What Defines a High Performing NBA Player?

An exploration of the defining characteristics of outstanding basketball

Dataset and Inquiry

The dataset we chose is an assortment of NBA Stats from 1947 to the Present (2024). This is a large dataset, including over 20 subsets and up to 32,000 records per field. This includes individual player and team statistics for every game played, more advanced data such as individual shooting data from different distances, and metrics like player points per 100 possessions. This breadth of data allows us to investigate the careers of various NBA players through detailed analysis of their stats.

Using this dataset, we hope to investigate the characteristics of highly successful players within the NBA. Through rigorous analysis, we hope to answer:

- What makes a player an MVP? More specifically, which criteria contribute most to the effectiveness of highly successful basketball players?
- What role does age play in the success of NBA players?

This data can help to better understand both the current trends in the sport and also allow us to examine in what ways ‘success’ within basketball has been redefined over time. Would a highly effective player from 1947 be able to keep up today? We can see the ways that the goalposts have shifted in terms of defining amazing teams and amazing players over time. Additionally, we can predict the future of the sport and what skills will be considered most valuable in years to come.

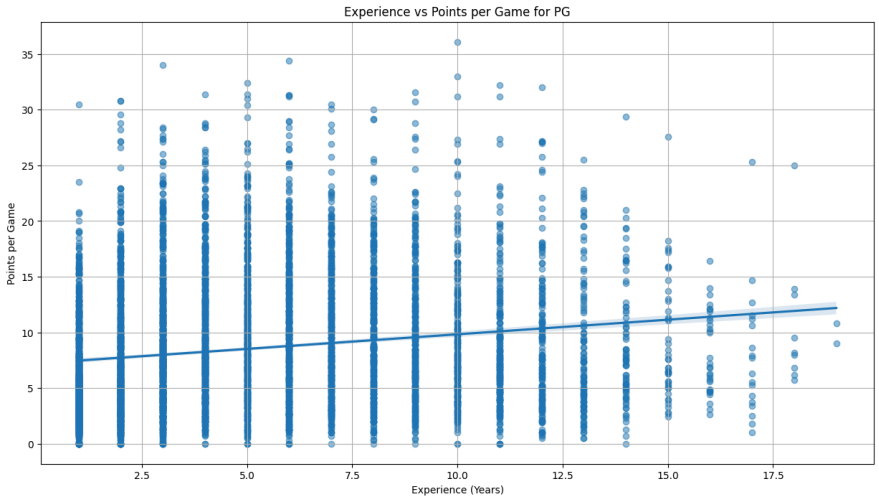
This analysis is most directly applicable to the players and coaches themselves. By deeply analyzing the characteristics of the most successful players, coaches can better understand exactly which skills need to be emphasized in training. From a wider point of view, we must also acknowledge that NBA teams operate as businesses, and valuing players appropriately is vital for contracts and deals. Our greatest tool in valuing players is looking at their strengths and weaknesses through the lens of statistical analysis. We can also model what the most effective player for any team may look like in terms of their desired skill set.

For the datasets used in the analysis, we explicitly used “PlayerPerGame.csv” and "EndSeason.csv”. “PlayerPerGame.csv” contained 31814 rows of NBA player data with attributes in game statistics, performance metrics, experience, age, team, and positions.

Experience and Age in the NBA

Question: Does more playing experience for NBA point guards correlate with higher points per game (PPG)?

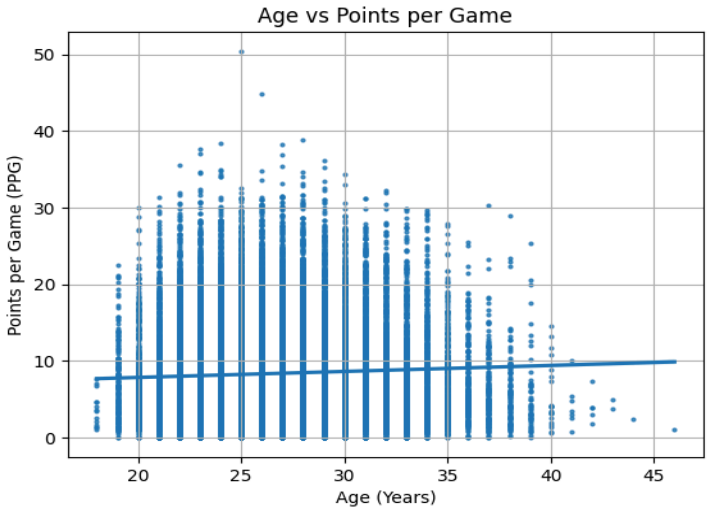
The Experience vs. Point Scored scatterplot shows a positive correlation where players with more years of experience tend to have higher points scored per game. This observation suggests that performance can generally be correlated with more years in the league which should be the case since players are more accustomed to their competition and steadily get better over the years. However, there are factors in play that aren’t accounted for in the data such as injuries to once high-performing players, duplicates of players (cross-listed as other positions - would need to pre-process the data), and we cannot see one specific player’s performance over time in this file (would need to combine with another dataset for further analysis).



