

Data Visualization Project – NBA Player Stats 2024-2025

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Links to visualizations :

<https://public.tableau.com/app/profile/ohad.krispin/viz/ExplorePlayerPerformanceOverTimeDashboard/Dashboard1?publish=yes>

<https://public.tableau.com/app/profile/ohad.krispin/viz/PlayerEfficiencyByRoleDashboard/Dashboard2?publish=yes>

<https://public.tableau.com/app/profile/ohad.krispin/viz/TeamMetricDashboard/Dashboard3?publish=yes>

<https://public.tableau.com/app/profile/ohad.krispin/viz/GameScoreDistributionDashboard/Dashboard4?publish=yes>

<https://public.tableau.com/app/profile/ohad.krispin/viz/PlayerShootingDashboard/Dashboard5?publish=yes>

Introduction

The topic I chose for the final project is analysing player performance dynamics throughout the 2024–2025 NBA season. Specifically, my goal is to explore how player performance fluctuates over the course of the season, which players are the most efficient relative to their playing time, and how different teams utilize their players in offensive vs defensive roles.

This topic is especially relevant for NBA analysts, scouts, coaches, fantasy basketball players, and basketball fans. Rather than relying solely on end of season averages or raw stats, the project allows users to uncover hidden patterns such as mid season improvements or declines, high efficiency role players, and team level strategy profiles based on how they allocate minutes and responsibilities.

The core problems I attempt to address include:

- **How do player performances evolve over time?**
- **Which players contribute the most per minute, rather than just by total points?**
- **Which teams rely more heavily on defence vs offense based on player stats like steals, assists, and blocks?**

- **Which players are the most effective shooters based on their field goal, 3-point, and free throw percentages?**

These are questions that would be difficult or extremely time consuming to answer by examining raw data tables. The visualization system is designed to simplify this exploration through interactive dashboards that highlight trends, efficiencies, and strategic differences between players and teams.

The potential users of the project include:

- **NBA analytics teams and coaching staff** – who need to track player performance and trends throughout the season to make better decisions for the team, and guide the player itself into making improvements overall.
- **Scouts** – looking for underrated or emerging players to recommend for future signings.
- **Fantasy basketball players** – who want to find efficient players that may not get a lot of attention but still bring great value.
- **Sports journalists and content creators** – who want quick and clear visuals to help their NBA content on the media.
- **NBA fans in general** – anyone who is curious to go beyond basic stats and dive deeper into how players and teams really perform.

I chose the dataset “NBA Player Game Stats – 2024/2025 Season” from Kaggle, which contains detailed game by game statistics for every player. The dataset is rich and granular, making it perfect for visualizing trends and comparisons across time and roles.

The Data

I chose the dataset from Kaggle (link:

<https://www.kaggle.com/datasets/eduardopalmieri/nba-player-stats-season-2425>)

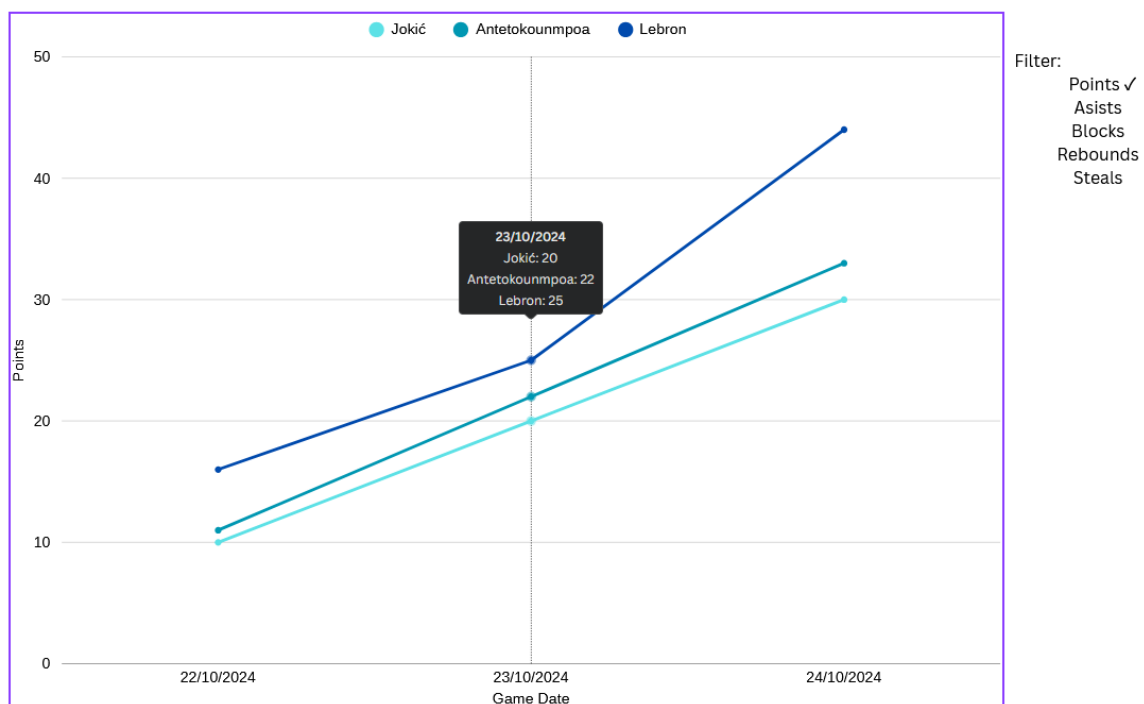
This dataset contains detailed game by game performance data for NBA players in season 2024-2025. Each row represents a single game played by a player, including their shooting stats, rebounds, assists, fouls, and more. The main columns:

