

# **PROJECT REPORT – NBA ANALYSIS**

## **INTRODUCTION**

An American professional basketball league with 30 teams is called the National Basketball Association. It is regarded as the best men's professional basketball league in the world and one of the most important professional sports leagues in the US and Canada. On June 6, 1946, the Basketball Association of America (BAA), the league's original name, was established in New York City. It merged with the rival National Basketball League (NBL) on August 3, 1949, and on that day adopted the name National Basketball Association. Four clubs were added to the NBA as a result of the 1976 merger of the NBA and the American Basketball Association (ABA). With each club playing 82 games, the NBA regular season lasts from October to April. June is dedicated to the league playoff tournament. In terms of average yearly salaries per player as of 2020, NBA players are the most paid athletes worldwide.

The NBA had 11 teams when it first began in 1946, and it now has 30 teams after a series of franchise additions, subtractions, and relocations. There are 29 teams in the United States, plus one in Canada. In the current league structure, 30 teams are split into two conferences with three divisions each and five teams each. In the 2004–05 season, the current divisional structure was introduced. With 13 clubs in the Eastern Time Zone, nine in the Central, three in the Mountain, and five in the Pacific, the majority of teams are located in the eastern part of the country, reflecting the demographic distribution of the United States and Canada as a whole.

The home team advantage, win percentage, rebounds, assists, turnovers, thefts, blocks, offensive rating, plus/minus score, defensive rating, and true shooting percentage were the most often utilized factors in NBA game prediction. Other factors were true shooting percentage and plus/minus score.

Examples of basketball statistics include –

AST – assists

FG% - field goals percentage.

3FG% - three-point field goals percentage.

FT% - free throws percentage.

GM, GP, GS – games played, games started.

PER – player efficiency rating.

PTS – points

TRB – total rebound.

WS – win shares.

EFG% - effective field goal percentage.

In this tableau project, we used information on individual statistics, team standings, and game results to examine the historical performance of NBA players and teams. The dataset contains pay information as well as information on player characteristics including height, weight, position, player game statistics and teams win percentage. The project will make use of Tableau's sophisticated data visualization tools to produce perceptive and captivating

representations that reveal patterns and trends in the data. We may better understand the elements of NBA success, including as player performance, team dynamics, and financial concerns, by examining this data. The ultimate goal of this project is to offer insightful information to NBA recruiters as well as to fans and commentators who are interested in learning more about the sport.

## **AMBITIOUSNESS**

In this project, we use information on player statistics, team standings, game results, player details, teams, win percentage and salary to assess the historical performance of NBA players and teams, might be regarded as ambitious. The project entails gathering and processing a substantial amount of data from many sources and utilizing cutting-edge data visualization techniques to produce interesting and instructive dashboards. The initiative also intends to find important insights that may guide strategy and decision-making in the realm of professional basketball, which necessitates a thorough comprehension of the data and an in-depth grasp of the game. Overall, the project's ambition reflects its potential to be very valuable to NBA coaches, players, and management, as well as fans and analysts who are interested in learning more about the game.

## **RESEARCH QUESTIONS**

1. How does the NBA's wage structure relate to a player's position?
2. How do the player statistics, physical profile and winning percentages of a team relate to the positions of its members?
3. How have historical and geographical variables affected the presence of various areas and institutions in the NBA?
4. What effects have league expansion and the NBA draft process had over time on the league's talent and variety of players?

## **METHODOLOGY**

The data used for this project was sourced from multiple sources where are mentioned below.

*Historical NBA Performance* - <https://data.world/gmoney/nba-team-records-by-year>

Year - The year that the NBA regular season was played.
Team - The name of the NBA team that the information is being gathered for.
Record - A team's win-loss record during a certain NBA season. A string value with the format "W-L" is used to represent this, with W standing for the number of victories and L for the number of defeats.
Winning Percentage - The team's percentage of victories throughout the specific NBA season. A decimal value between 0 and 1, where 0 denotes that the team did not win any games and 1, denotes that the team won every game, is used to symbolize this.

*NBA Playerlist* - <https://sports-statistics.com/sports-data/nba-basketball-datasets-csv-files/>

DISPLAY_FIRST_LAST - The player's entire name, in the order of first name and last name, is displayed as DISPLAY_FIRST_LAST.
DISPLAY_LAST_COMMA_FIRST - The player's complete name, in the following format: last name, comma, first name.
FROM_YEAR - The year the player's NBA career officially began.
GAMES_PLAYED_FLAG - A flag showing whether the player participated in any NBA games during the current season.
OTHERLEAGUE_EXPERIENCE_CH - A flag that indicates if the athlete has any prior experience playing in other professional basketball leagues. A boolean value is used to represent this, with 1 denoting that the player has prior league experience and 0 denoting that they do not.
PERSON_ID - A special identification number given to the player by the NBA.
PLAYERCODE - A code used by the NBA to identify a player.
ROSTERSTATUS - A code identifying the player's present position on the roster of their squad.
TEAM_ABBREVIATION - The player's current team's three-letter abbreviation.
TEAM_CITY - The city where the player's current team is headquartered is designated.
TEAM_CODE - The NBA uses the TEAM_CODE code to identify a player's current team.
TEAM_ID - A special identification number given by the NBA to identify the player's current team.
TEAM_NAME - The player's current team's name.
TO_YEAR - The player's NBA career concluded in the year, or if they are still active, the year it is anticipated to end.