Player per Game.csv

Question: Does age (in years) correlate with points scored per game (PPG)?

In this visualization, we investigated the correlation between age (in years) and points scored per game (PPG) in the NBA, to better understand the intricacies of player performance dynamics associated with age. The relationship between age and PPG reveals a less pronounced positive correlation, with a shallow increasing trendline. Notably, there is a tendency for older players to generally have slightly higher scoring outputs compared to younger athletes. This observation suggests a plausible correlation between age and enhanced scoring abilities over a player’s career trajectory. However, it is essential to note that numerous factors beyond age can contribute to this correlation. Variables such as injury history, physical condition, playing style, and players’ roles within the team may affect the observed relationship in this visualization between age and PPG. Therefore, it is imperative to account for these additional variables when interpreting the results.



Positions and Point Scoring

We determined that having more experience in the NBA is positively related to Points Per Game (PPG). However, besides age and experience of practicing hard, we want to find other factors that contribute to success. Winning as a team is important, but being an MVP is every NBA player's goal too. Utilizing "EndSeason.csv", we will determine what it takes to become an MVP by analyzing the players' positions with the most points of all seasons combined. We can further analyze the performance of the best players of the last 10 seasons and how their total points for the season are compared to the distribution of the points for other players' seasons.

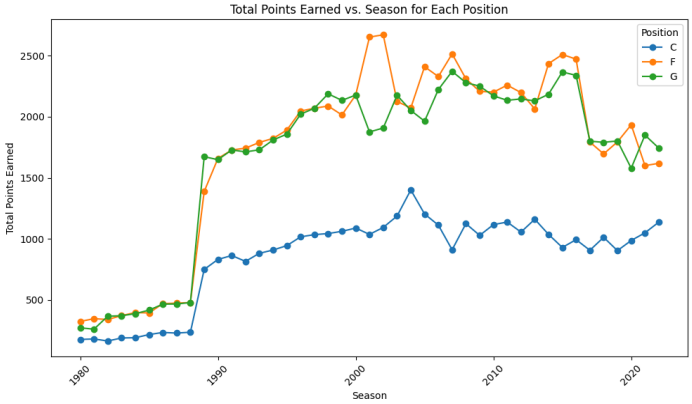


Figure 1: Position Performance Over Seasons

Across the seasons, we can determine that the forward (F) position and guard (G) position have traditionally scored the most points every season. However, if we further dig deeper into each of the positions, we can find an interesting fact about how different players score. In Figure 2: Distribution of Points Won by Position, we can determine that the range of forward (F) position is bigger than G, implying that individual players in forward position tend to score higher points across the seasons. Although their respective 50% interquartile range denotes that the majority falls under a similar range to that of the guard (G) position, the forward (F) position's median is positioned higher than that of the

guard (G) position. However, This applies differently if we consider the total amount of points scored across all seasons. Let's consider the bar graph below it.

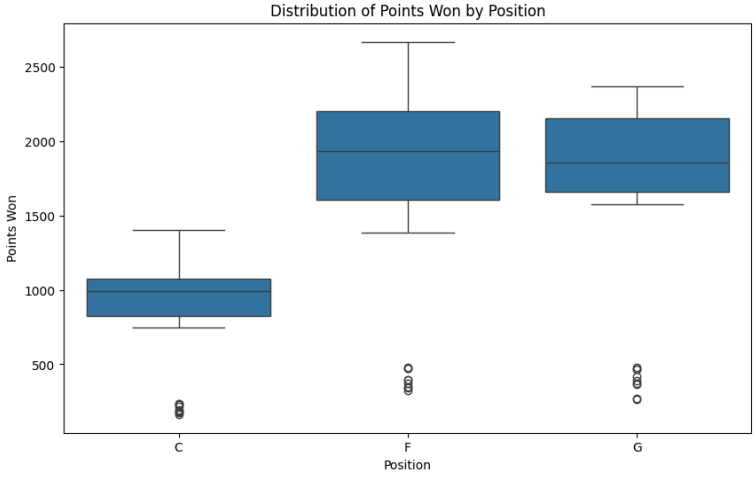


Figure 2: Distribution by Positions

Figure 3, a bar graph analysis shows that, cumulatively, guards have amassed a greater total of points than forwards. This could be attributed to the higher number of players in the guard position who maintain consistent scoring across seasons. However, on an individual level, forwards often outperform guards, suggesting that while guards contribute significantly to the overall point tally due to their numbers, forwards typically exhibit superior scoring efficiency or individual scoring capabilities. Forwards scoring more on an individual level than guards can be attributed to several factors. While guards play crucial roles in ball-handling, perimeter shooting, and setting up plays, their scoring opportunities might be more distributed or reliant on jump shots and three-pointers, which can be less efficient than shots taken closer to the basket.

