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DATA 8008 - DATA VISUALISATION & ANALYTICS

# 'MOTORBIKES - AN ANALYSIS OF RIDERS'

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# Abstract

We are analysis a dataset from Kaggle, that contains riders that competed in any category in 2024. Therefore, our analysis is limited as historical riders such as Valentino Rossi or Casey Stoner are not present in our data since retired.

The goal of this analysis is simply to understand the history and performance of MotoGP riders but also try to understand if there is a specific dominance of make, rider or countries and finally identify champions and interesting rookies.

We are developing visual for analyzing the data and answer questions dealing with:
- Rider performance and rider trajectory, where each rider is different but we can see Marc Marquez as a regular champion but also Bagnaia and Martin as recent serious opponents
- Motorcycle analysis detailing the previous dominance of Honda and the recent leadership of Ducati
- Country analysis with a high presence of Spanish riders across class and champions and a Europe-centered distribution of riders
- Metrics analysis quantifying efficiency of Marquez but highlight relationships between number of races participated, wins and points.
- Champion Analysis highlighting where we could be champion with only 1 win but where riders mostly engage in 18 races. A focus on Marquez trajectory is provided in this sections as he is the most awarded champion over seasons.

It will be interesting to follow the battle between Marquez, Bagnaia and Martin as the last established new record while Marquez is back on top riders after injury in 2020.

# Rider Performance and Career Trajectory

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How has a rider's performance evolved across different classes (Moto3, Moto2, MotoGP) over their career ?

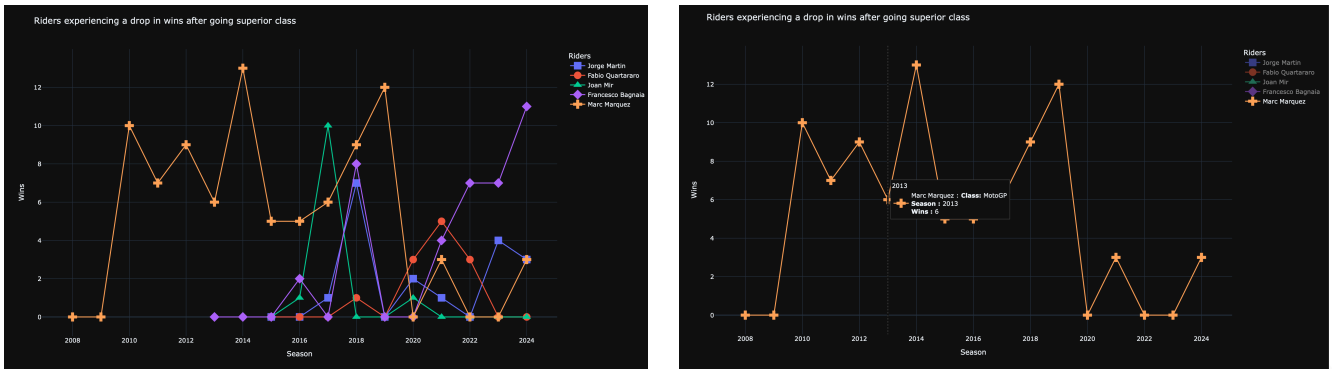


*Fig 1.0 ; 1.1: Plotly Lineplot of MotoGP Champions wins over seasons (Fig 1.1: Focus on Marc Marquez)*

Plotting the number of wins over seasons, we can see each MotoGP champion has different trajectories. We can see only Marquez making several instances of more than 8 wins (3 in MotoGP), making him appearing a regular winner until 2020. We can notice drops in wins as he transition to the upper class (2011: from 125cc to Moto2, 2013: from Moto2 to MotoGP).

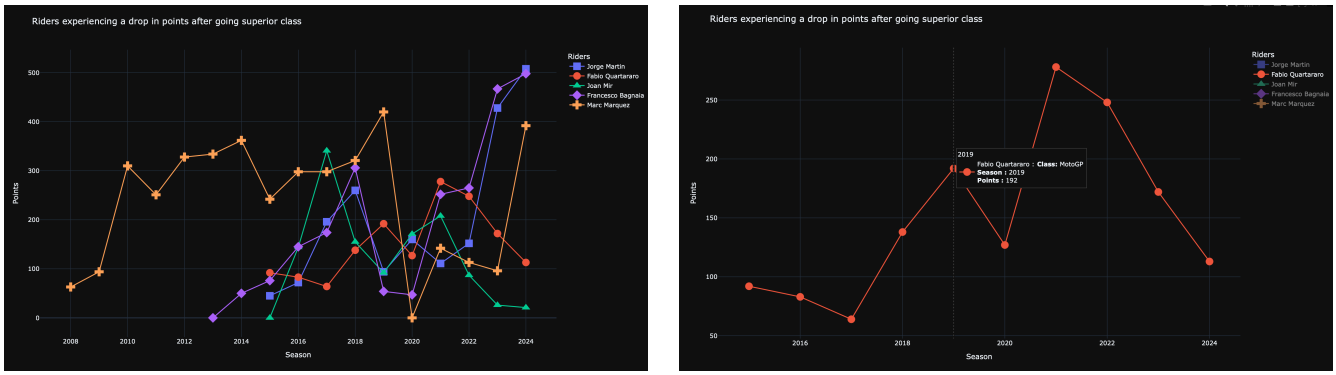


*Fig 2.0 ; 2.1: Plotly Lineplot of MotoGP Champions points over seasons (Fig 1.1: Focus on Fabio Quartararo)*

Similarly, we can notice a similar pattern when plotting the points for each champions, with a drop after going into the upper class. However, we notice Quartaro managed to score more points the year he got into MotoGP (2019). Another interesting fact, while Marquez is still a favourite, Bagnaia and Martin set the bar of points higher in last 2 years, with Martin holding the record of 508 points.