- **Player** – Name of the player
- **Tm / Opp** – Player’s team and the opposing team
- **Res** – Game result for the player’s team (W/L)
- **MP** – Minutes played
- **FG / FGA / FG%** – Field goals made, attempted, and shooting percentage
- **3P / 3PA / 3P%** – 3-point stats

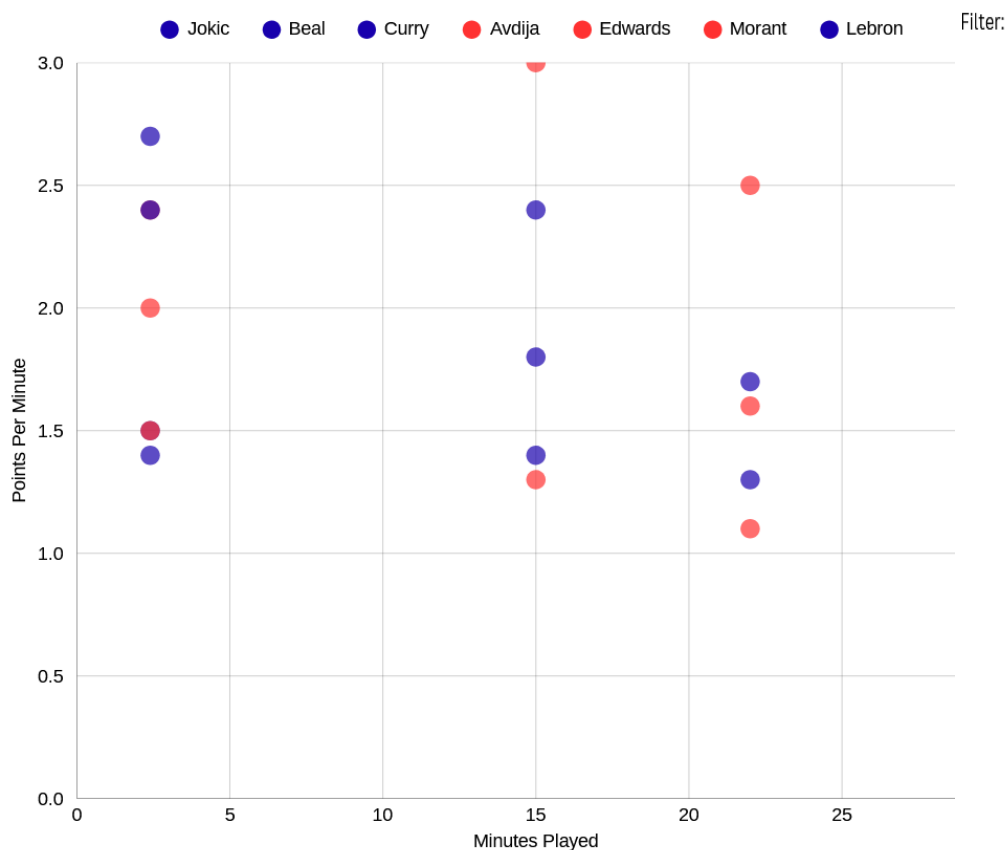
- **FT / FTA / FT%** – Free throw stats
- **ORB / DRB / TRB** – Offensive, defensive, and total rebounds
- **AST, STL, BLK, TOV, PF** – Main performance stats (assists, steals, blocks, turnovers, personal fouls)
- **PTS** – Total points scored
- **GmSc** – Game Score: a summary metric of overall performance
- **Date** – Game date

