Predicting whether the Los Angeles Lakers will have enough wins to directly advance to the 2022 – 2023 NBA Playoffs.

Purpose of the Project

The purpose of this project is to predict whether the Los Angeles Lakers will have enough wins to directly advance to the Playoffs for the 2022 – 2023 season by performing a set of correlation and regression analysis. This will allow the team to determine if changes within the organization is necessary.

About the Project

The NBA can be defined as having 2 distinguished periods throughout a season. The first, is the regular season which consists of 30 teams that play 82 games, and the second, a postseason tournament called the "Playoffs" to determine the league champion. Prior to the 2019 – 2020 season, teams that finished within the top 8 seeds in their respective conference, the East and the West, were advanced to the Playoffs. However, with the introduction of the Play-In tournament[1], only the top 6 teams from each conference advance to the Playoffs while teams that finish the season between 7th and 10th seed compete for the final 4 spots (2 spots in the East and 2 spots in the West).

Therefore, this analysis will look at the statistics of an NBA team to determine whether the Los Angeles Lakers will achieve enough wins to finish the season within the top 6 places from each conference, guaranteeing the team a spot in the Playoffs.

Throughout this report, all basketball statistics are related to a team as a whole, not an individual player.

Analysis Summary

[1] The play-ins, a preliminary tournament that determines the final two playoff seeds in the Eastern Conference and Western Conference, was introduced in the 2020 – 2021 season.

Only the top 6 seeds in each conference directly advance to the Playoffs. In the Western Conference, the 6th seed wins, on average, 49 games in the regular season. The Los Angeles Lakers are predicted to win 44 games in the regular season; therefore cannot directly advance to the Playoffs. To win 49 games, the team needs an NRtg of 4.5. However, the Los Angeles Lakers have a NRtg of 1.6. The team should look to change the rotation of their current roster to reach a more optimal NRtg or bring in key players that will have a positive impact towards increasing the NRtg in order to win more games in the regular season to directly advance to the Playoffs.

Key Questions

1. How many wins does the Los Angeles Lakers need in the regular season to be guaranteed a spot in the Playoffs?
2. What does it take to win enough games in the regular season to be guaranteed a spot in the Playoffs?
3. Will the current roster of the Los Angeles Lakers achieve enough wins to guarantee them a spot in the Playoffs?
4. What can the Los Angeles Lakers do to improve their regular season record to be guaranteed a spot in the Playoffs?

Key Insights

1. The Los Angeles Lakers is part of the Western Conference; therefore, the team will need to win, on average, at least 49 games to finish within the top 6 seeds to directly advance to the Playoffs.

2. The Los Angeles Lakers need to have a NRtg of around 4.5 to win 49 games by the end of the season.

3. The Los Angeles Lakers will not have enough wins to directly advance to the Playoffs for the 2022– 2023 season. The Los Angeles Lakers, with a NRtg of 1.6, is predicted to win about 44 games by the end of the 2022 – 2023 NBA season, short of the calculated 49 games.

4. The Los Angeles Lakers should look to change the rotation of their current roster to reach a more optimal NRtg or bring in key players that will have a positive impact towards increasing the NRtg in order to win more games in the regular season to be guaranteed a spot in the Playoffs.

About the Data

The data contains season statistics for the 30 teams in the NBA (National Basketball Association) from the seasons that represent the Modern Era[2], 2013 – present. The data that represents the 2023 season was used after the statistical model was created to predict the number of wins the Los Angeles Lakers;s current roster will have by the end of the 2022 – 2023 season. From the data sources, I used the tables labeled “Conference Standings,” “Per Game Stats,” and “Advanced Stats.” I combined the data sources into 3 different tables in Excel that contained information regarding the teams’ standings at the end of the season, advanced team statistics, and per game statistics. In R, the 3 tables were combined to create one large dataframe with a total of 58 columns.

Data Sources:
2022 - 2023 Season
2021 - 2022 Season
2020 - 2021 Season
2019 - 2020 Season
2018 - 2019 Season
2017 - 2018 Season
2016 - 2017 Season
2015 - 2016 Season
2014 - 2015 Season
2013 - 2014 Season

Tools Used:
RStudio

1. tidyverse (dplyr, ggplot2)

In Depth Analysis

1. How many games does the Los Angeles Lakers need to win to advance to the Playoffs without going through the Play-in tournament?