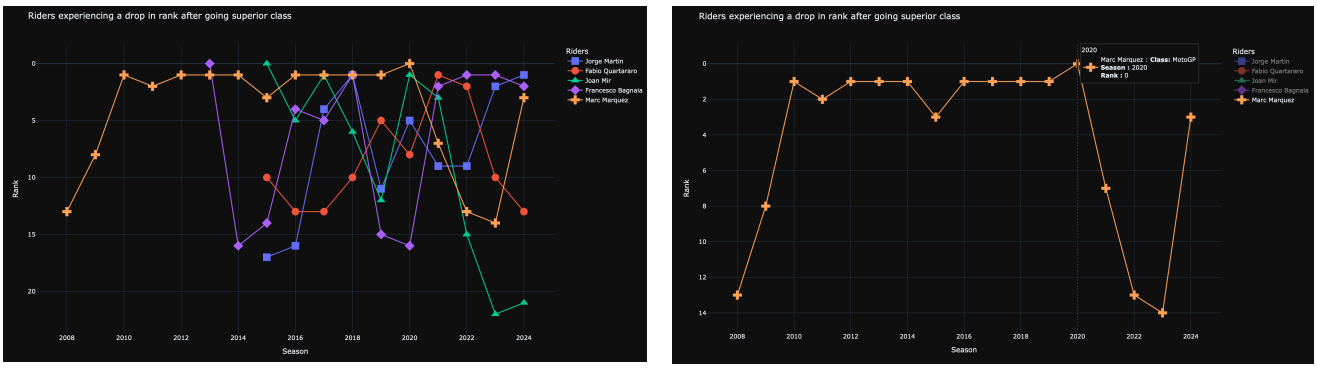


*Fig 3.0 ; 3.1: Plotly Lineplot of MotoGP Champions ranks over seasons (Fig 1.1: Focus on Marc Marquez)*

As wins and points are factors of final ranks, we can also observe the same pattern within ranks, dropping after going into upper class. We can Marquez was not ranked in 2020 (ranked 0). After research, this was the year he broke his arm. He slowed built up his rank back over season and made Top 3 last year, making it interesting for him next year if rank still rise.

## What is the distribution of podium finishes for each rider ?

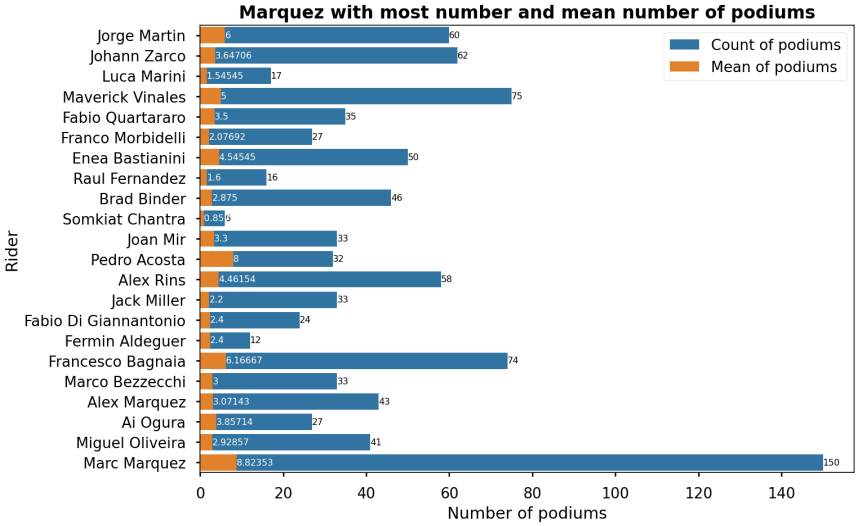


*Fig 4: Seaborn barplot of Number of podiums per MotoGP riders*

Plotting numbers and mean number of podium finishes, we can see Marquez being dominant in podiums. His counts (150) being twice as big as the second (Vinales: 75) with more than 8 podiums a season. We can see Acosta also with a mean of 8 but with a much lower count (32) which is explained by his recent join as Moto rider (started in Moto3 in 2021).

## What is the average points scored by each rider per season in MotoGP?

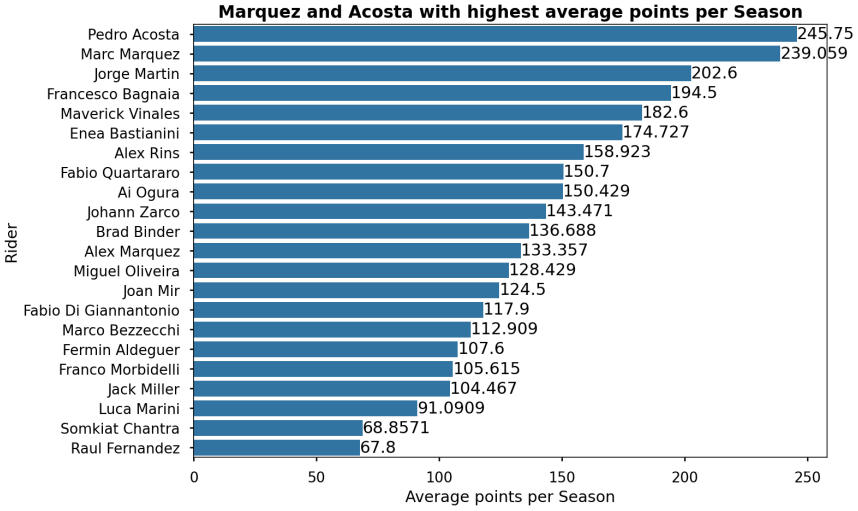


*Fig 5: Seaborn Barplot of Average number of points in a season per riders*

In terms of average points, Acosta seems leading with a mean number of points of 245.75, followed by Marquez with 239.059. From previous plots, Marquez seems to have a lot more experience with 17 season behind him, but Acosta made a first good MotoGP season in 2024, with 215 points. This is a typical Youth vs Experience dual to follow.

How consistent is each rider's performance over the years in terms of finishing position (placed)?