Ideas and Plans

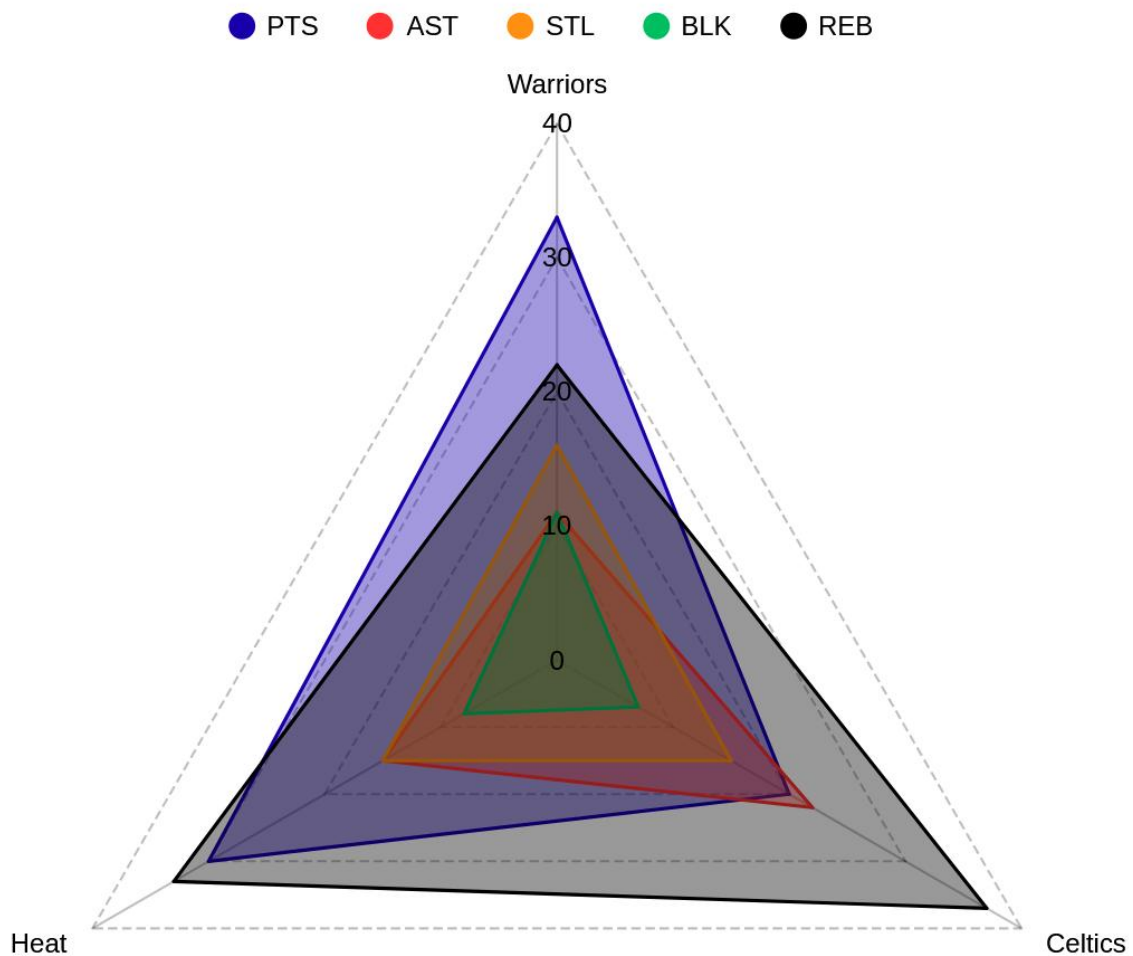
Throughout an NBA season, players often go through hot streaks, slumps, or show consistent improvement. The goal is to highlight these patterns by tracking each player's performance over time looking beyond season averages to reveal real momentum shifts. For example, did a rookie start slowly and then peak midseason? Did a star player's production drop after returning from injury? Such a visualization would help coaches and analysts monitor trends in real time, assist fantasy players in spotting undervalued rising stars, and allow fans to understand player development in a more dynamic way.



Raw total stats don't tell the full story. Sometimes a bench player who scores 12 points in just 15 minutes can be more efficient and impactful than a starter who scores 18 points over 38 minutes. We want to shed light on these high impact, low minute players the unsung heroes who maximize their time on the floor. This perspective can help scouts identify breakout talent, assist coaches in optimizing rotation efficiency, and enable fantasy players to draft smarter by recognizing hidden value.

