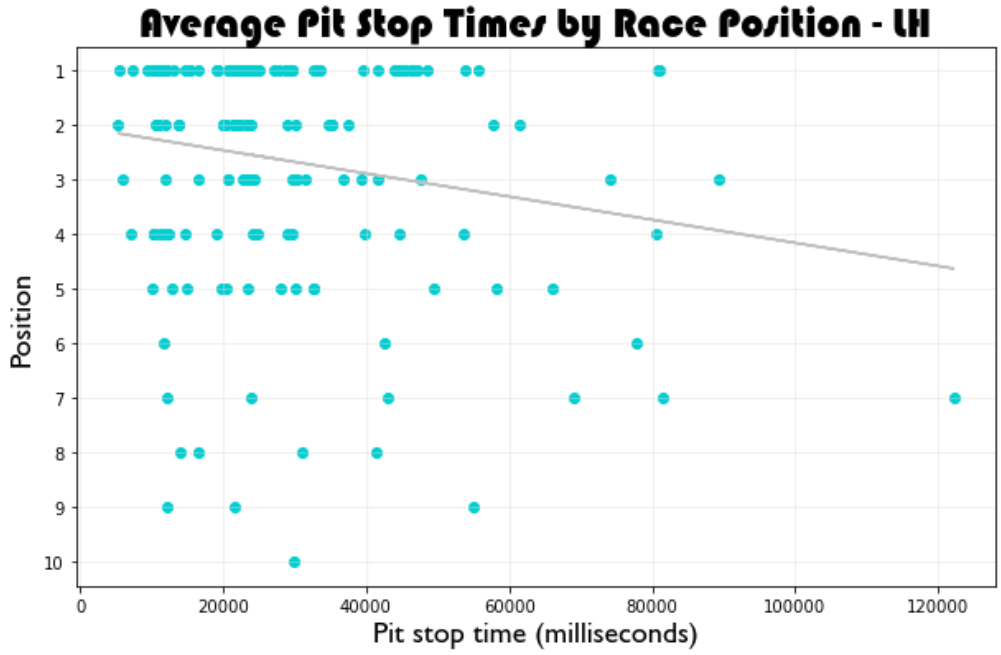
One aspect of Formula 1 racing is pit stop times. Every driver stops their car at least once during every race to receive maintenance and a replacement of tires. When determining what factors contribute to Lewis Hamilton's success, we wanted to see if shorter pit stop times had a meaningful impact on his racing outcomes.

The Kaggle Formula 1 dataset used included pit stop times for drivers in every race starting in 2011. To start, we normalized the pit stop data by calculating the average pit stop time for each winning driver as well as for all of Lewis Hamilton's races. From there, we compared the winning drivers to see what range existed. Finally, we ran a linear regression on Lewis Hamilton's races to see if his average pit stop time was an indicator for his outcomes.

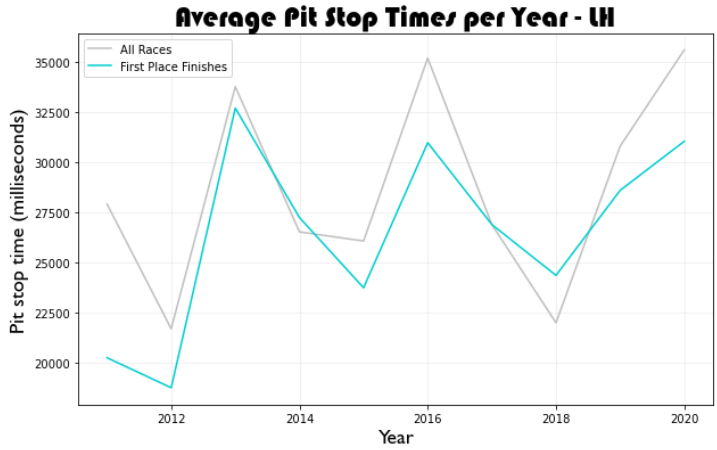
The results indicate that there is little correlation between pit stop time and outcome. First, when looking at the winning drivers, the range of average pit stop times ranges from about 2.1 seconds to 2.45 seconds - a very narrow spread.



Next, we used a regression analysis used to see if pit stop times would predict Lewis Hamilton's points earned or position concluded that there was a very weak correlation, of -.16 and .18 respectively.



Following this analysis, we compared Lewis Hamilton's pit stop times in his winning races against his pit stop times in all his races, by year. Two things jumped out from this comparison: 1) There was a minor likelihood that his pit stop times were better in his winning races, but not consistently and not by a large margin; and 2) there was a marked increase in pit stop times in 2013, when he changed to a new car manufacturer.



Ultimately, it appears there is a weak correlation between pit stop times and driver outcomes. One theory for this result is that these teams are so well-trained that the spread of pit stop times is too minor to have an effect on outcomes. Stated differently, a difference between a 2 second and 3 second pit stop time, when looked at over many races, is simply not enough to be a deciding factor.

Conclusion

This dataset had some limitations that might have skewed our analysis slightly. We limited our analysis to Lewis Hamilton's career time frame, 2007-2020, although Formula 1 Racing has been around for over 70 years and while it could have highlighted other drivers, we wanted to focus on who was the best Formula 1 Driver now.

In the end, our analysis concluded that Lewis Hamilton is the best Formula 1 Driver. His wins and points certainly demonstrate his mastery of the sport. Our analysis further demonstrated that his switch to Mercedes and his added years of experience only contributed further to his skill. While there was some correlation in pit stop times and none and in qualifying times, it is apparent that every move a Formula 1 driver's make impacts their outcome. To add further emphasis, days after this presentation was completed, Lewis Hamilton went on to win his 7th Formula 1 World Championship.

Resources

Data

https://www.kaggle.com/rohanrao/formula-1-world-championship-1950-2020

Copy & Editorial information:

https://www.tutorialspoint.com/formula_one/formula_one_quick_guide.htm

https://www.lewishamilton.com/

https://www.mercedesamgf1.com/en/team/drivers/lewis-hamilton/

https://www.formula1.com/en/latest/article.gone-in-1-88s-putting-together-the-perfect-f1-pit-stop.3lLKnEoPKdJgACsUn9lltC.html

Charts & Graphs for Inspiration:

https://public.tableau.com/profile/pratheek.pj#!/vizhome/LewisHamilton-MostPodiumsinFormula1/LH-MostPodiums

https://public.tableau.com/profile/rene.tijssen#!/vizhome/LapChartGPFormule1/LapChart

https://public.tableau.com/profile/rene.tijssen#!/vizhome/LapChartGPFormule1/LapChart

https://www.kaggle.com/jonathanbouchet/f1-data-analysis

https://www.tutorialspoint.com/formula_one/formula_one_quick_guide.htm

Images:

https://www.theweek.co.uk/formula-1/100791/f1-lewis-hamilton-title-race-up-in-the-air-mercedes-ferrari-red-bull

https://www.theweek.co.uk/formula-1/100791/f1-lewis-hamilton-title-race-up-in-the-air-mercedes-ferrari-red-bull

https://www.theguardian.com/sport/2019/feb/13/lewis-hamilton-f1-formula-one-mercedes

https://www.schemecolor.com/medium-turquoise-and-black.php#download

https://www.formula1.com/content/dam/fom-website/manual/XPB_Images/Misc/WilliamsPitStop3XPB.jpg.transform/9col/image.jpg

https://beyondtheflag.com/2020/07/19/formula-1-lewis-hamilton-dominates-8th-hungary-win/