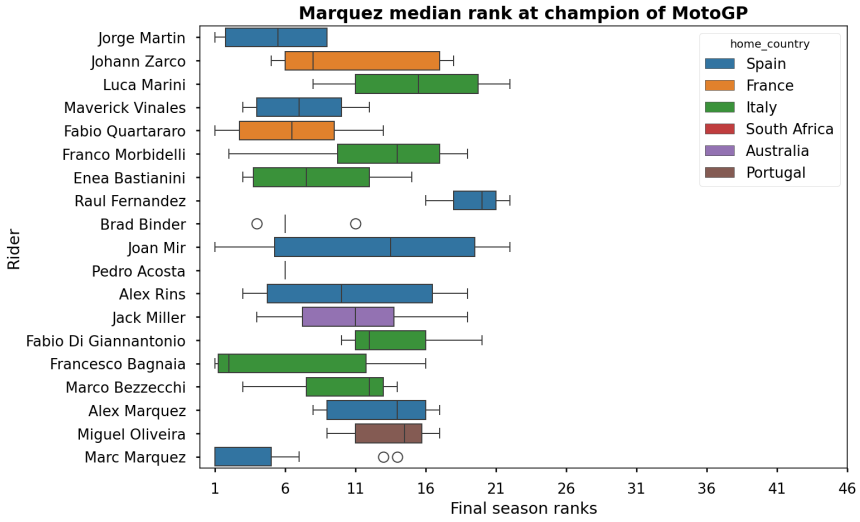


*Fig 6: Seaborn Boxplots of distributions of final ranks*

With boxplots, we can see that only Marquez has its first quartile as ranked 1, meaning he has been a consistent champion over his career in MotoGP. We can also see, he ends mostly between 1 and 8, with 2 outlying values (explained after his got injured). Only Martin and Bagnaia have their first quartiles in Top 3 and come as Marquez most regular opponents.

# Motorcycle Analysis

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## Which motorcycle brand has the most wins or podium finishes in the dataset?

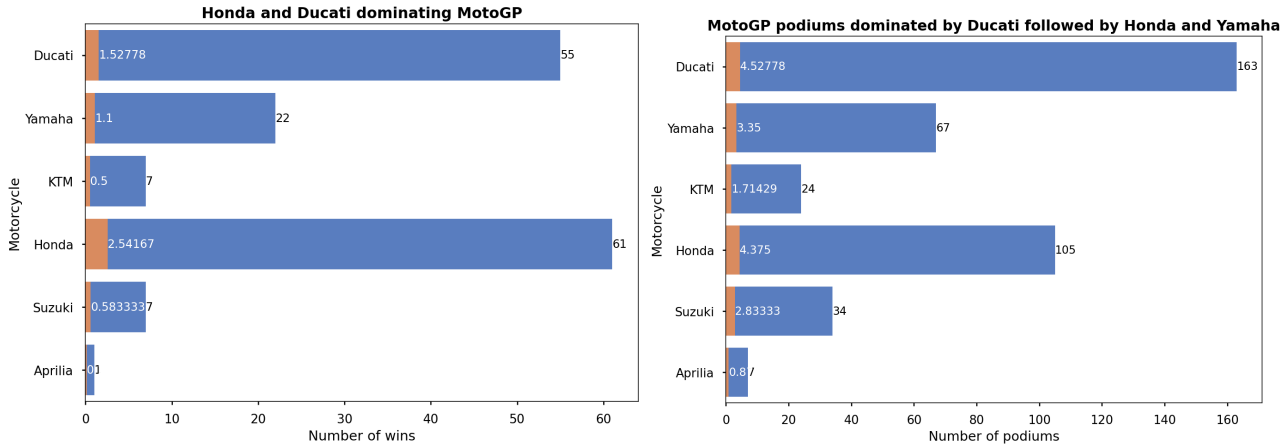


*Fig 7.0 ; 7.1: Seaborn barplots Numbers and Average number of wins and podiums*

When looking at the wins in MotoGP, we can see that Honda is dominating with 61 wins over the seasons and an average of 2.54, followed by Ducati with 55 wins and an average of 1.52. Those are the most dominant, followed by Yamaha completing Top 3. It is also interesting to notice Aprillia made only one win in MotoGP (Vinales, 2024). As Marquez is now riding a Ducati since 2024 after riding for Honda, we may assume Ducati will overtake Honda in the wins.

Regarding the podiums, we can see Ducati is dominating with 163 podiums over the seasons and a average of 4.52, followed by Honda with 105 podiums and an average of 4.375. We may assume with Marquez now with Ducati the gap between Honda and Ducati will deepen, especially with Marquez being regular while Bagnaia and Martin establish new points record, as the three of them ride with a Ducati.

## What is the trend of wins for each motorcycle over the seasons?

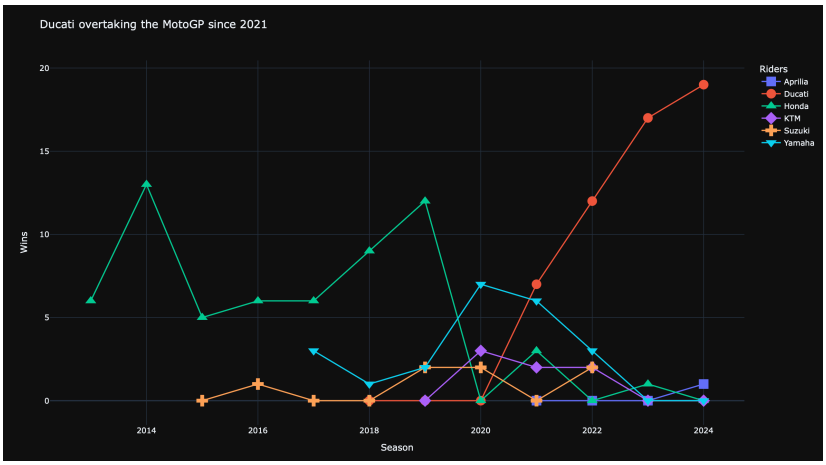


*Fig 8: Plotly Lineplot of Motorcycle win over seasons*

Plotting wins per Motorcycle over time highlight again the weight of Honda and Ducati, with Honda being dominant from 2013 to 2020 then Ducati being the new leader from 2021 onwards. We can notice Yamaha being leader in 2020. Again, we can perceive the effect Marquez has on the wins. Honda was dominating with Marquez until he got injured then Ducati started to shine with its new riders (Bagnaia and Martin) and is likely to keep shining as Marquez just completed Ducati's Top 3 riders.