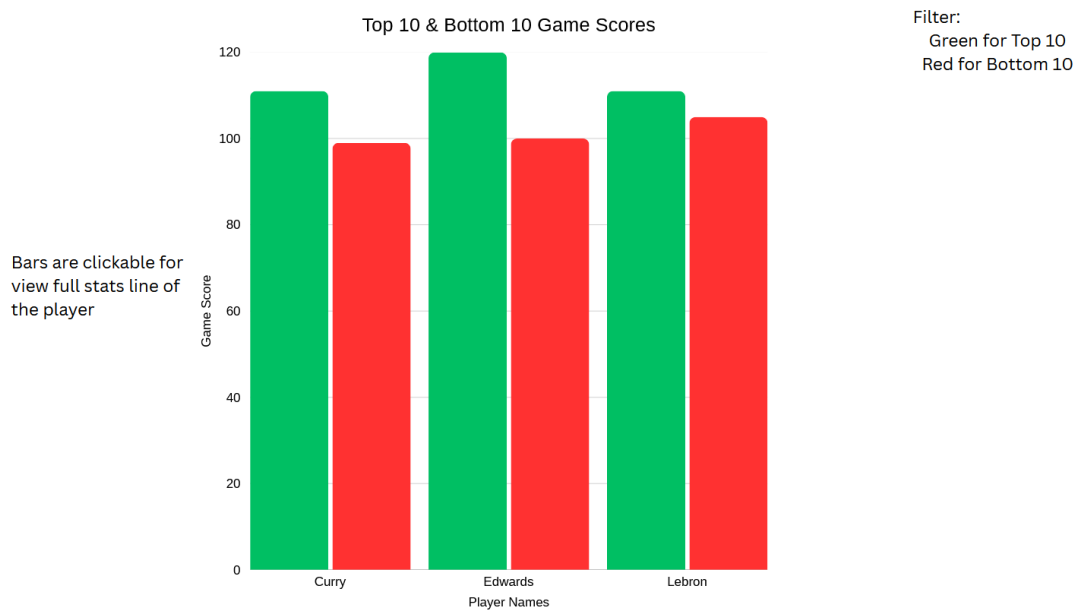


Every team has a unique approach: some focus on offense through assists and fast pace, while others emphasize defense with steals, blocks, and limiting opponent scoring. By aggregating team stats like assists, steals, and blocks, and comparing these against opponent stats, I can reveal strategic profiles and playing styles. This insight would be valuable for journalists and content creators analyzing team identities, for analysts comparing matchups, and for fans who want to understand how their favorite team operates beyond the box score.



With such a large dataset, it's easy to get overwhelmed by the sheer volume of numbers. To help users find meaningful patterns, I want to offer smart filtering options letting them focus on specific timeframes like November only, differentiate between starters and bench players, or examine performance against particular opponents. This flexibility allows exploration of questions like: How do players perform in back-to-back games? Do certain players improve against specific teams? Are there noticeable performance spikes before or after major breaks like the All-Star weekend?

Game Score is a handy summary metric that captures overall player performance in a single number. I want to highlight the top 10 best and worst individual games of the season the truly historic nights and those off games where even stars struggle. This feature appeals to fans looking for memorable performances, content creators seeking compelling stories or highlights, and analysts studying what peak or poor performances look like statistically.



The solution

The solution I ultimately ended up choosing focused on building five distinct, interactive dashboards to address the core research questions. Each dashboard is designed to provide specific insights into player and team performance dynamics, allowing users to go beyond raw statistics to find meaningful patterns.

- **Dashboard 1 (Player Performance Trends):** The solution to the question of how player performance evolves over time is a dynamic dashboard centered on a line chart. By using a player dropdown filter, users can select any player and immediately see how their key stats (e.g., GmSc, PTS, MP) fluctuate over the course of the season. This allows for the quick identification of hot streaks, slumps, or consistent improvement without having to manually sift through game logs.
- **Dashboard 2 (Player Efficiency by Role):** To address which players are the most efficient per minute, I built a dashboard focused on the Game score per minute (GmSC PM) metric. The central visualization is a treemap that compares the overall efficiency of starters versus bench players. Clicking on a role in the treemap dynamically filters a bar chart that then shows the top 10 players within that specific role, providing a clear way to identify impactful underrated players who maximize their limited minutes.
- **Dashboard 3 (Team Strategy Profiles):** To understand team level strategy, I created a dashboard with a scatter plot that maps teams based on their offensive (Assists, Offensive rebounds) versus defensive (Steals, Blocks,

Defensive rebounds) averages. This visualization instantly reveals which teams are more defensively minded and which rely on a high offensive style. The dashboard also includes interactive bar charts that allow users to rank teams by any of these metrics for a more detailed comparison.