Players - <https://data.world/datadavis/nba-salaries>

Id	- A special identification number for the player typically given by their team or league.
Birth Date	- The player's birth date
birth year	- The player's birth year
birth Place	- The player's birthplace
birth City or Country	- The birth city or country of the player
career_AST	- A floating-point representation of the player's career assists per game average.
career_FG%	- A floating-point value that represents the player's lifetime field goal percentage.
career_FG3%	- The player's lifetime percentage of three-point field goals is shown as a floating-point figure.
career_FT%	- A floating-point value that represents the player's lifetime free throw percentage.
career_G	- The total games a player has participated in during their career.
career_PER	- Career Player Efficiency Rating for the player, shown as a floating-point figure.
career_PTS	- A floating-point representation of the player's average points per game across their whole lifetime.
career_TRB	- A floating-point representation of the player's lifetime rebound average per game.
career_WS	- A floating-point value that represents the player's career victory shares.
career_eFG%	- A floating-point value that represents the player's career effective field goal percentage.
College	- The player's previous college or university.
draft_pick	- The pick at which the player was selected in the draft.
draft_round	- The player's round of selection in the draft.
draft_team	- the team that selected the player in the draft.
draft_year	- the year the player was selected in the draft.
Height	- the player's height, in feet and inches.
high School	- The player's senior high school.
Name	- The player's full name.
position	- the position the athlete plays or formerly held.
Shoots	- the hand that the player uses to shoot.
Weight	- Player's weight in pounds.

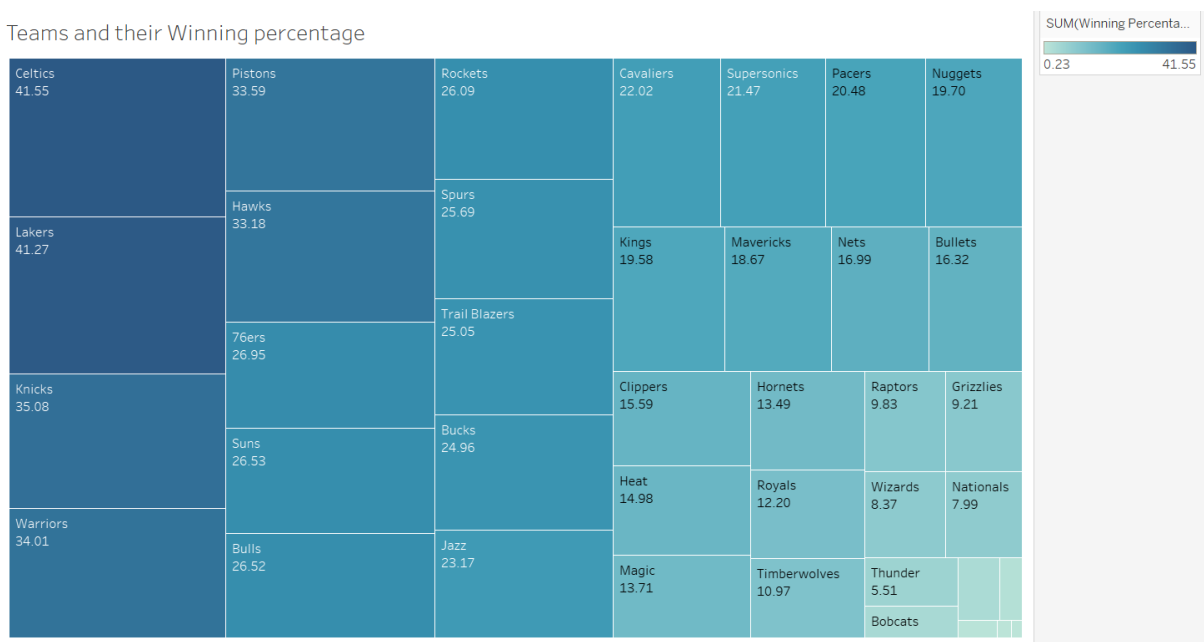
*Salary* - <https://data.world/datadavis/nba-salaries>

League	- The division in which the participant's squad competes.
player_id	- A special identification number for the player, typically given by the team or league.
Salary	- The player's pay for the current campaign.
Season	- The time period during which the pay was made.
season_end	- The calendar year when the pay period ends.
season_start	- The calendar year when the pay period began.
Team	- The group for which the athlete participated during the season.

