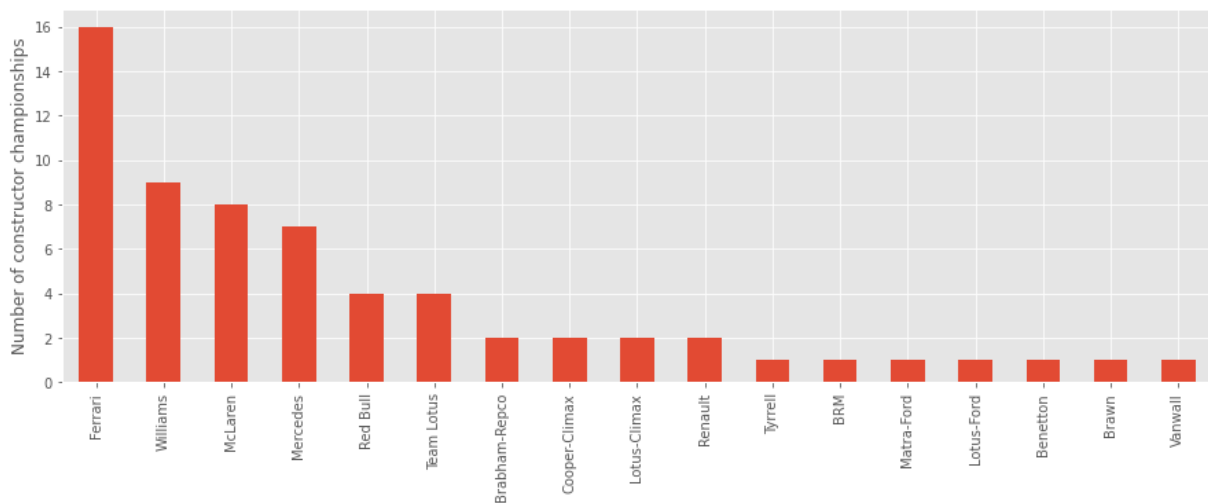


EAS 503 Final Report

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Description:

FIA Formula 1 is an international autosport that is considered to be the pinnacle of motor racing. It is also the highest revenue generating sport per event in the world. Some of the big racing teams like Scuderia Ferrari spend millions of dollars every year (reportedly \$463 million in 2019).



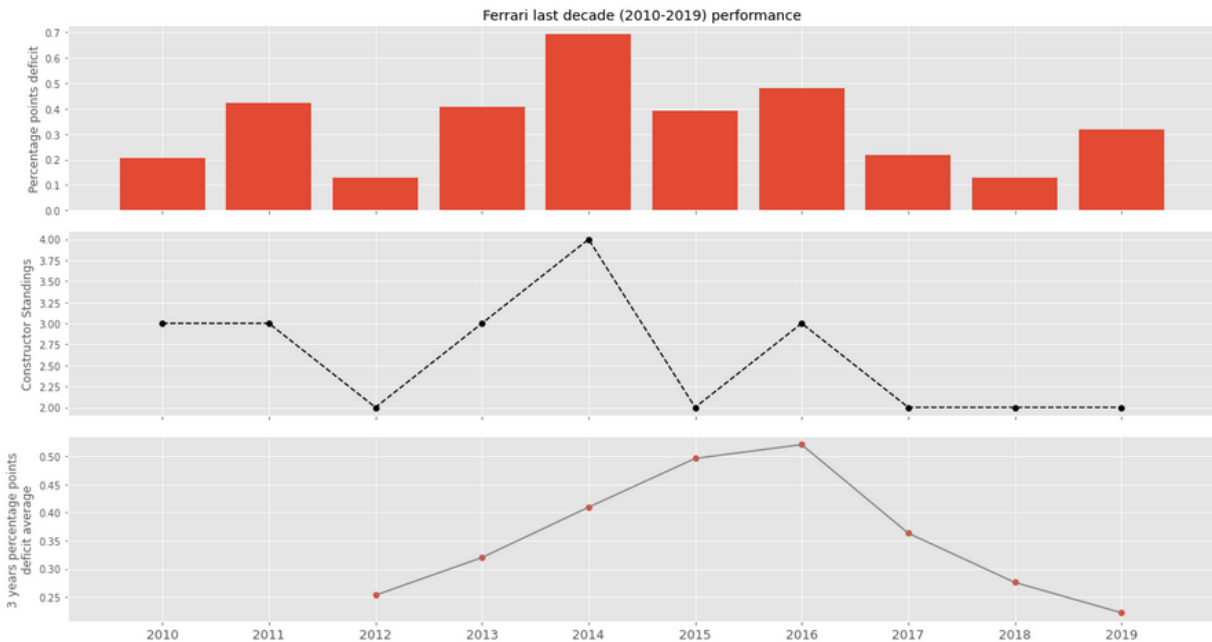
Scuderia Ferrari is also the most successful F1 team of all-time, but in the last decade the team failed to win a single championship. Hence, in this project we try to find some of the key reasons why Ferrari has fallen short of winning championship titles.