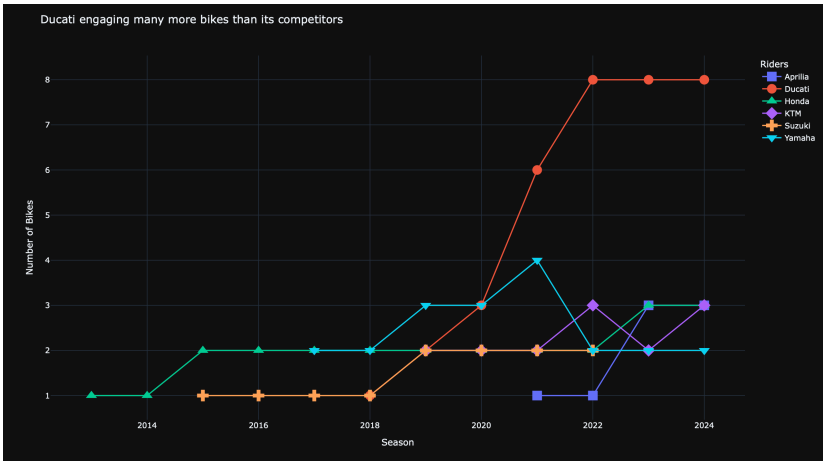


*Fig 8: Plotly Lineplot of Number of Bikes per make over seasons*

Moreover, Ducati seems to be the new favorite choice of teams as we can see the number of bikes the constructor engages from 2021 is much higher than the rest of the competitors, currently engaging 8 riders spread across different teams. We can suspect here that the dataset we have seems incomplete as it highlights some riders may be missing (per research Yamaha has engaged other riders not present in the dataset, such as Lorenzo, Rins, Miller or Rossi).

# Country and Rider Analysis

Which country produces the most successful MotoGP riders (based on wins or championships)?

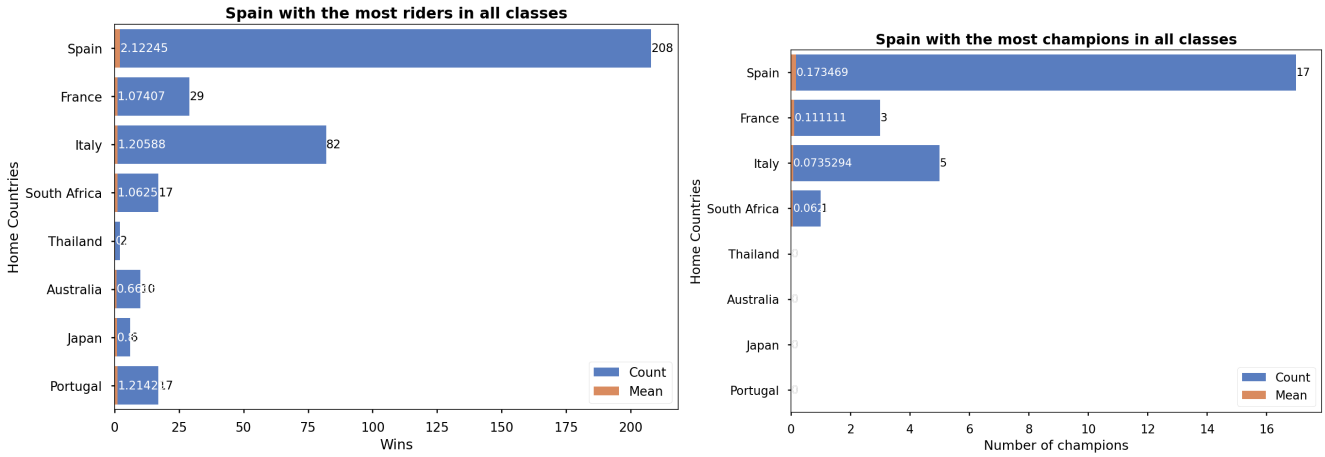


*Fig 9.0 ; 9.1: Seaborn barplots of Home Countries counts of wins and champions in all classes*

We can see Spain is providing the highest count of champions (17) followed by Italy (5) across classes. Spain also hold the highest count of wins (208) also followed by Italy (82). We can also see only Spain, France, Italy and South Africa provided champions.

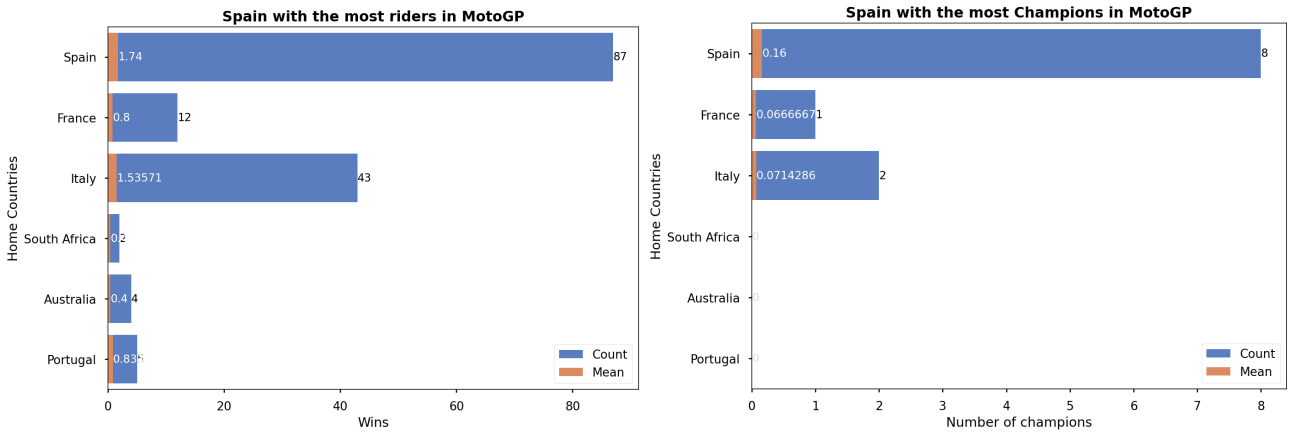


*Fig 10.0 ; 10.1: Seaborn barplots of Home Countries counts of wins and wins in all classes*

We can see Spain is providing the highest count of champions (8) followed by Italy (2) in MotoGP. Spain also hold the highest count of wins (87) also followed by Italy (43). We can also see only Spain, France and Italy provided champions.