- **Dashboard 4 (Best and Worst Individual Games):** To highlight extreme individual performances, I designed a dashboard with a boxplot that visualizes the distribution of Game Score across all teams, with individual games as data points. A dynamic table, controlled by a single parameter, allows users to seamlessly switch between a list of the top 10 best games of the season and the bottom 10 worst. This feature is perfect for quickly finding historic performances and memorable off nights.
- **Dashboard 5 (Player Shooting Efficiency):** This dashboard provides a focused analysis of individual player efficiency by looking at their three key shooting percentages. A heatmap offers a comprehensive overview of all players, displaying their average FG%, 3P%, and FT%. It also includes a dynamic bar chart that ranks players by any of these metrics and a scatter plot that visualizes the relationship between FG% and 3P%. This allows users to gain a deeper understanding of player shooting profiles and identify the most reliable shooters in the league.

In terms of advantages of the solution, I believe that it successfully moves beyond static, end of season averages to provide a dynamic and interactive view of NBA data. The dashboards empower a wide range of users from fantasy players to professional scouts to find specific, actionable insights that would be difficult to uncover in a raw data table. The solution provides a foundational view of performance and efficiency, giving users a strong starting point for further analysis.

In terms of disadvantages, I acknowledge that the solution has some limitations. The dataset I chose is for a single season, so I cannot analyze year over year player development or team trends. Additionally, while the project highlights statistical performance, it does not include other important contextual data such as player injuries, trades, or team chemistry, all of which have a significant impact on performance. Finally, the definition of Starter versus Bench is a simplified proxy based on minutes played and may not perfectly align with a coach's actual rotation strategy.

Preprocessing the data

Before jumping into Tableau, I cleaned and enhanced the raw Kaggle file in a Google Colab notebook to make sure the visualizations would run smoothly and tell the right story. First, I loaded the CSV and ran a quick check for null values across every column there weren't any missing values, so I didn't need to impute or drop rows for gaps. Then I converted the MP column (originally in float format) into a single numeric value in minutes, rounding to two decimal places so that all subsequent per minute calculations would be consistent.

With clean minute values in place, I added several new efficiency metrics that form the backbone of the analysis:

- **PPM (Points Per Minute):** $PTS \div MP$
- **APM (Assists Per Minute):** $AST \div MP$
- **GmScPM (Game Score Per Minute):** $GmSc \div MP$

I also performed several key preprocessing steps directly within Tableau to prepare the data for visualization:

- **Role:** Created a calculated field named Role to distinguish between starters and bench players. The rule was: IF [MP] >= 25 THEN 'Starter' ELSE 'Bench' END. This allowed us to analyze performance dynamics based on a player's primary role, if played above 25 minutes is a starter player in the team.
- **Game Count:** Created a field called Game count using COUNTD([Date]) to easily track the number of games played by each player.
- **Filtering:** To keep the focus on meaningful playing time, I filtered out any appearances under 5 minutes, as these "mop-up minutes" often inflate per-minute numbers without providing real insight.
- **Ranking:** Created a calculated field named Game Rank (RANK(SUM([GmSc]))) which was critical for sorting and filtering the top and bottom individual game performances.

The end result is a clean csv NBA stats file that contains every original game stat plus the new per minute and usage metrics, primed for creating interactive line charts, scatter plots, and dashboards that reveal true performance dynamics.