## ANALYSIS

### Teams and their Winning percentage

Teams and their Winning percentage

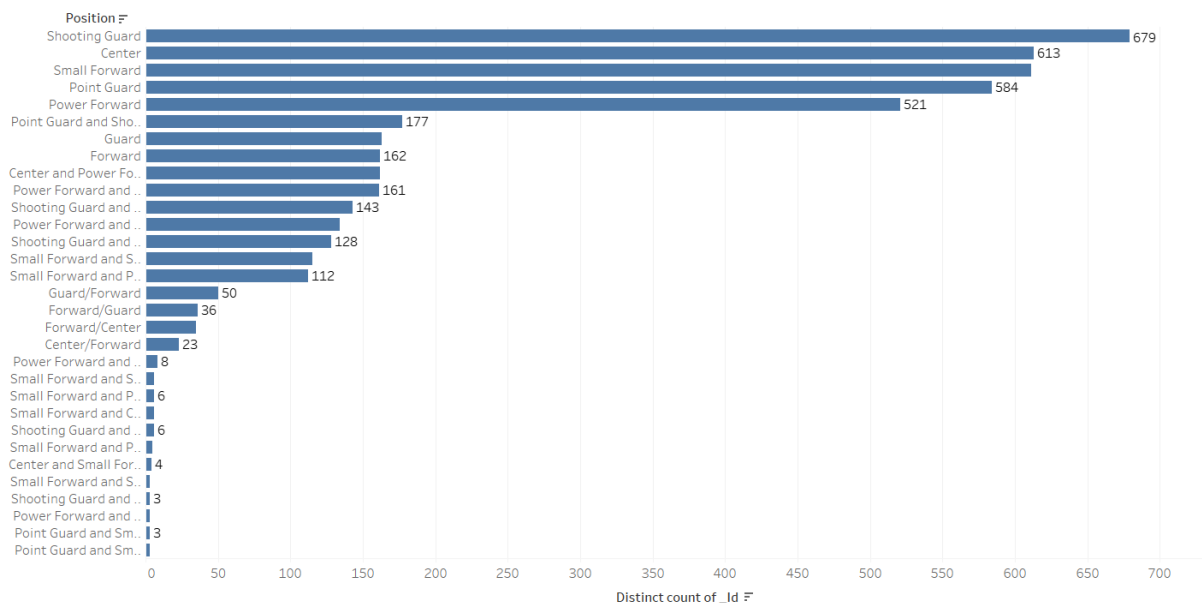


The proportion of victories for each NBA club is shown on the graph. By dividing the number of games won by the overall number of games played, one may determine their winning percentage. The graph demonstrates how different each NBA team's winning % is. The team with the greatest winning percentage prevailed in the majority of its games, whilst the team with the lowest winning percentage triumphed in fewer than 25% of its contests.

To make it simpler to distinguish between the teams, the graphic has been color-coded. Darker shade of blue indicates the team has a high winning percentage, while lighter shade of blue indicates a team has a poor winning percentage. Moderate shade of blue is used to identify the middle-range teams.

## Count of player positions

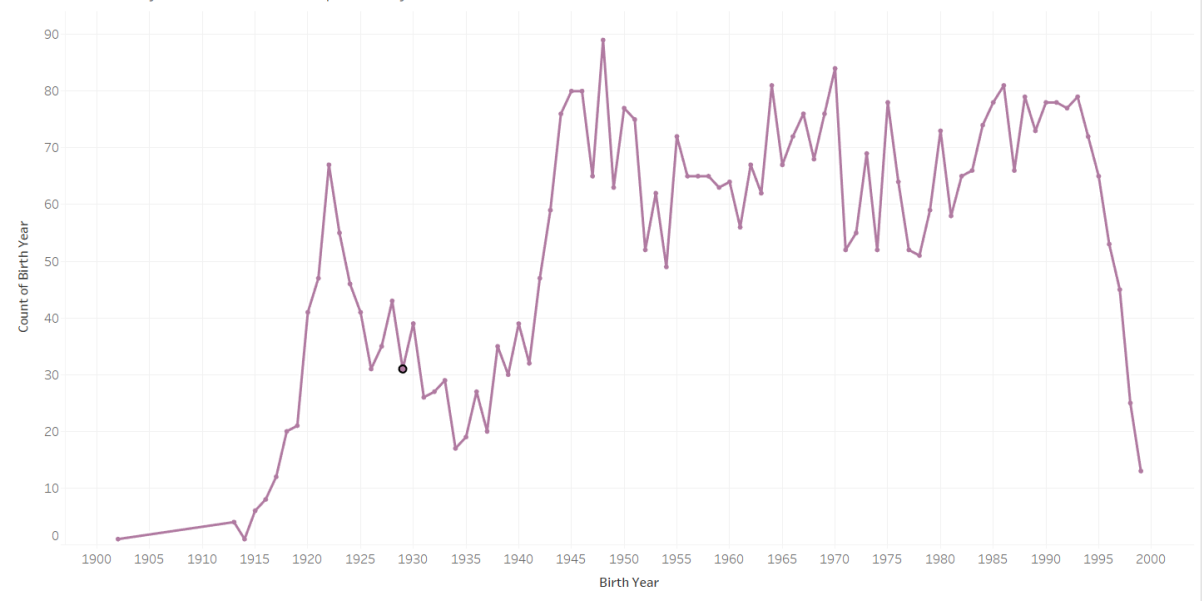
Count of player positions



The different player positions in the NBA are shown by the bar graph. Players can play in a variety of positions, including point guard, shooting guard, small forward, power forward, and center etc. The number of players at each position is shown by a separate bar in the graph. The number of players is indicated by the height of the bar; longer bars imply more players in that position. The graph may also be used to examine the distribution of player positions among various NBA leagues or divisions, as well as to spot patterns in the number of players at each position over time.

