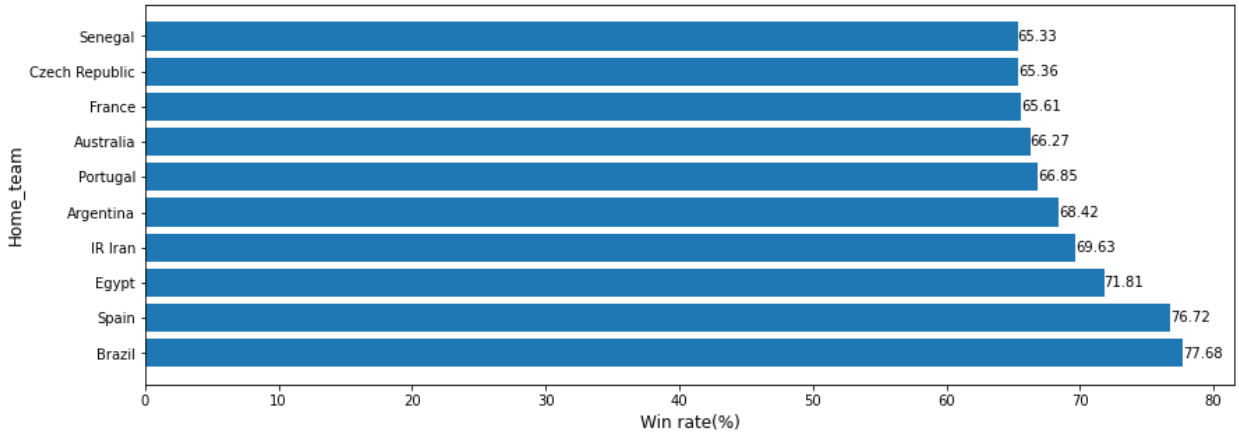
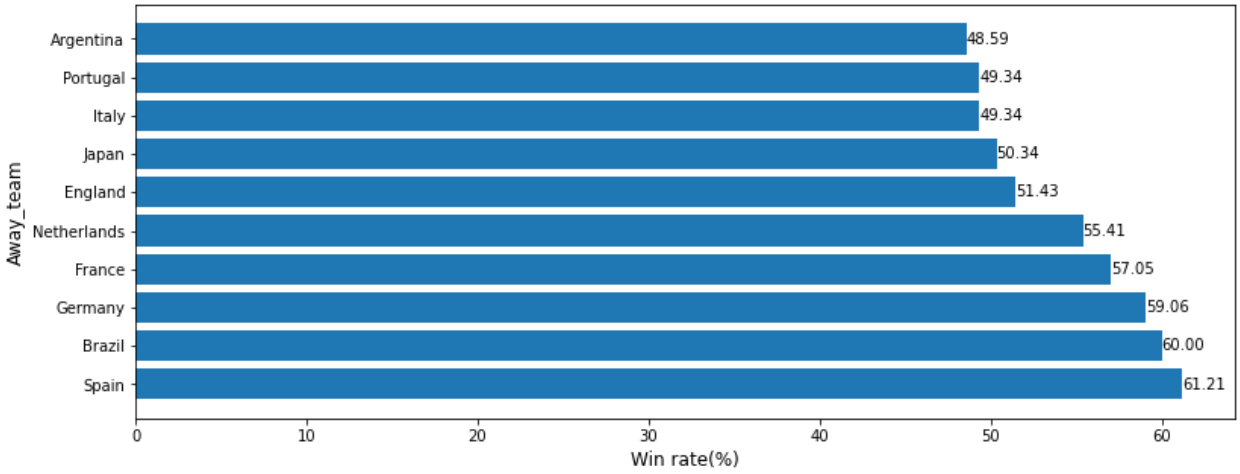
Is there really such a thing as a home-team advantage?

When I first saw the question I thought that home-team advantage was non-existent because it was just a change of venue for the players, but after I saw some data I realized that the home-team advantage was true. First I first looked at the top ten FIFA teams with the highest home and away win rates and then I found that for example, Brazil, a strong elite soccer team, at home game their win rate is 77.68% but on the away game it is reduced to 60% and we see that the highest win rate of home-team, Brazil has 77.68% while the highest win rate of the away team, Spain is only 61.21%. This difference is almost 16% of the winning percentage.