Project work-flow:

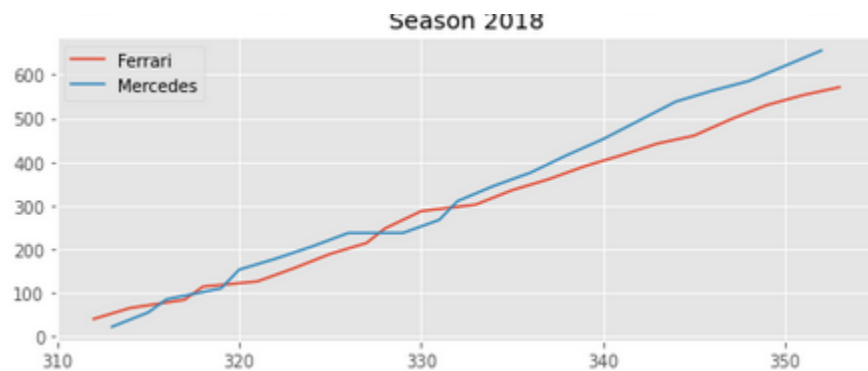
- 1) Get the csv files
- 2) Create sql database connection
- 3) Create sql tables
- 4) Insert data from csv files into sql database
- 5) Sql queries and visualization
- 6) Hypothesis testing
- 7) Conclusion

Findings:

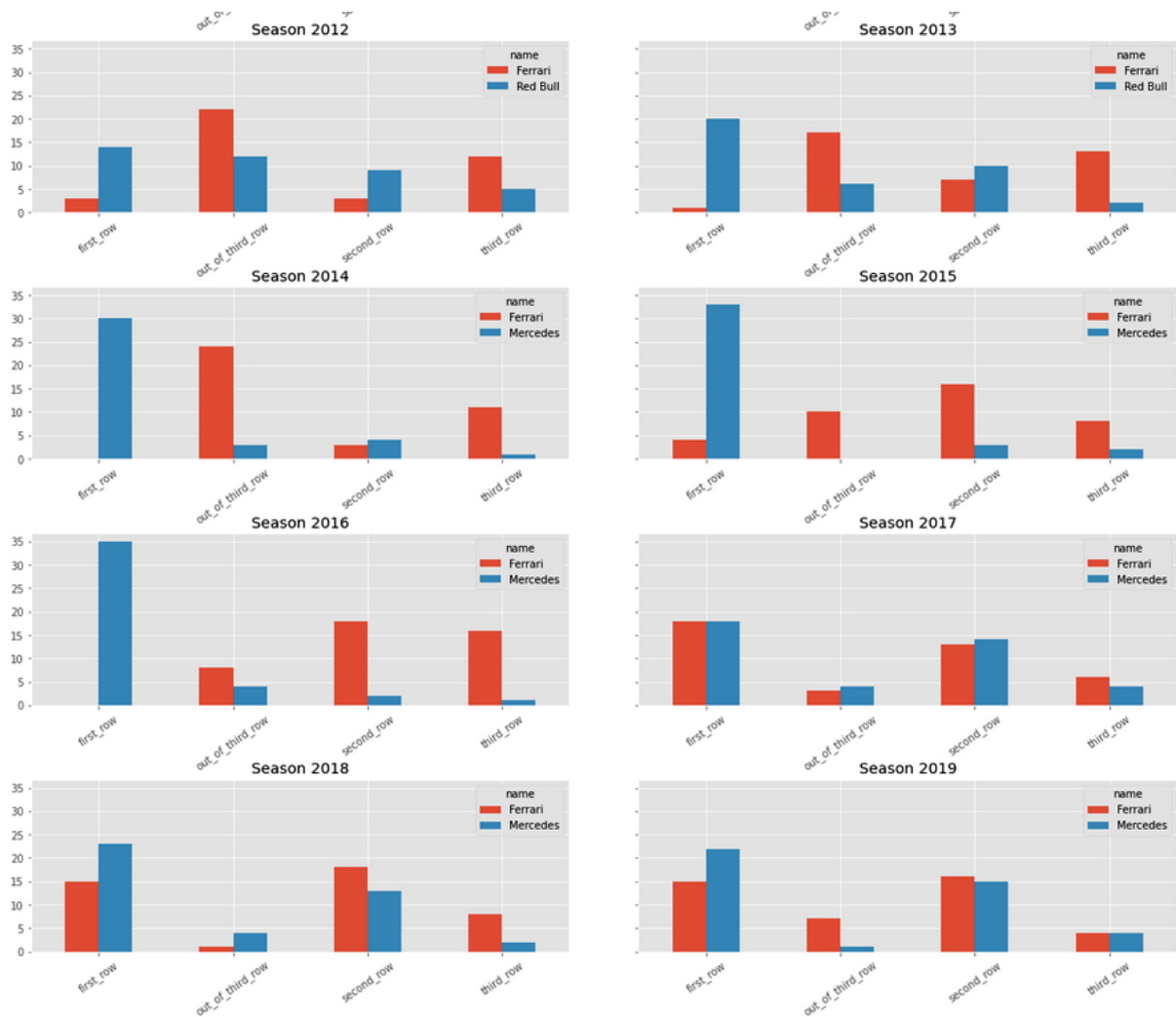
The plot below reveals a lot of information:



In the entire decade of 2010 - 2019, we conclude that 2018 is Ferrari's best performing year. This conclusion is supported by many other performance indicators such as race by race comparison between Ferrari and a championship winning team of a season as shown in the plot below.