## Number of Players born with respect to year

Number of Players born with respect to year

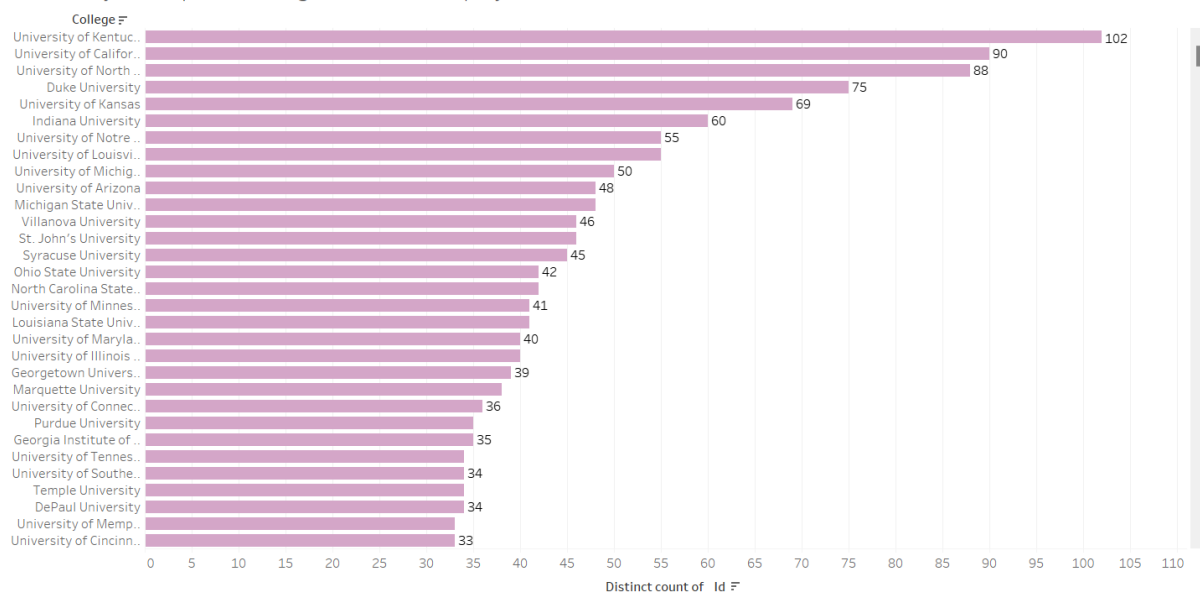


The line graph from 1900 to 2000 shows the quantity of NBA players born in each year. The graph's x-axis denotes the year of birth, and the y-axis the number of birth years. The number of players born in a specific year is shown by each point on the line. To produce a continuous visual depiction of the trend in the number of players born each year, a line is drawn between these locations.

The graph might be used to examine the NBA players' age distribution and spot historical trends in the years when players were born. It might also be used to contrast the years when NBA players were born with other demographic information, such as population growth or social and cultural events that would have affected birth rates in specific years.

## University which produced highest number of players

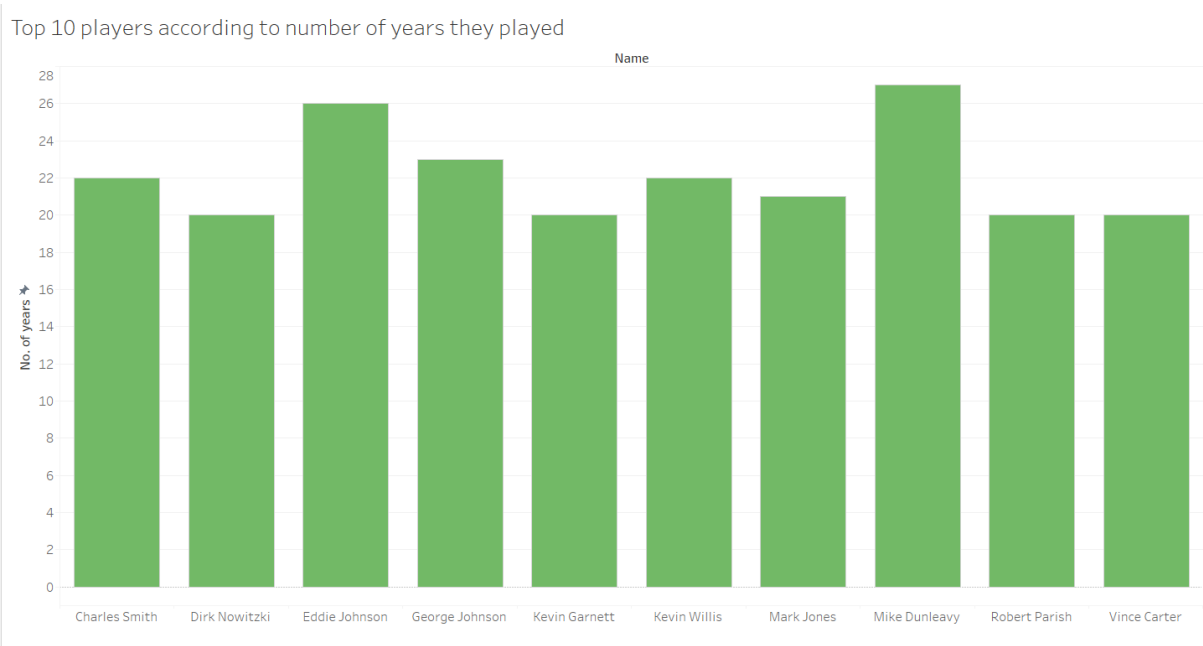
Univeristy which produced highest number of players