To advance to the Playoffs, without going through the Play-In tournament, a team needs to finish within the top 6 seeds in their respective conference. Therefore, by calculating the number of games the 6th seed wins in the regular season, it will benchmark the minimum number of games a team will need to win to advance to the Playoffs.

[2] 2013 to present, a period characterized with more efficient shot selections by rewarding three-point shots compared to the two-point shots (https://content.iospress.com/articles/journal-of-sports-analytics/jsa200525)

To begin the calculation, all 30 teams in the league were split into their respective conferences, and the average percentage of games the 6th seed in the East and the 6th seed in the West won were calculated. The average percentage of games the 6th seed in each conference won was calculated because there were 2 regular seasons where the full 82 games were not played due to COVID-19. Then, this value was multiplied by the standard 82 game season, providing an average number of games the 6th seed in East and 6th seed in the West won throughout the Modern Era of basketball.

Formula:

East Win Percentage = (Total Wins / Total Games) x 100
East Win Percentage = 53.5%
West Win Percentage = (Total Wins / Total Games) x 100
West Win Percentage = 59.9%

Average Wins = Win Percentage x 82 Games
East Average Wins =0.535 x 82
East Average Wins = 43.9
West Average Wins =0.599 x 82
West Average Wins = 49.1

The 6th seed in the East wins, on average, 44 games. The 6th seed in the West wins, on average, 49 games.

The Los Angeles Lakers is part of the Western Conference; therefore, the team will need to win, on average, at least 49 games to finish within the top 6 seeds to directly advance to the Playoffs.

2. What does it take to win, on average, 49 games in the regular season to directly advance to the Playoffs?

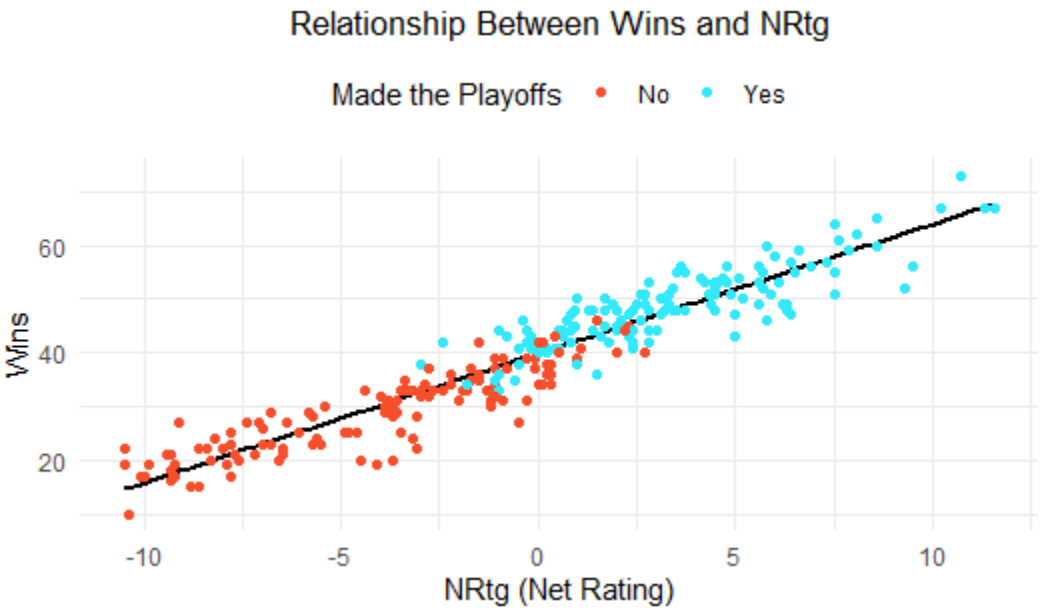
The Los Angeles Lakers need to win 49 games in the regular season. So, how does a basketball team win games?