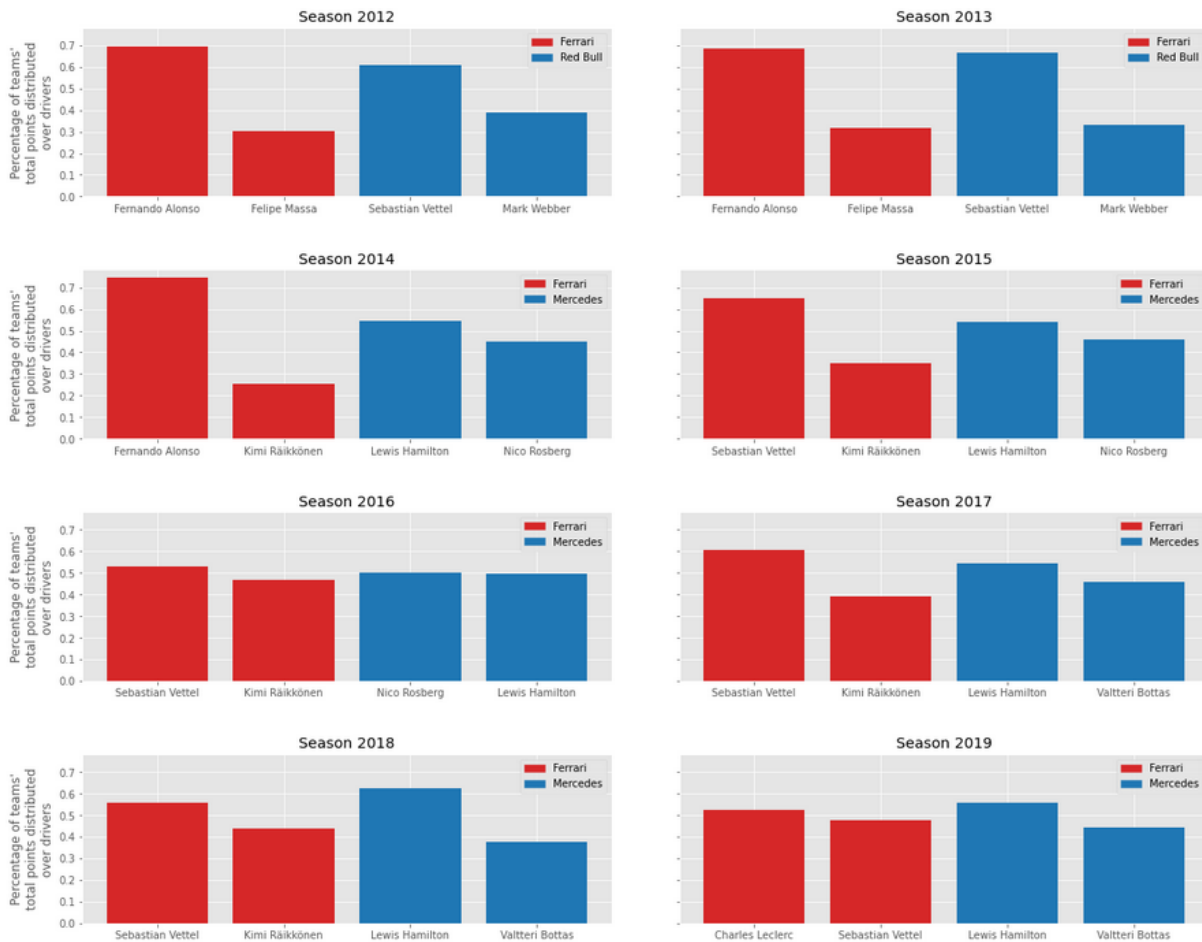


Throughout the analysis we can see an increase in overall performance after the 2016 season. In fact 2013 - 2016 seasons are concluded as real nightmares for Scuderia Ferrari. From another performance comparison plot (of Qualifying session) we can see that 2017 is the best performing season in terms of a Qualifying session. (Qualifying is the second most important event of a race weekend.)



The above plot shows, season by season qualifying session comparison between Ferrari and a championship winning team. We can see in the 2017 season Ferrari has an equal number of front row races as the championship winning Mercedes team.