Top 10 home-team win rates:

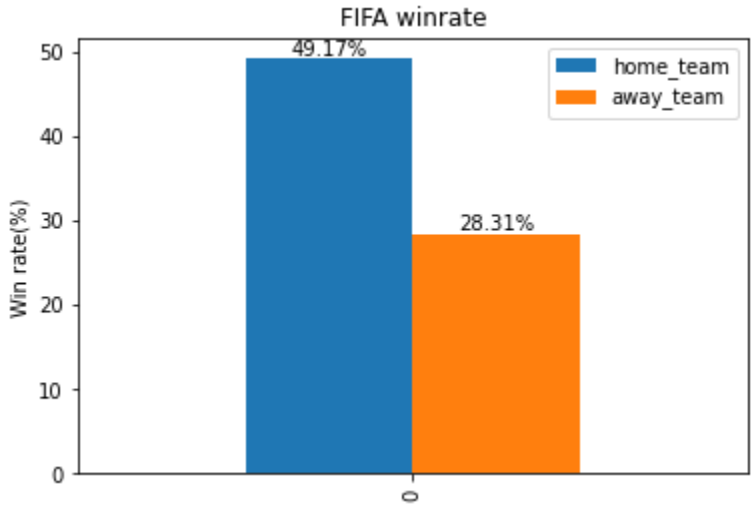


Top 10 away-team win rates:

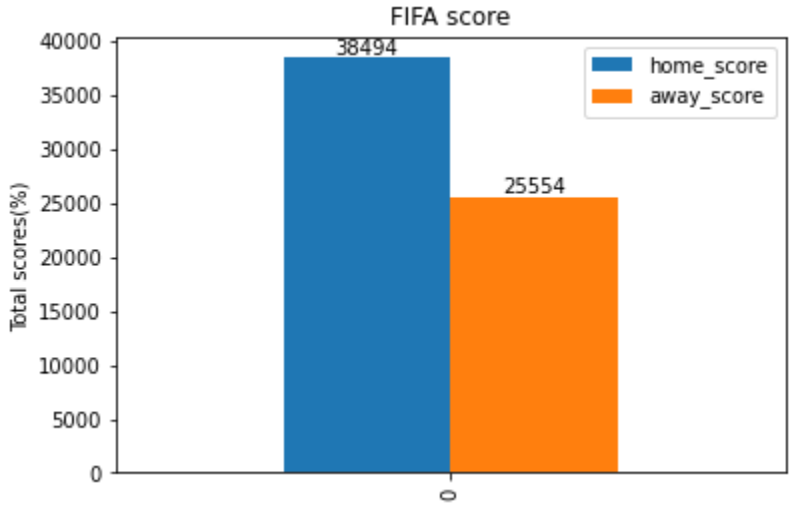


After looking at the individual team win percentages I looked at the total win percentages for both sides and found that the home win percentage was also overwhelmingly higher than the away game at 49.17% while the away game was only a paltry 28.31% and the number of goals scored at home was 38,494 while the away game was only 25,554. All of this shows that the team's win percentage at home is much higher than when playing as an away team. Of course, there are many factors other than the venue that can affect the game and really create a home-field advantage such as the number of local spectators, the condition of the players on the day, the weather, etc.

Total win rates:

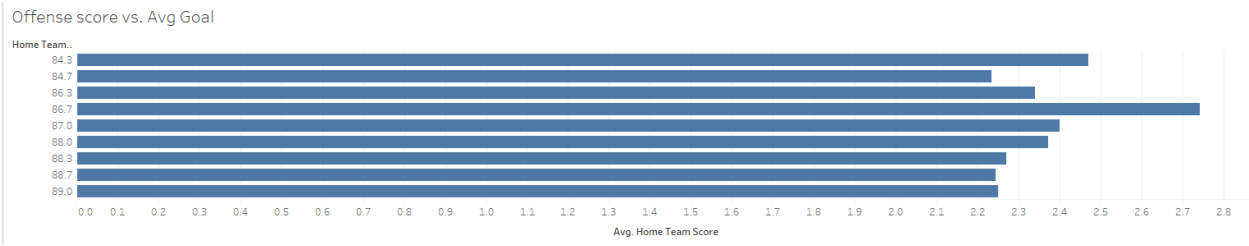


Total scores(Goals):