The basketball team that scores more points than their opponent by the end of regulation wins. Therefore, the basketball statistic that represents the score and also is related to winning was found by performing a Pearson correlation test between columns that represent the total number of wins to 46 other variables that represent the offensive statistics and defensive statistics from all 30 teams in the association.

From these calculations, the NRtg (team's net rating) has the highest correlation with 0.95. The NRtg is the difference in the score per 100 possessions. It will display the quality of play and the quality of the team.

In order to determine the necessary NRtg to win 54 games in the regular season, a linear regression model was created (Figure 1).

Figure 1




```
Call:
lm(formula = W ~ NRtg, data = df)

Residuals:
    Min      1Q  Median      3Q     Max
-11.6338  -2.3582   0.1805   2.6591   9.0763

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 39.83787    0.23705  168.06   <2e-16 ***
NRtg         2.40815    0.04943   48.72   <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 3.895 on 268 degrees of freedom
Multiple R-squared:  0.8986,  Adjusted R-squared:  0.8982
F-statistic:  2374 on 1 and 268 DF,  p-value: < 2.2e-16
```

Figure 1 shows a positive relationship between the NRtg and wins, and the linear regression model shows that the results are highly significant. This means that teams with a higher NRtg are more likely to win.

Our regression equation to calculate the number of wins is:

$$Wins = 39.83787 + 2.40815(NRtg)$$

To be guaranteed a spot in the Playoffs, a team needs approximately 55 wins during the regular season. So, the necessary NRtg can be calculated by using the regression model created:

$$49 = 39.83787 + 2.40815(NRtg)$$
$$NRtg = 4.5$$

The Los Angeles Lakers need to have a NRtg of around 4.5 to win 49 games by the end of the season.

3. Will the current roster of the Los Angeles Lakers achieve enough wins to directly advance to the Playoffs?

To determine if the current roster of the Los Angeles Lakers will have enough wins to guarantee them a spot in the Playoffs, the NRtg of the current team needs to be calculated.

This is done by taking the difference of the ORtg (team's offensive rating) from the DRtg (team's defensive rating):

$$NRtg = ORtg - DRtg$$

To determine which variables have a statistical relationship with the ORtg and the DRtg, two Pearson correlation tests were performed. These 2 correlations compared the ORtg and the DRtg from all 30 teams, across 9 seasons, across 46 different variables that represented the offensive and defensive statistics.

Variables highly correlated to the ORtg:

- TS% has a positive correlation of 0.903844287
    - TS% = a measure of shooting efficiency that takes into account 2-pointers, 3-pointers and free throws
- eFG% has a positive correlation of 0.879423785
    - eFG% = Statistics adjusted for the fact that a 3-point field goal is worth one more point than a 2-point field goal percentage

Variables highly correlated to the DRtg:

- OeFG% has a positive correlation of 0.91730576
    - OeFG% =Opponent's statistics adjusted for the fact that a 3-point field goal is worth one more point than a 2-point field goal percentage
- PA/G% has a positive correlation of 0.86309331

- PA/G% = Opponent's points per game

ORtg (Offensive Rating) Calculation

First, the variables that correlated with the ORtg were fitted into a multivariate regression model to understand how these variables combined affect the offense of a team.