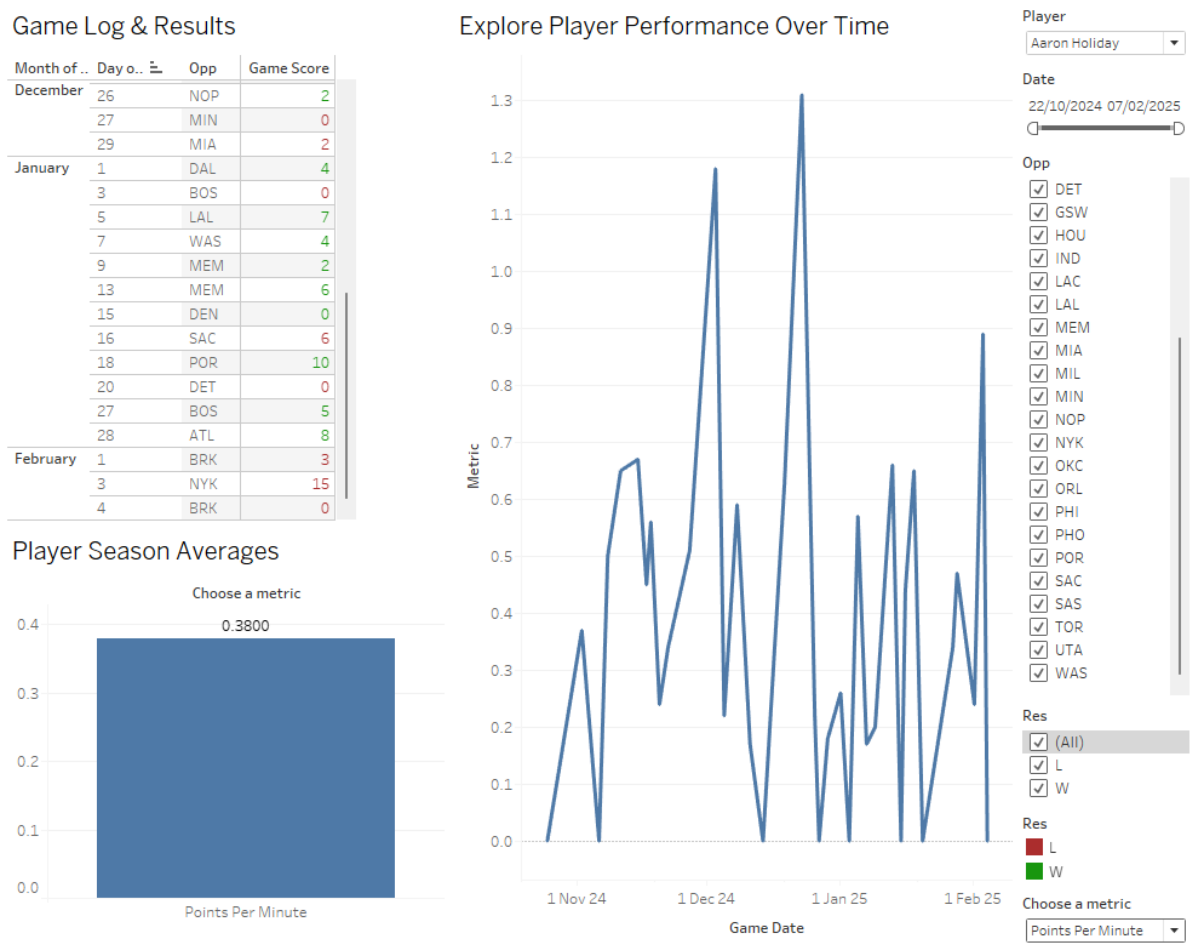
The Visualizations

In this section, I will explain each of the dashboards I created to address the core research questions. The visualizations are designed to be interactive, allowing users to

explore the data dynamically and uncover key insights into player and team performance.

Dashboard 1: Player Performance Trends

This dashboard provides a detailed, game by game view of a player's performance throughout the season, allowing you to track their progress and identify trends.



Player Dropdown: The Player dropdown on the top right allows you to select a single player, and the entire dashboard will update to show only their performance data (the dashboard main focus is to show one play at the time).

Player

Aaron Holiday

Enter search text

(All)

A.J. Green

A.J. Lawson

Aaron Gordon

Aaron Holiday

Aaron Nesmith

Aaron Wiggins

Adam Flagler

Adama Sanogo

Adem Bona

AJ Johnson

Ajay Mitchell

Al Horford

Alec Burks

Alex Caruso

Alex Ducas

Alex Len

Game Log & Results This table on the left shows the stats for each game played by the selected player. It displays the game date, the opponent (Opp), and the points scored.

Interactions included:

- **Player Dropdown:** The dropdown on the top right allows you to select a single player, and the entire dashboard will update to show only their performance data.
- **Highlighting:** When you click on a data point on the line chart, the corresponding game is highlighted in this table, linking the visualizations.

Data mappings:

- **Color:** The color of each row indicates the game's outcome: green for a win and red for a loss.
- **Table contents:** Mapped to the date, opponent, and points for each game

Game Log & Results

Month of ...	Day o..	Opp	Game Score
December	26	NOP	2
	27	MIN	0
	29	MIA	2
January	1	DAL	4
	3	BOS	0
	5	LAL	7
	7	WAS	4
	9	MEM	2
	13	MEM	6
	15	DEN	0
	16	SAC	6
	18	POR	10
	20	DET	0
February	27	BOS	5
	28	ATL	8
	1	BRK	3
	3	NYK	15

Player Season Averages This bar chart provides a quick summary of a player's average performance.