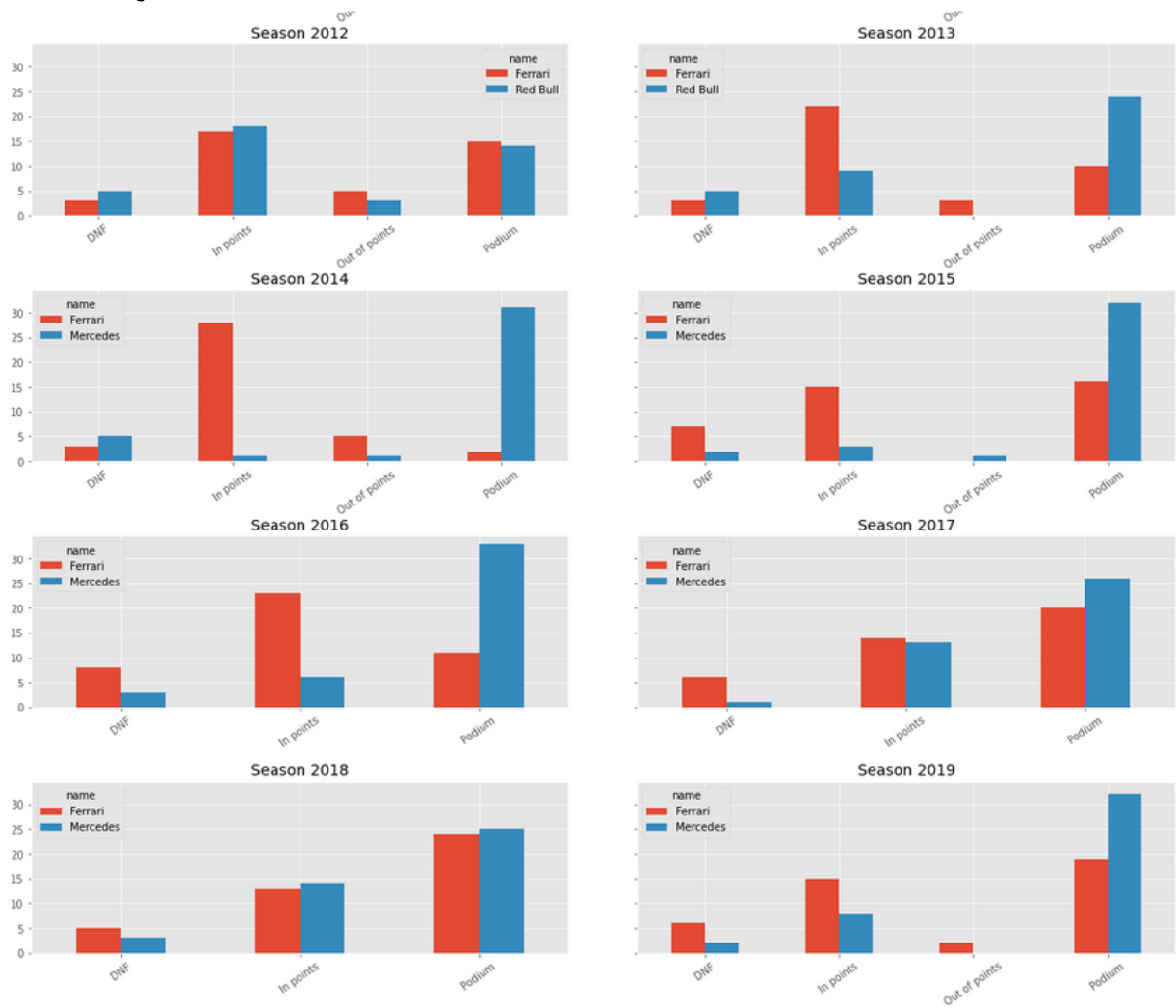
Another indicator of the increased team performance, is a balanced driver contribution.



In the above plot, we can see that before 2016 Ferrari drivers had a significant gap in the driver contribution of teams' total tally of points. Whereas that dynamic changed from 2016 onwards.

Overall, we saw Ferrari's performance increase from 2016 season onwards, as is also indicated by the percentage point deceit's 3 years moving average in the first plot. Then the question becomes why they failed to win at least one season from 2016 onwards?

We believe that not being able to finish a race and not collecting a single point from the race event is a significant factor.



The plot above shows an increased number of DNFs for Ferrari in every season since 2015. Whereas before 2015, they did not touch 5 DNFs per season mark in a single season. We believe that played a significant role for not being able to win a championship.

Hypothesis testing:

In order to make assured conclusions, we ran several hypothesis tests. The two tests that produced statistically significant results are presented below.

From 2010-2014, did Ferrari have an unusually low number of Podiums?

	Ferrari's Podiums	Champions' Podiums
Sample means	10.4	23.2
Sample variances	28.3	42.7

Pooled SD	5.96
T stat	3.40
T crit (p=0.05)	1.86

Yes, since $T_{stat} > T_{crit}$

From 2015-2019, did Ferrari have an unusually high number of DNFs?

	Ferrari's DNFs	Champions' DNFs
Sample means	5.4	2.2
Sample variances	1.3	0.7

Pooled SD	1.00
T stat	5.1
T crit (p=0.05)	1.86

Yes, since $T_{stat} > T_{crit}$

We can see two test reports that concludes:

- 1) Ferrari did have an unusually low number of podiums since 2010-2014
- 2) Ferrari did have an unusually high number of DNFs since 2015-2019

Conclusion:

- The second half of the decade 2010-2019 were better than the first half for Ferrari in terms of car performance.
- Drivers' balanced team contribution is also important as we saw before 2015 having a lead driver did not help Ferrari overall.
- Having a balanced driver line-up since 2016 with improved performance efficiency made Ferrari a title contender team once again.
- But, an increase in DNFs (Did Not Finish) resulted in significant championship points loss, which did not help seasons like 2018 where Ferrari was closer than ever in decade to win championship.