The bar graph shows how many NBA players each university represented in the data has produced. In the graph, each bar corresponds to a different university and the number of NBA players that attend that school. Taller bars reflect more NBA players, while the height of the bar represents the number of players produced by each university. The university that generated the most NBA players is at the top of the graph, which is arranged by the quantity of players created. At the bottom of the line is the school with the fewest NBA players.

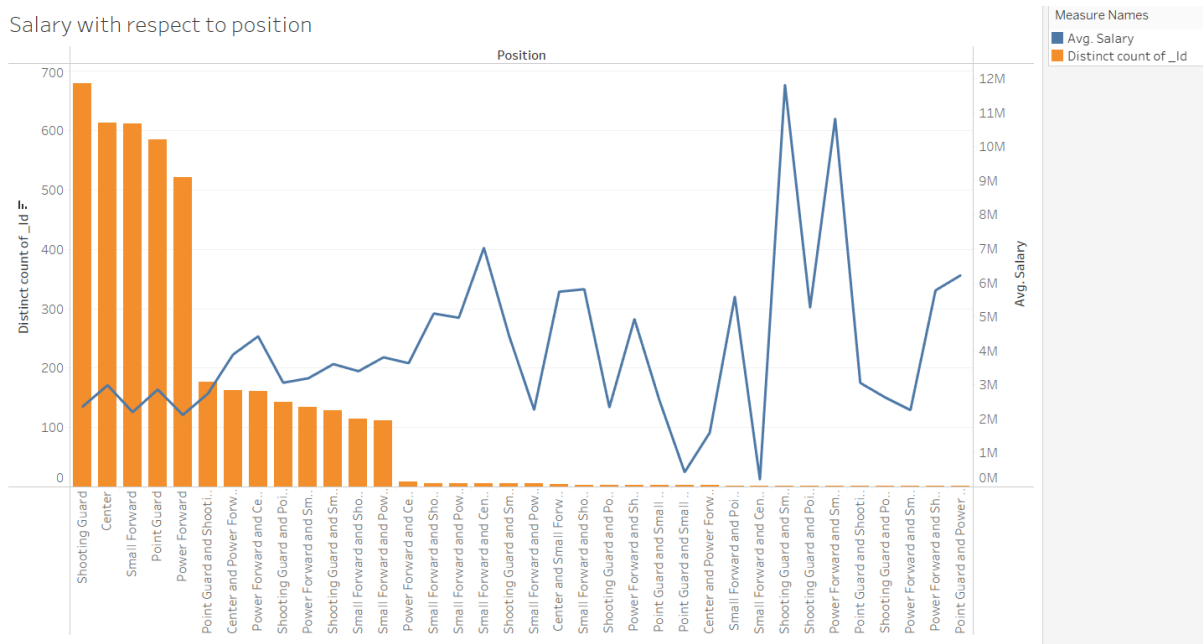
The graph's overall findings indicate that certain institutions have generated more NBA players than others. The graph might point out particular tendencies or patterns, such as colleges that have a history of producing NBA players who go on to succeed.

Top 10 players according to number of years they played.



According to how long they played in the league, the top 10 NBA players are shown in a vertical bar graph. The height of the bars on the graph, which each represent a distinct player, shows how long the player spent playing in the NBA. Players who spent more time in the league are shown by taller bars. The graph may be used to compare the number of years played by players from various eras or teams, or to examine how well various players fared in terms of longevity in the league.