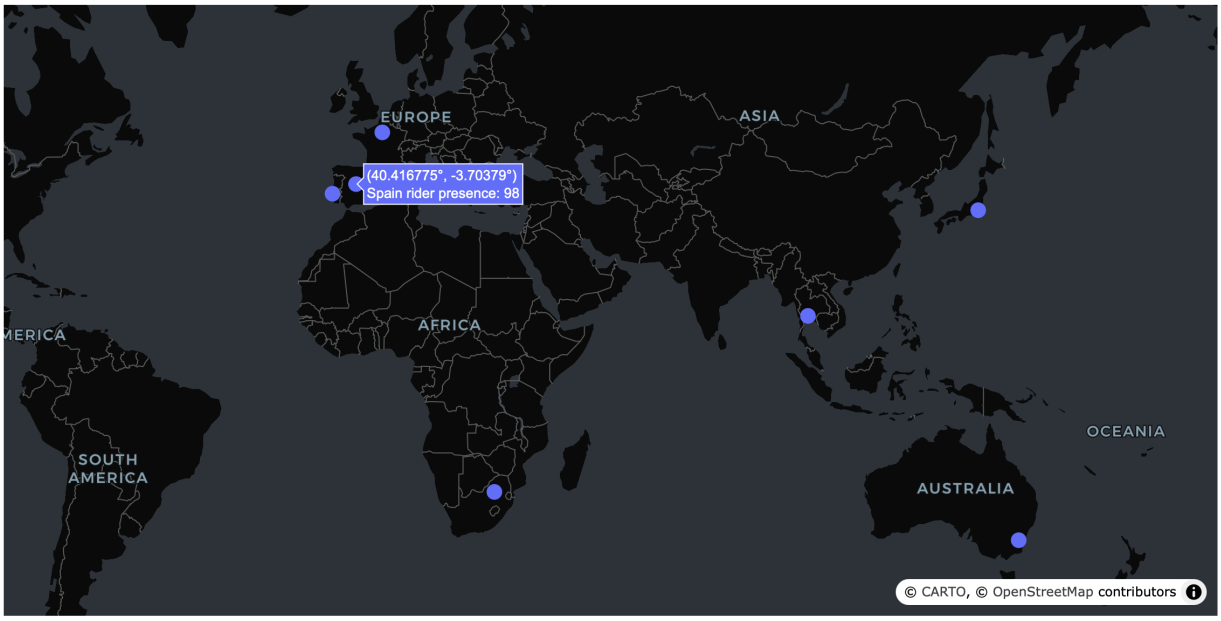


*Fig 11: Plotly Scattermap of rider presence across seasons*

Using a interactive map, we can see Spain is the most present across seasons in the dataset with 98 riders presences over years in all classes. Then comes Italy with 68 presences and France completes the Top 3 (27 presences). We can notice a European Top 3.

European Countries providing most riders

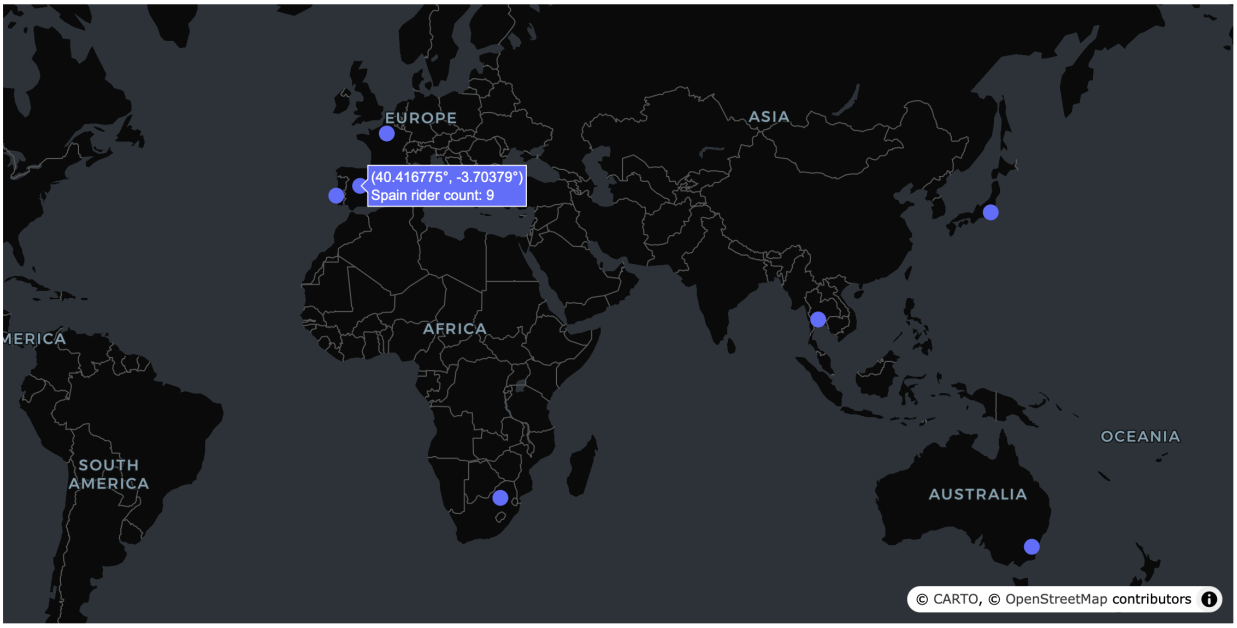


*Fig 12: Plotly Scattermap of distinct rider counts*

Regarding individual riders, we observe a similar trend with Spain providing 9 distinct riders over seasons. Then comes Italy with 6 distinct riders and France with 2 distinct riders. Again most population here centered in Europe.