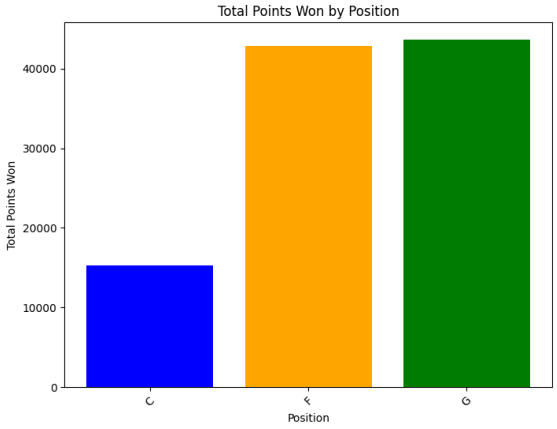


Figure 3: Total Points

Now, we should extract the best members among all seasons in terms of points and check their positions and stats.

The table below shows the top-performing players in all seasons. We can determine that out of 5 players, 3 of them were in the forward (F) position, which is contrary to the guard (G) position having slightly more total points than forward (F) position.

index	player_id	player	position	pts_won
355	3463	LeBron James	F	9046.0
280	3000	Kobe Bryant	G	7417.0
290	3092	Tim Duncan	F	6437.0
172	2252	Karl Malone	F	6143.0
246	2751	Shaquille O'Neal	C	5769.0

Then, let's consider LeBron's scoring range to the distribution of other player's scoring for every season. LeBron is chosen as a comparison object since he scored not only the most total points across all seasons but also the last 10 seasons. He exemplifies what an individual expects if he wants to be the best player in terms of points. The figure below shows LeBron's record for each season in total points he scored. Excluding the given outliers in Figure 4, we can see that in Figure 5, LeBron scores exceptionally high compared to other player's total points for every season.

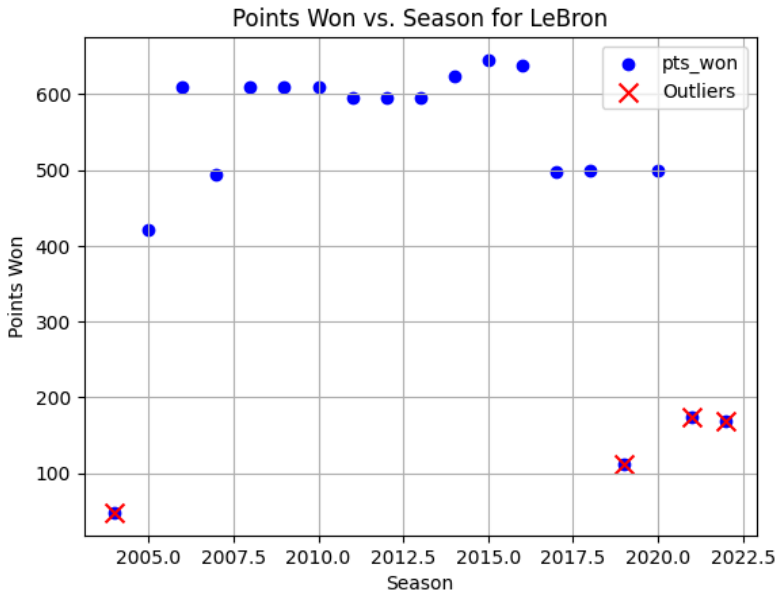


Figure 4: Lebron Scoring

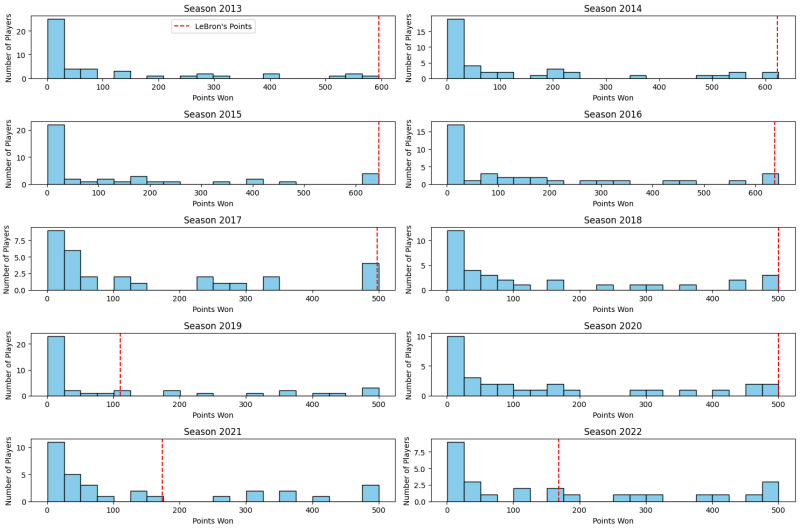


Figure 5: Distribution of Points

So, what makes a player an MVP? Being in a forward (F) position seems to give an advantage in scoring more points. To be the most exceptional player, players should expect to score consistently 500-600 points each season. The possible explanation for consistent high scores can be explained by other factors including dedicated practice routines, physical conditioning, teamwork, and game intelligence. However, we can determine that the criteria for being the best player is very high with exceptional scoring abilities and possibility of implication on what position you are in the basketball court.