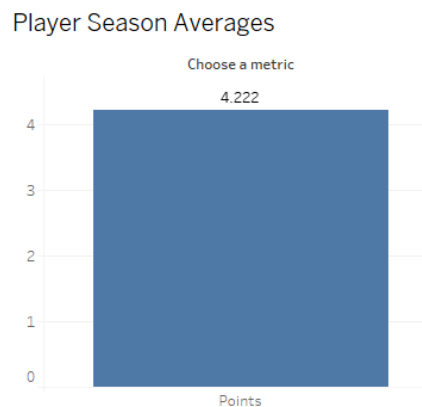
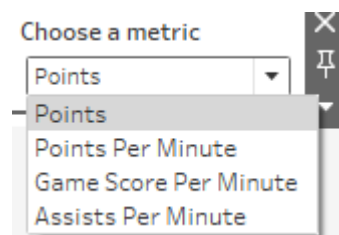
Interactions included:

- Choose a metric Filter: You can use this filter to change the metric being displayed, allowing you to see the player's average Points, Points per minute, GmScPM, or Assists per minute.

Data mappings:

- Length of bar: Mapped to the average value of the metric chosen in the filter.

Choose a metric:



Explore Player Performance Over Time The main visualization is this line chart, which plots the selected player's points throughout the season.

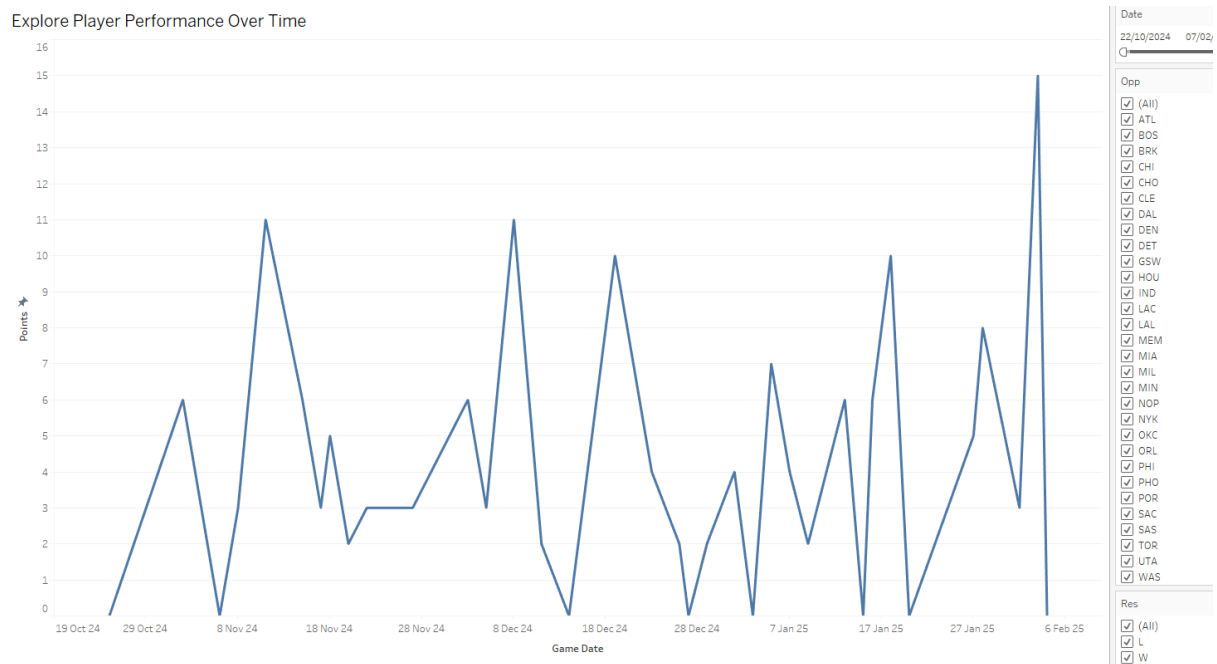
Interactions included:

- Highlighting: Clicking on a data point will highlight the corresponding game in the Game Log & Results table.
- Filters: You can use the filters on the right to focus on specific dates, opponents (Opp), or game results (Res), giving you more freedom to analyze performance under different conditions.
- Tooltip – includes date of the game , assists ,rebounds , FG%, 3P%, Game Score of the selected player.