## Is there a correlation between the rider's home country and their performance (podiums)?

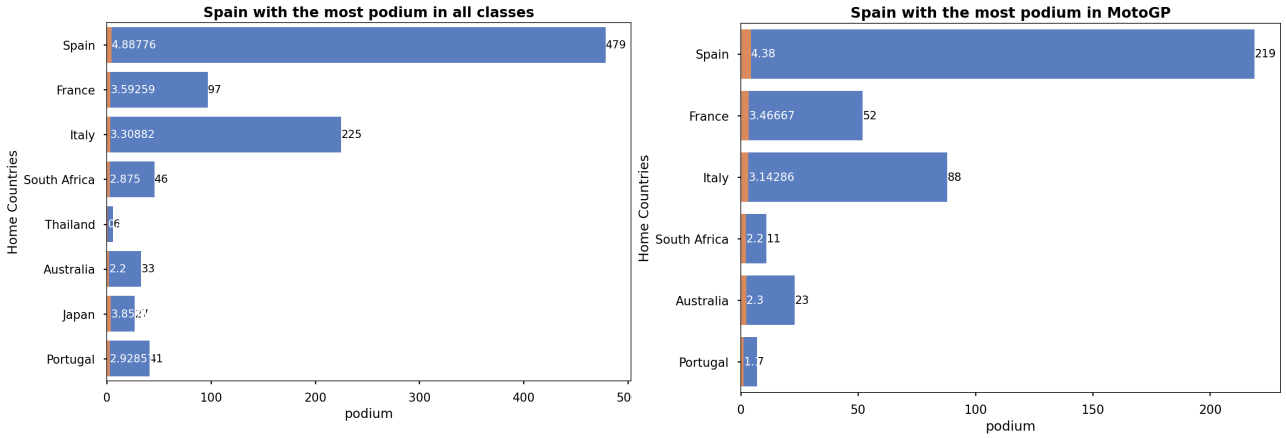


*Fig 13.0 ; 13.1: Seaborn barplots of distribution of podiums and MotoGP podiums among Countries*

In terms of podium, again, we see Spain dominating in all classes with a total 479 podium, including 219 in MotoGP. It is interesting to see than 2 countries never managed any podiums (Japan and Thailand). Dominance goes again to European countries.

# Specific Performance Metrics

## Which riders have the highest number of pole positions or fastest laps?

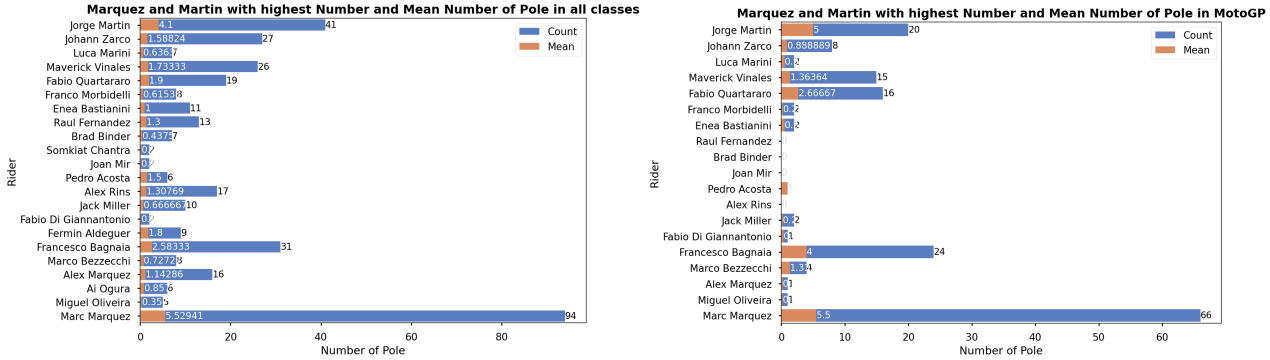


*Fig 14.0 ; 14.1: Seaborn barplots of distribution of podiums and MotoGP podiums among Countries*

We can see Marquez is dominating the number of pole positions generally with mean number of pole of 5.53 and a total number of 94 poles until 2024. The total is twice as more than the 2nd highest (Martin). The MotoGP follows a similar but the difference is wider, explained with the length of Marquez in MotoGP in comparison to Martin and Bagnaia.

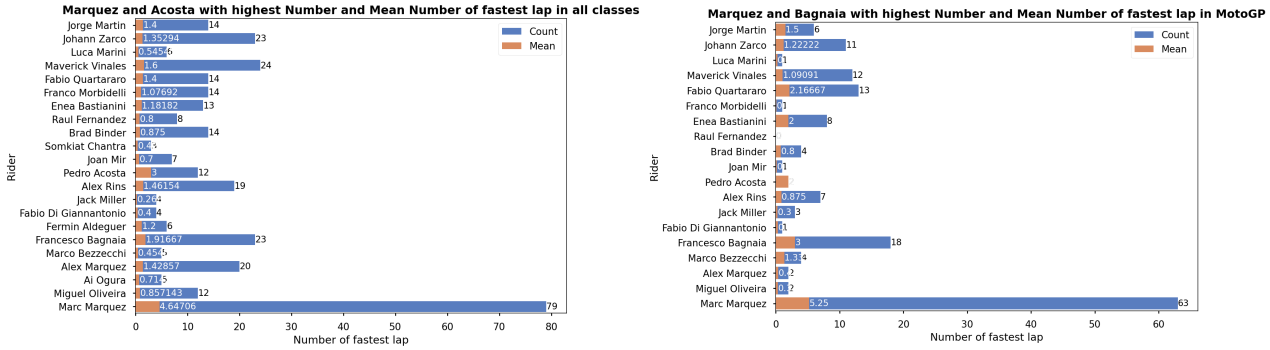


*Fig 15.0 ; 15.1: Seaborn barplots of distribution of podiums and MotoGP podiums among Countries*

It seems Marquez also holds the highest number of fastest lap (79) and the highest mean in all classes (4.65). It seems Acosta also has  high mean of fastest lap(3). Marquez mean goes even higher in MotoGP (5.25) and made 63 fastest lap, representing almost 80% of his fastest laps.