Figure 2

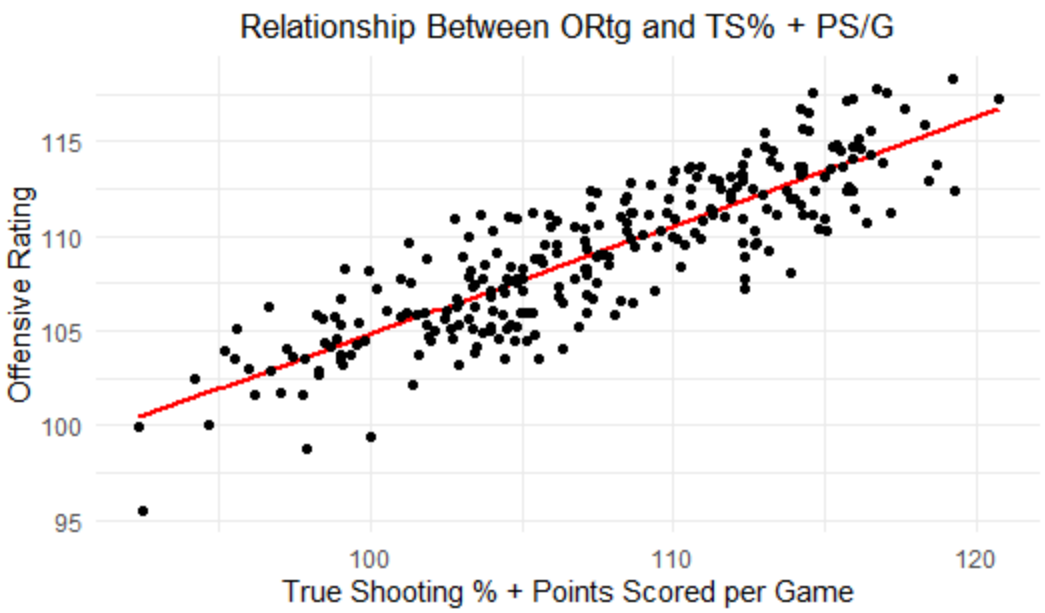
```
Call:
lm(formula = ORtg ~ TS. + eFG., data = df1)

Residuals:
    Min      1Q  Median      3Q     Max
-4.5668 -1.1866 -0.1145  1.1928  5.8777

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   12.390      3.121   3.970 9.25e-05 ***
TS.          195.288     24.274   8.045 2.83e-14 ***
eFG.         -22.341     22.608  -0.988    0.324
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.72 on 267 degrees of freedom
Multiple R-squared:  0.8176,  Adjusted R-squared:  0.8162
F-statistic: 598.4 on 2 and 267 DF,  p-value: < 2.2e-16
```

From the regression model, we see that the eFG% is not significant, meaning that there is no statistical relationship between the eFG% and ORtg.

Instead, another multivariate regression model was created by substituting the eFG% with the PS/G (points scored per game), the next highest correlation to the ORtg.

PS/G has a positive correlation of 0.858321231.

Figure 3



Call:
lm(formula = ORtg ~ TS. + PS.G, data = df1)

Residuals:

Min	1Q	Median	3Q	Max
-4.3440	-1.0509	-0.0255	1.0124	4.5629

Coefficients:

	Estimate Std.	Error	t value	Pr(>|t|)
(Intercept)	19.41223	2.56342	7.573	5.98e-13 ***
TS.	117.25455	8.04738	14.571	< 2e-16 ***
PS.G	0.23086	0.02836	8.140	1.51e-14 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.542 on 267 degrees of freedom
Multiple R-squared: 0.8533, Adjusted R-squared: 0.8522
F-statistic: 776.7 on 2 and 267 DF, p-value: < 2.2e-16

From Figure 3, the results show that the "signif. code" (p-value) is between 0 and 0.001. This shows a high significance between the ORtg, TS%, and PS/G. It also shows a positive relationship between the variables ORtg and the TS% + PS/G.