Salary with respect to position



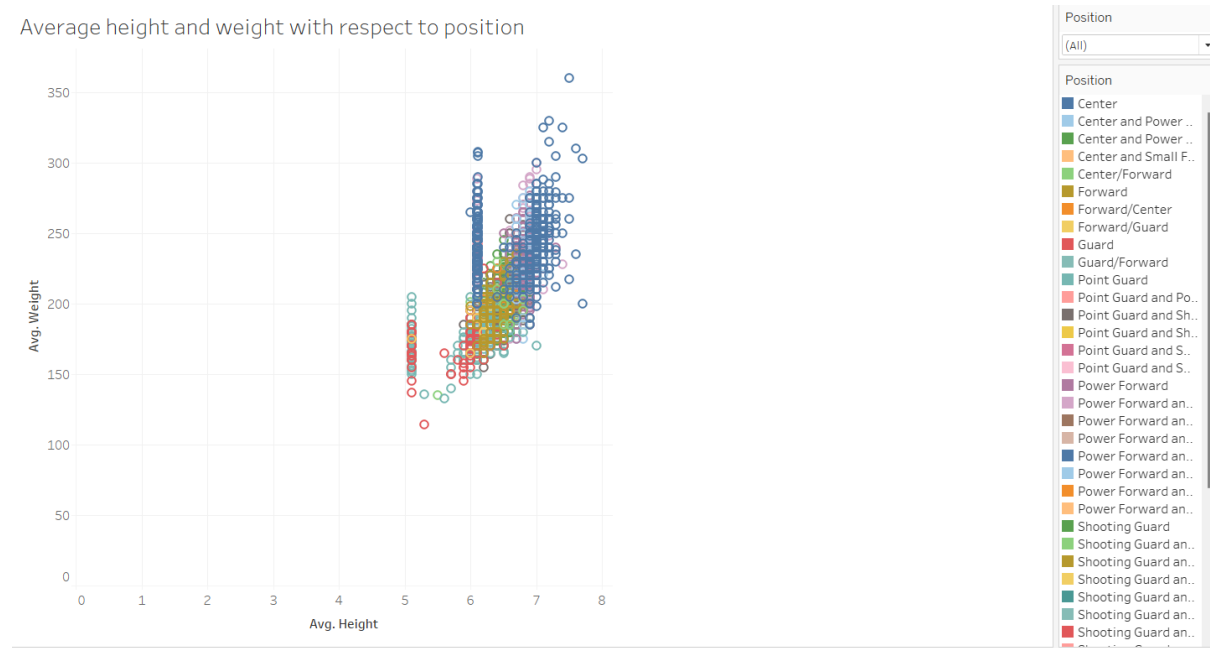
The dual axis graph compares side by side two different representations, a vertical bar chart and a line graph. The first visualization is a bar chart that shows the breakdown of NBA players by position. Each bar represents a distinct position, and the height of the bar shows how many



players are in that position. The roles might include center, small forward, power forward, point guard, shooting guard, etc. The second visualization is a line graph that shows the yearly average earnings of NBA players, with each point on the line denoting the yearly average pay. These points are connected by a line to produce a continuous graphic depiction of the trend in average incomes through time.

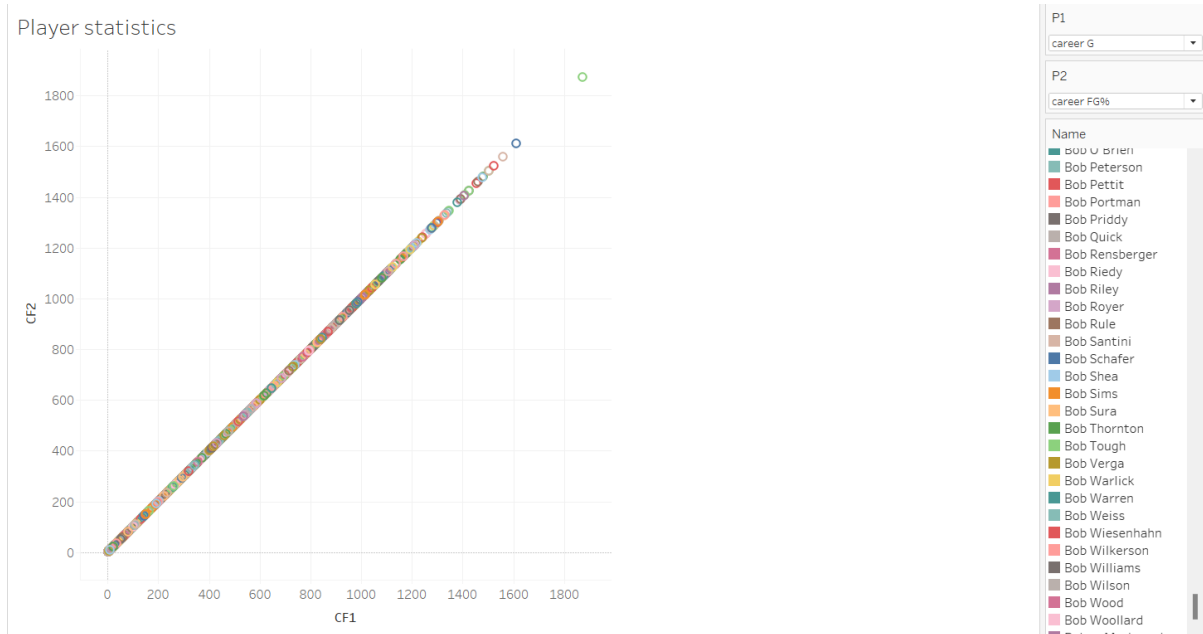
Overall, the graph demonstrates the evolution of the link between NBA players' average wages and the number of players at each position. The graph could show specific patterns or trends, such as positions with higher salary or a correlation between the number of players in a position.

## Average height and weight with respect to position



We can observe from the scatter plot that, there is a usually positive association between height and weight. Average player weight is greater for taller players and less for shorter ones. As some players may be outliers in terms of their height or weight, there is also a lot of variation within each position. You can compare the typical height and weight of players across positions since different colours are used for each player position. You may have noticed, for instance, that point guards tend to be the shortest and lightest players, while centers often have the biggest, heaviest frames. Scouts and coaches trying to add players to their teams may find this information to be helpful.