## What is the relationship between the number of races participated in and the points scored?

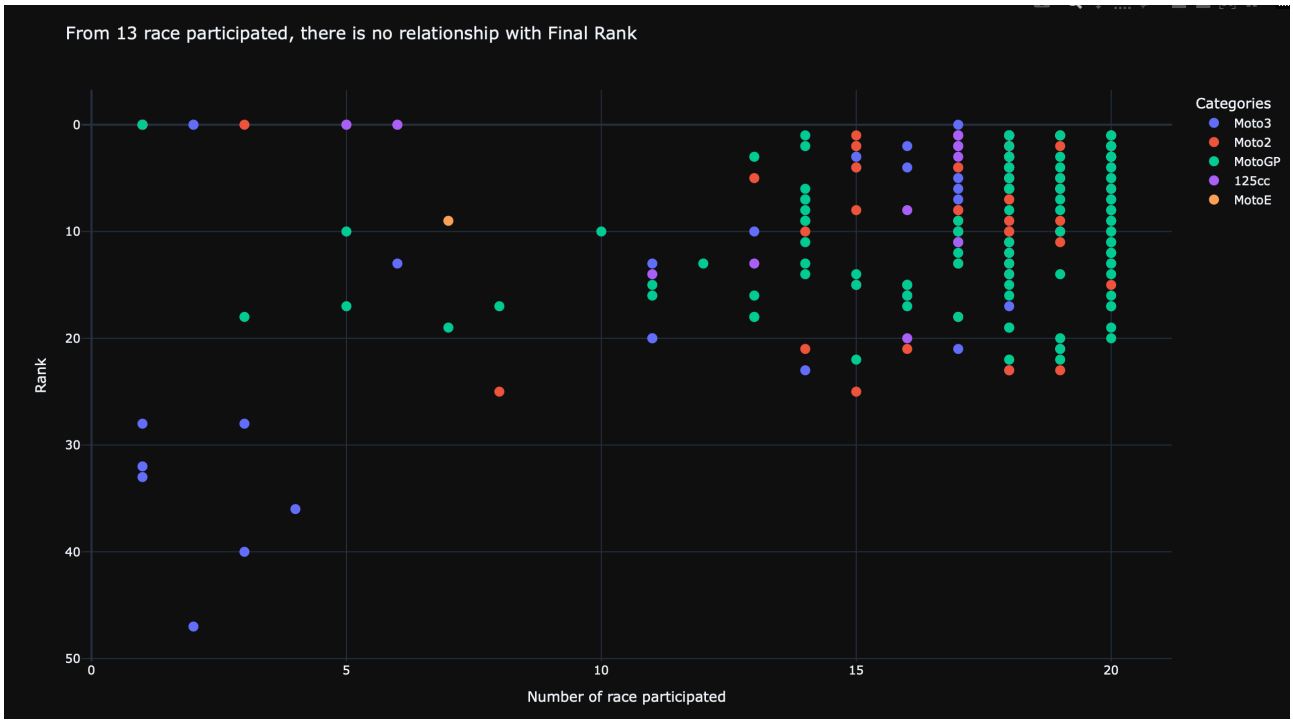


*Fig 16: Plotly Scatterplot of Ranks against number of race participated*

Plotting the ranks against the number of race participated, we can see a weak negative correlation between variables until a rider compete in 13 races. From there, no relationship appears.

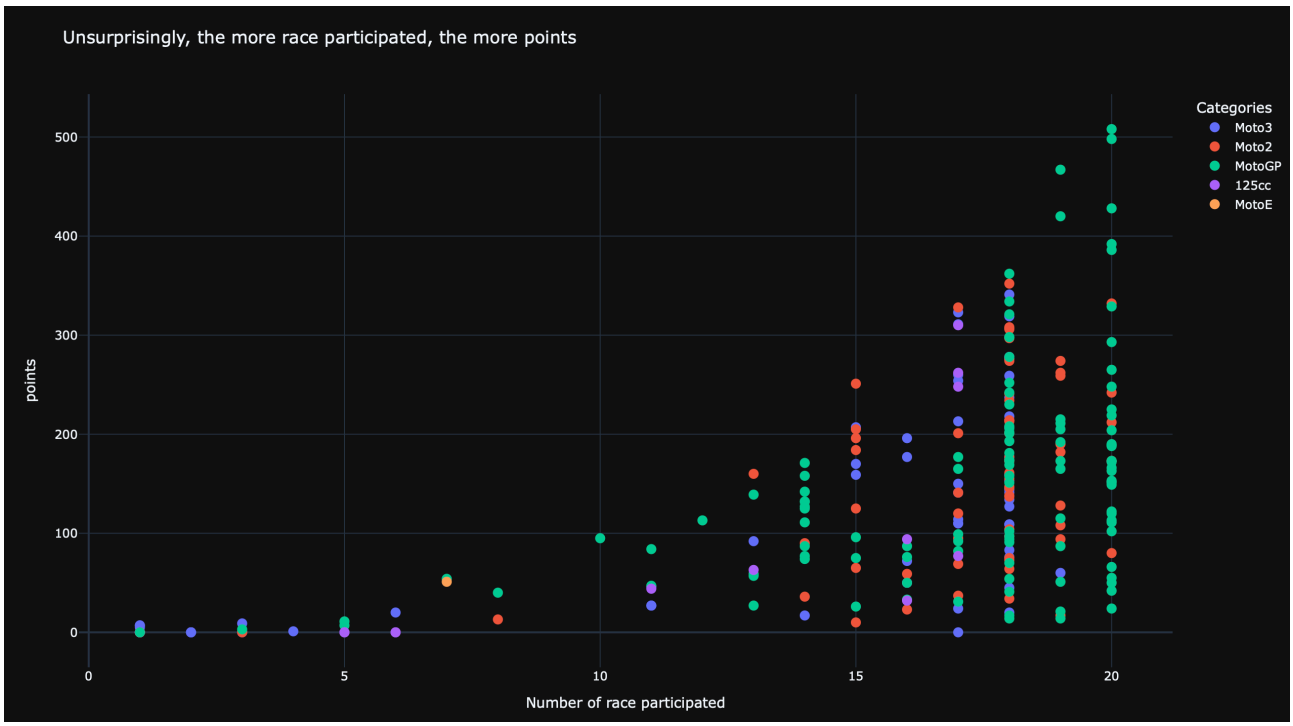


*Fig 17: Plotly Scatterplot of points against number of race participated*

Testing our assumptions that when we compete in more races, the more points we get seems accurate as we can see a positive correlation between points and number of races. However, we can see an increasing variance with races, where the relationship does not seem linear but quadratic.