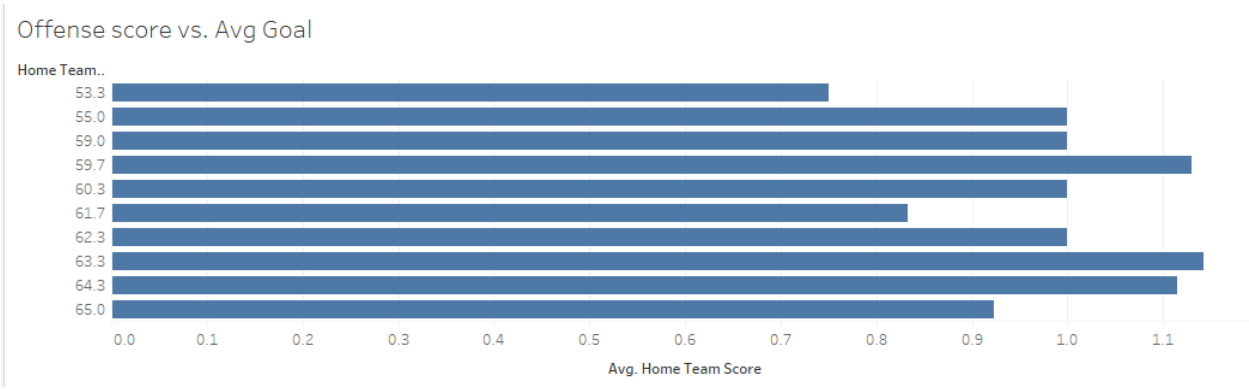


Do teams with stronger offensive players score more goals? And do teams with stronger goalkeepers receive fewer goals?

The charts below are filtered with more than 10 games.

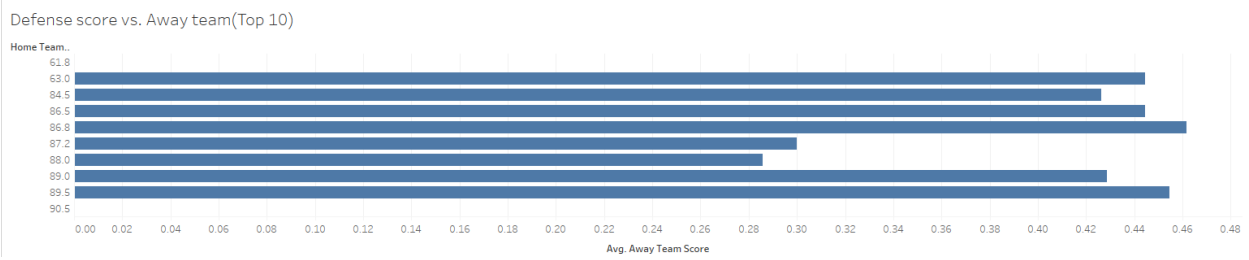


This chart above represents the top 10 home teams with the most player offense points and scoring averages, and from which we can see that they are all above 80 offense scores and their average goal is at least 2.