## Player Statistics



We have two measures for the scatter plot shown above, and which can be changed by adjusting the parameters, where the parameters are career AST, career G, career PTS, career WS, career FG%, career FT%, career eFG%.

AST – assists

GM, GP, GS – games played, games started.

PTS – points

WS – win shares.

FG% - field goals percentage.

FT% - free throws percentage.

EFG% - effective field goal percentage.

The scatter plot may be used to find the correlation between several measurements. By adjusting the parameters, we may evaluate, for instance, the link between career assists and career points or between career field goal % and career effective field goal percentage. This can give information on the advantages and disadvantages of certain players and positions as well as general league trends. Additionally, it can be used to spot anomalies and outliers in the data. We may quickly identify athletes who do well in one area but poorly in another by showing the connection between two measurements. This may provide managers and teams important information to consider when assessing potential players and making tactical choices.

Edit Parameter [P1]

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Name

P1

Properties

Data type

String

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Display format

career PTS

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Current value

career PTS

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Value when workbook opens

Current value

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Allowable values

☐ All

☒ List

☐ Range

Value	Display As
carrer AST	carrer AST
career G	career G
career PTS	career PTS
career WS	career WS
career FG%	career FG%
career FT%	career FT%
career eFG%	career eFG%
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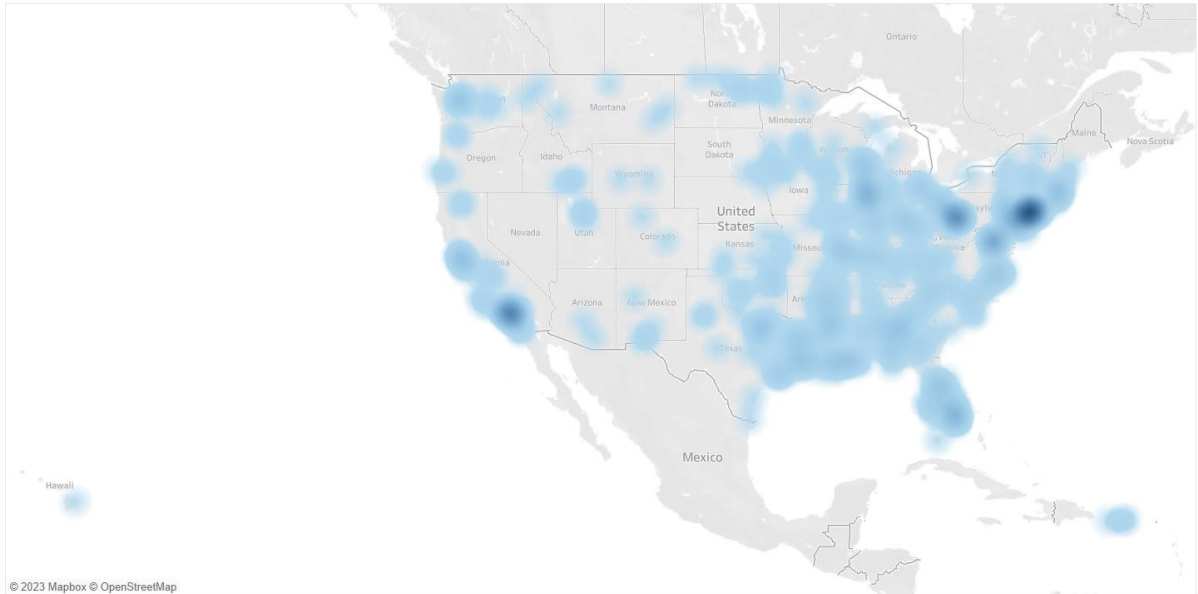
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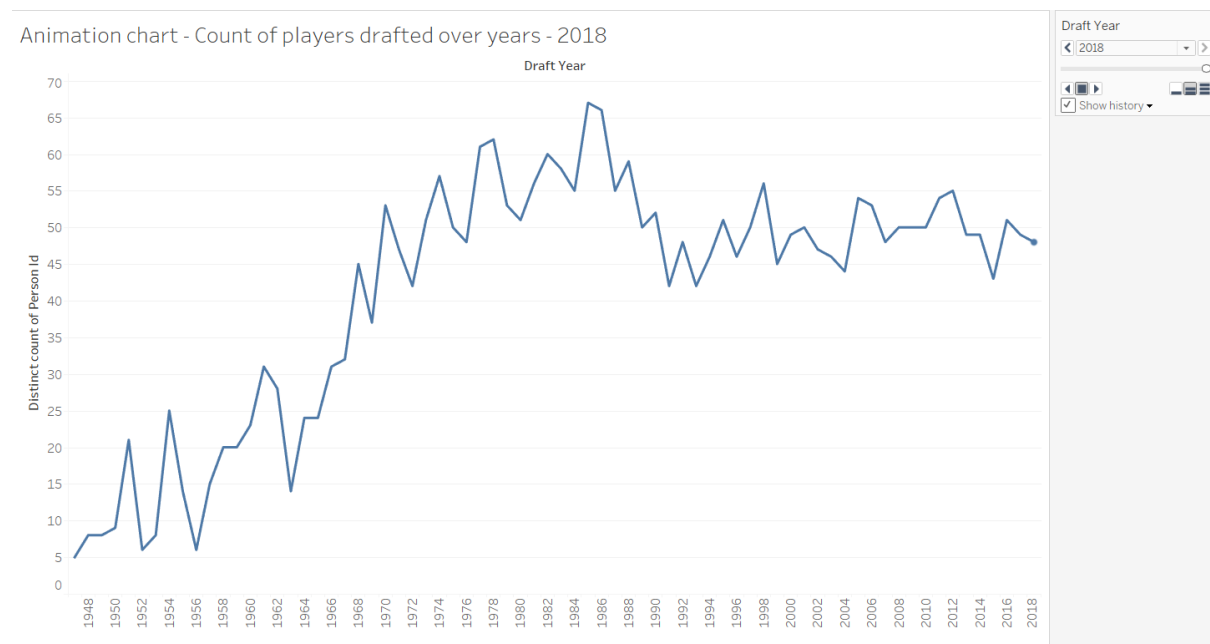
## Players and their birthplace