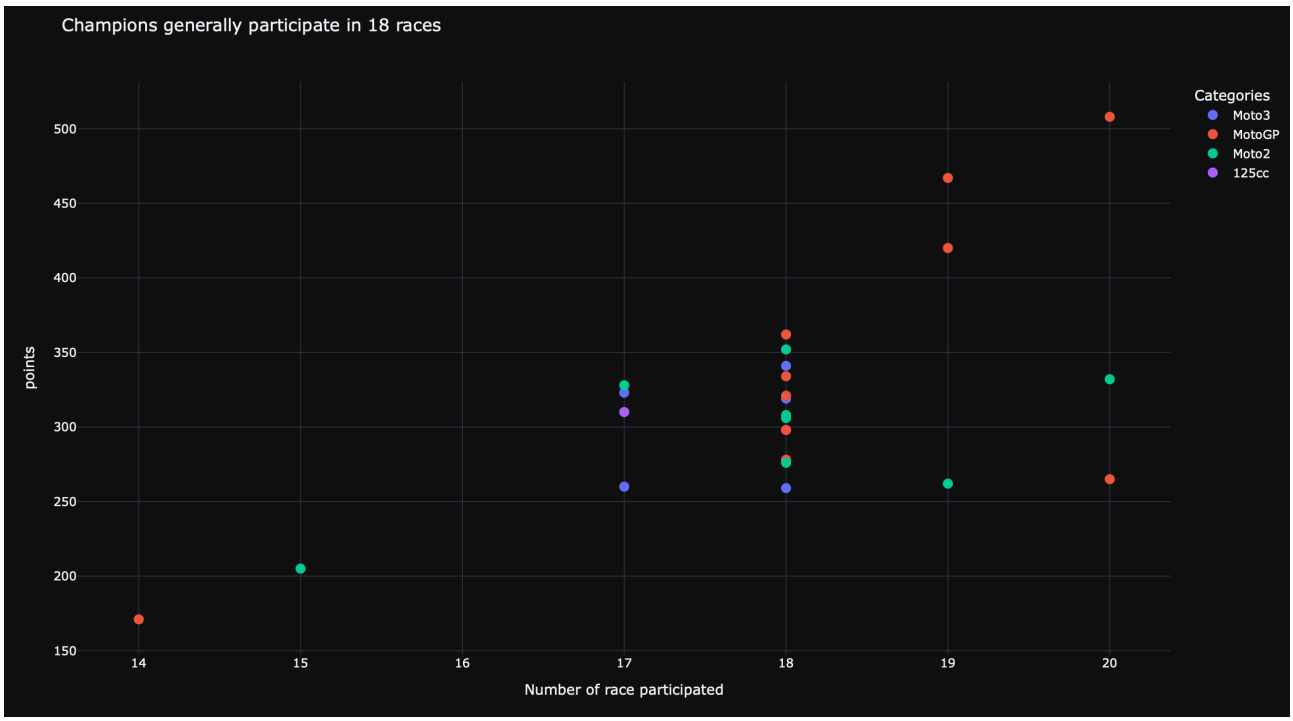


*Fig 17: Plotly Scatterplot of points against number of race participated for champions only*

Plotting only the champions, we can see the minimal number of race participated is 14 but most of the time, champions compete in 18 races.

# Championship Analysis

Which riders have won the most world championships, and how many points did it take them to achieve each championship?


*Fig 18.0 ; 18.1: Seaborn barplots of Distribution of championship podiums among riders in all classes and MotoGP*

We can see Marquez is the Champion of all classes with 8 championships and 6 championships in MotoGP. He is champion 50% of time he raced in MotoGP. We can see Bagniaia is the main competitor of Marquez in terms of Championship with a mean of 0.33.


*Fig 19: Plotly Lineplot of Marquez points over seasons*

We can see Marquez being champion most of the time when he managed to reach 298 points. The only instance when he did not became champion was in 2024. Making some research in 2024, Marquez ended 3rd on Ducati behind Bagnaia (498 points) and Martin (508 points) breaking a record of points in a season.

# Conclusion/evaluations

The rider performance analysis shows that riders have different trajectories. When focusing on champions, we can notice drops in wins, points and ranks generally when going in the superior class but we can notice exceptions such as when Quartararo upgraded to MotoGP in 2019. We can see Martin and Bagnaia being recent serious competitor of Marquez and they recently scored new record of highest points. However, Marquez experience seems to have been a regular champion until 2020, where he got injured (Turner, 2025). According to data, he struggled to come back in top riders but managed to integrate Top 3 in 2024.

The motorcycle analysis shows a dominance of Ducati and Honda across classes in terms of numbers of bikes, riders and victories while Aprillia seems to be the least present. We can hypothetically say that Honda could enjoy its dominance with Marquez. While not necessarily be significantly more present than other makes, Honda enjoyed significantly more wins until 2020. At that time, Marquez was riding Honda (Repsol) and won several MotoGP until he broke his arm. From then, Ducati become the leader not only by winning with Bagnaia and Martin but also be present in many more teams, with a much higher number of Bikes. Now that Marquez is back in top riders and is riding a Ducati, it is likely that the make dominance will increase.

The country analysis shows dominance of Spain in terms of riders, podiums, wins and champions. Spanish riders includes champions such as Marquez or Martin but also champions in other categories than MotoGP such as Vinales, Mir or Acosta. It is also interesting to point that Joan Mir became champion with only one win in the same season. Italy engage other riders such as Bagnaia, Morbidelli or Bastianini and generally rider distribution is Europe-centered with Spain, Italy and France, before other countries such as South Africa, Australia or Japan engage their respective rider.

Dealing with metrics, Marquez is dominating the number of poles and fastest laps. When understanding if a relationship exists between ranks and number of races participated, it seems both are positively correlated until 13 races participated, where relationship does not seem to exist anymore. There also seem to be a point/number of race relationship, which does not seem to have a linear correlation, as we can see variance increasing with number of races. Usually a champion makes 18 races a season.

Finally, a championship analysis of Marquez indicates that he has been a regular champion over the years and dominates MotoGP stats. We can see that he usually a champion when he manages to score 298 points, except in 2024 when he did not ended champion. That year, Bagnaia and Martin break points records, with Martin as champion with 508 points. However, Marquez is on a rising curve, so he should be not be an outsider next year.

# Bibliography

Oxley, M (2020) 'How does Joan Mir's MotoGP title rate against the previous 71?', Motor Sport Magazine, Retrieved November 6th, 2025, from https://www.motorsportmagazine.com/articles/motorcycles/motogp/how-does-joan-mirs-motogp-title-rate-against-the-previous-71/

Turner, V (2025) 'Marquez's comeback from 'nightmare' to contender', BBC Sport, Retrieved November 6th, 2025, from https://www.bbc.com/sport/motorsport/articles/c79e7pln4r9o

# Appendix - Scripts

**Rider Performance and Career Trajectory:** Rider Performance and Career Trajectory.py

**Motorcycle Analysis:** Motorcycle Analysis.py

**Country and Rider Analysis:** Country and Rider Analysis.py

**Specific Performance Metrics:** Specific Performance Metrics.py

**Championship Analysis:** Championship Analysis.py