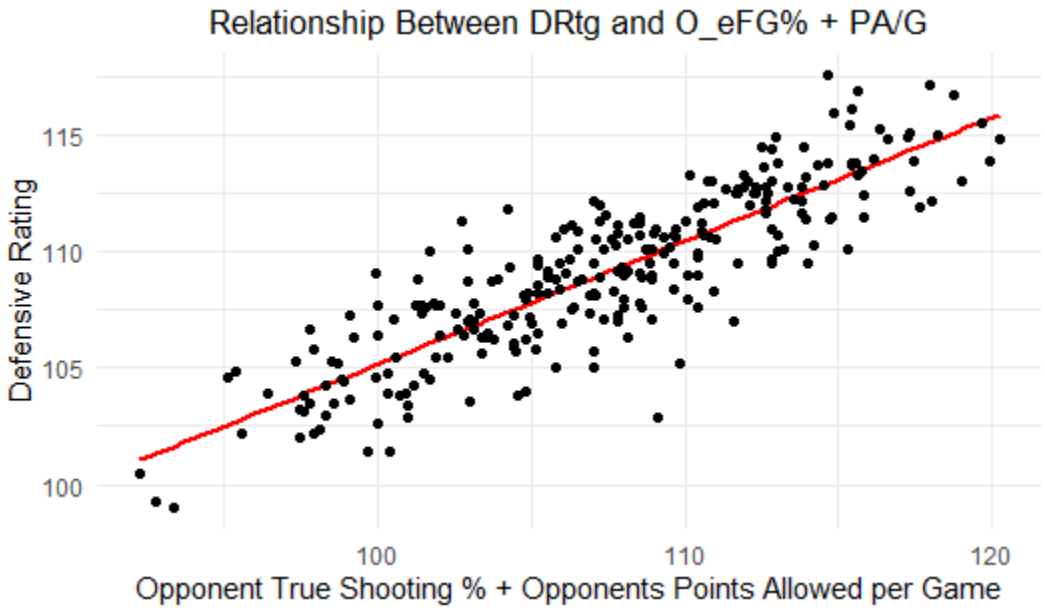
From Figure 3, the Los Angeles Lakers's ORtg can be calculated:

$$ORtg = 19.41223 + 117.25455(TS\%) + 0.23086(PS/G)$$

DRtg (Defensive Rating) Calculation

Another multivariate regression model was created to understand the relationship between the O_eFG% and PA/G to the DRtg of a team.

Figure 4



Call:
lm(formula = DRtg ~ O_eFG. + PA.G, data = df1)

Residuals:

Min	1Q	Median	3Q	Max
-3.5615	-0.7996	-0.0682	0.8688	3.1836

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	28.47503	1.95587	14.56	<2e-16 ***
O_eFG.	112.27513	6.46080	17.38	<2e-16 ***
PA.G	0.21032	0.02259	9.31	<2e-16 ***

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.243 on 267 degrees of freedom
Multiple R-squared: 0.8803, Adjusted R-squared: 0.8794
F-statistic: 981.9 on 2 and 267 DF, p-value: < 2.2e-16

From Figure 4, the results show that the “signif. code” (p-value) is between 0 and 0.001. This shows a high significance between the DRtg, O_eFG%, and PA/G. It also shows a positive relationship between the variables DRtg and the O_eFG% + PA/G.

From Figure 4, the Los Angeles Lakers’s DRtg can be calculated:

$$DRtg = 28.47503 + 112.27513(O\_eFG\%) + 0.21032(PA/G)$$

With Figure 3 and 4, the Los Angeles Lakers’s NRtg can be calculated:

Los Angeles Lakers’s Basketball Statistics:

TS% = 0.582
PS/G = 117.2
O_eFG% = 0.535
PA/G = 116.6

$$ORtg = 19.41223 + 117.25455(TS\%) + 0.23086(PS/G)$$
$$DRtg = 28.47503 + 112.27513(O\_eFG\%) + 0.21032(PA/G)$$

$$ORtg = 114.7$$
$$DRtg = 113.1$$

$$NRtg = ORtg - DRtg$$
$$NRtg = 1.6$$

With the calculated NRtg, the number of wins a the Los Angeles Lakers will have by the end of the season can be predicted by using Figure 1:

$$Wins = 39.83787 + 2.40815(NRtg)$$
$$Wins = 43.7$$

The Los Angeles Lakers will not have enough wins to directly advance to the Playoffs for the 2022– 2023 season. The Los Angeles Lakers, with a NRtg of 1.6, is predicted to win about 44 games by the end of the 2022 – 2023 NBA season, short of the calculated 49 games.

4. What can the Los Angeles Lakers do to improve their regular season record to directly advance to the Playoffs?

The Los Angeles Lakers currently have an NRtg of 1.6 and is predicted to win 44 games in the regular season. To directly advance to the Playoffs, the team needs an NRtg of 4.5 to win 49

games in the regular season. Possible recommendations are to change the rotation of their current roster to reach a more optimal NRtg or bring in key players that will have a positive impact towards increasing the NRtg in order to win more games in the regular season to be guaranteed a spot in the Playoffs.