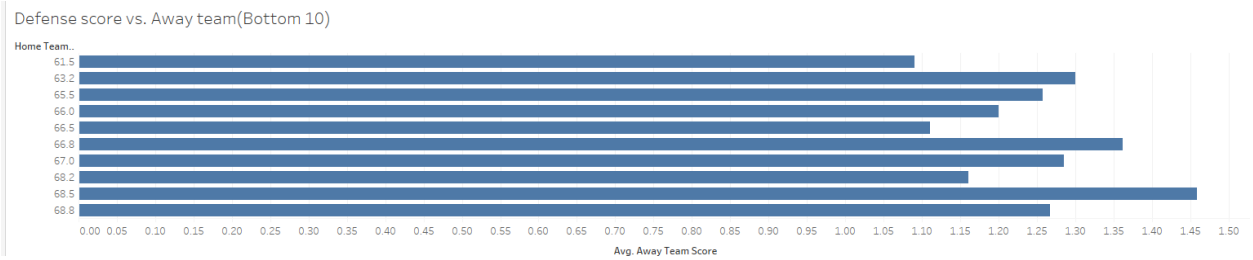


This chart represents the bottom 10 home team with the most player offense points, and all of their offense is around 60 or below 60, and their average goal is below 1. Comparing these two charts, we can see that teams with high offensive scores score more goals on average than teams with low offensive scores. Based on this, I wouldn't conclude that a player's offensive score equals that they can score more goals, but it is certainly one of the most significant factors that lead to more goals.

Next, we look at the home team defense score vs. Avg away team score.



This is the chart of top 10 home team with defense score and its opponent's scoring averages. From that, there are two data that I didn't expected which are the score of 60.5 and 63.0 because rest of the defense scores of the top 10 are all above 80. All of the scores are below the average of 0.60 meaning they received less than 0.6 goal per game .



This chart represent the bottom 10 home team with defense score and its opponent's scoring averages. This graph seems better than the last one where it all in a range of 60-70, and they have an average over 1 of receiving goal which means they got scored at least 1 goal per game.

After looking at the graph of offensive and defensive scoring vs. goals against average, I can conclude that it has a big impact on a team's strength of scoring/being scored, but it does not directly determine whether a team can score more goals or less goals through their scoring. For example, if a team has a low defensive score but a high offensive score and they receive fewer goals because their striker destroy (not sure if this is the right word) their opponents, then this would be a case of a low defensive score but still scoring fewer goals, which also happens with a defensive score of 60.5 and 63.0.

Just some random finding, the column with the highest correlation to home_team_score is away_fifa_rank.

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Most Positively Correlated Column: away_team_fifa_rank
Maximum Correlation Value: 0.29898230957861455
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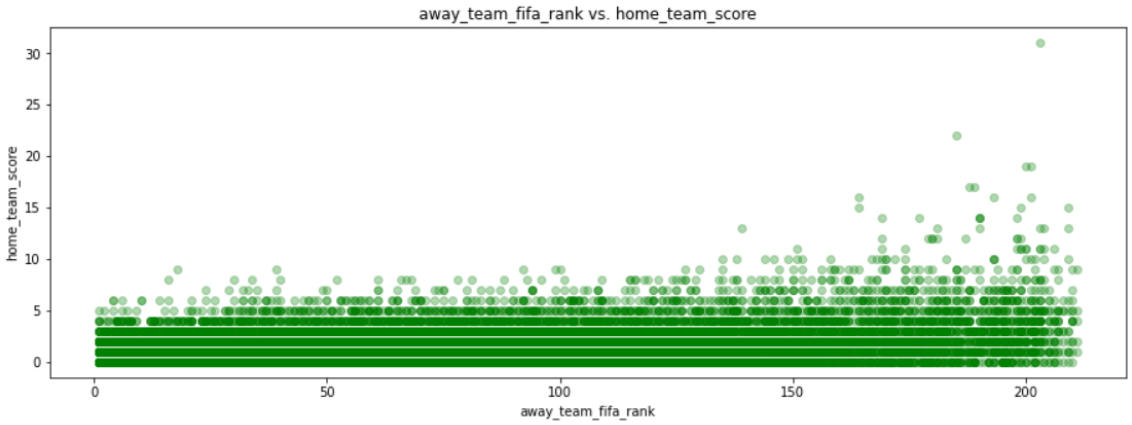
This is not a significantly high value, but it still has some relationship between the away_team_fifa_rank to the home_team_score because the rank could represent a team's strength, and the weaker the away team is, the easier it is for the home team to score because there is strength gap in between.



From this graph, we can see that it is quite even until rank 150 where the home team score goes up from an average of 9-10 to a maximum of 30 scores.