Players and their birth place



On a map, we can see where the majority of NBA players are from by visualizing their birthplaces. This may be used to spot both regions that may be underrepresented and those that produce a large number of participants. The geography chart may also be used to locate the hometowns of notable NBA players. In terms of the sorts of players that excel at the top levels of the sport, this might assist discover any trends or patterns.

## Animation chart - Count of players drafted over years



You may view the general trend of player drafting in the NBA by animating the graphic to display the number of players selected each year through time. By doing so, it will be easier to spot any league growth or decrease tendencies as well as any possible causal variables. Overall, an animation showing the number of NBA players selected through the years might offer

important insights about the development and evolution of the league over time. You may get a greater grasp of the elements that have impacted the NBA's evolution through time by examining trends and patterns in player drafting.

## **CONCLUSION**

1. How does the NBA's wage structure relate to a player's position?

It is evident and significant that a player's position and compensation are correlated, according to an examination of the NBA's wage structure in connection to player position. In general, players who play positions with higher salaries, like centers and power forwards, make more money than those who play positions with lower salaries, like point guards and shooting guards. For players, teams, and the league as a whole, these discoveries have significant ramifications. Teams that want to assemble winning teams must carefully distribute player pay across the various positions, taking into consideration the proportional importance of each position to overall team performance. The compensation structure of the league and how it relates to each player's position and performance must be taken into account by players wanting to optimize their profits.

2. How do the player statistics, physical profile and winning percentages of a team relate to the positions of its members?

It is apparent that a player's position has an influence on both their performance on the court and the success of the team based on the examination of player statistics, physical profiles, and winning percentages in connection to player positions. For instance, players in offensive positions like point guards and shooting guards typically have greater scoring and assist numbers, whereas players in defensive positions like centres and power forwards typically have higher rebounding and blocking statistics. Additionally, a player's physical attributes have a big impact on their performance and how successful the team is. For example, players in specific positions, such centres and power forwards, frequently have larger build and heavier build, which aids in their ability to dominate in the paint and control the boards. In contrast, players in other positions, including point guards and shooting guards, typically have smaller frames and more agility, which enable them to move more swiftly and skillfully on the perimeter.

3. How have historical and geographical variables affected the presence of various areas and institutions in the NBA?

Based on the examination of historical and geographic factors in connection to the participation of different regions and institutions in the NBA, it can be said that the league's development over time exhibits definite patterns and tendencies. The success and notoriety of particular universities and their participation in the NBA are clearly correlated. For instance, schools with successful basketball programs, like Duke, Kentucky, and UCLA, tend to generate more NBA players than other schools. In a similar vein, cities with a long history of basketball play, like New York City, Chicago, and Los Angeles, tend to generate more NBA players.

4. What effects have league expansion and the NBA draft process had over time on the league's talent and variety of players?

Considering the skill and diversity of the league's players, it can be said that both league expansion and the NBA draft process have had a substantial influence on the league's development throughout time. A larger variety of players with various backgrounds and playing styles can now be found in the league as a consequence of league expansion, which has increased the number of clubs and players in the league. Due to the increased competition for roster spots and playing time, the league has become more difficult and dynamic.

The talent and diversity of the league's players have both been greatly impacted by the NBA draft process. clubs have the chance to choose the best players from a large pool of outstanding prospects during the draft, which serves to maintain league competition and guarantee that talent is allocated equally across clubs.

### **ADDITIONAL RESEARCH QUESTION FOR FUTURE SCOPE**

1. How does a team's winning percentage evolve over time when ownership, management, coaching staff, and other variables change? Is it possible to have long-term success in the NBA using specific team building and team management techniques?
2. What are the long-term impacts of NBA play on a player's physical and mental health? How can the league and the teams collaborate to assist the players' health and wellbeing during their careers and beyond?
3. How can the NBA improve the level of diversity and representation in the league, both among players and in leadership roles? What effects may this have on the league's popularity and success as well as on the larger social and cultural environment?
4. How can the NBA use data analytics and new technology to boost player performance, improve the fan experience, and encourage innovation inside the league?

### **REFERENCES**

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