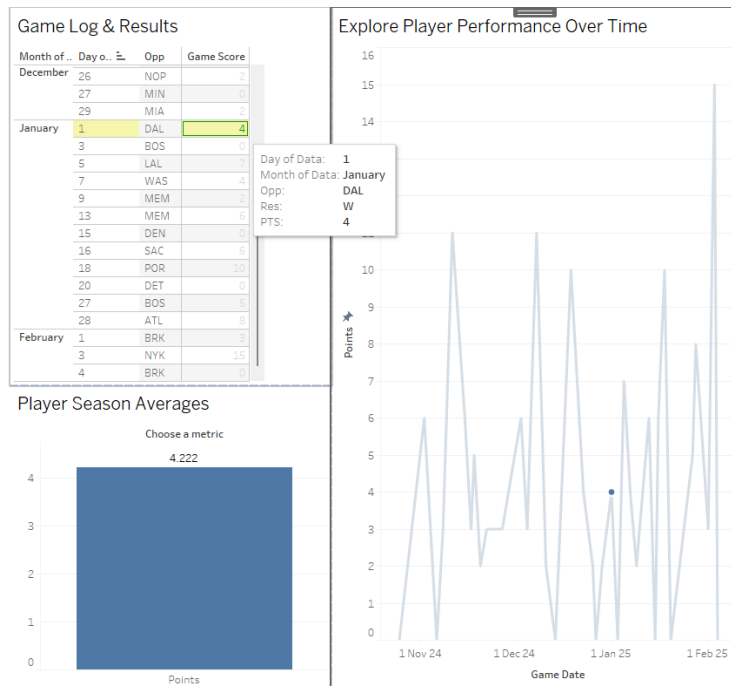
Data mappings:

- x-axis: Mapped to the game date.
- y-axis: Mapped to the selected metric (e.g., Points).

Explore Player Performance Over Time



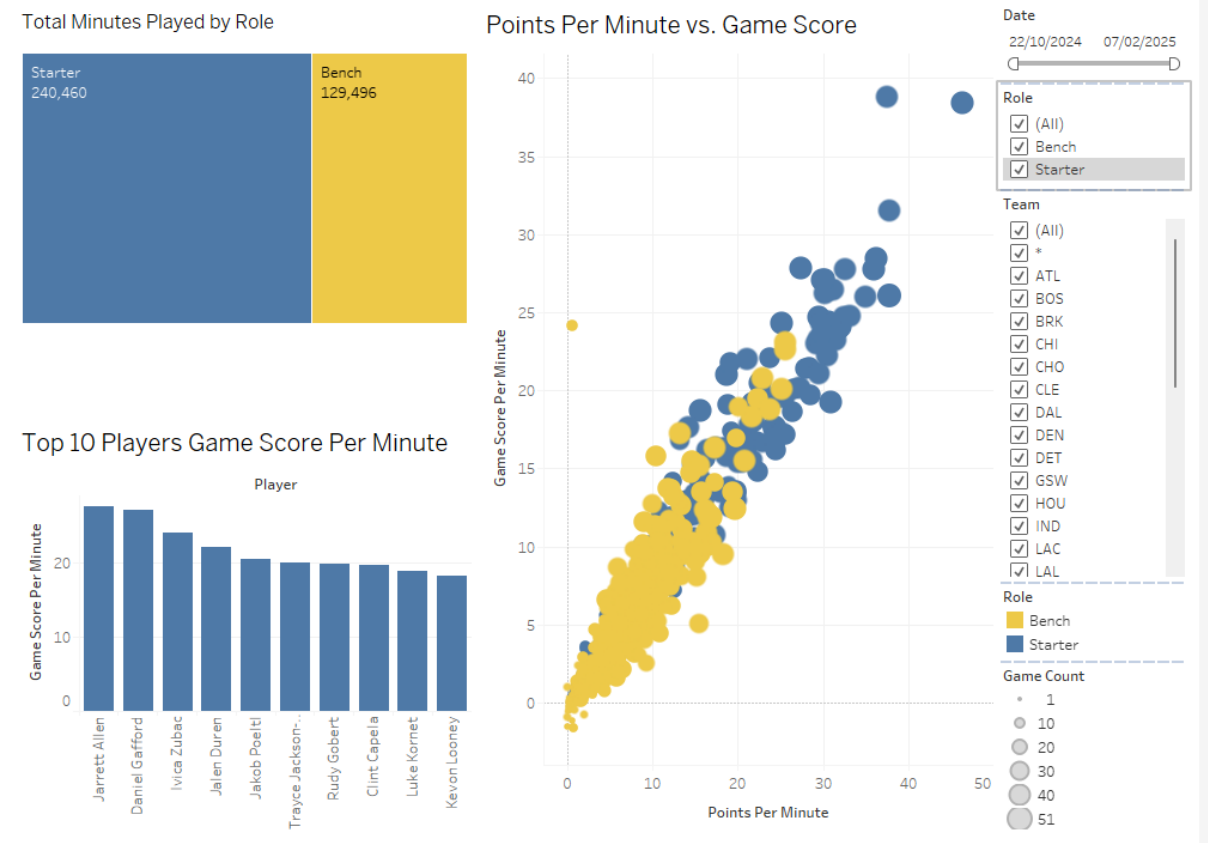
Highlighting: When you click on a data point on the line chart, the corresponding game is highlighted in the Game Log & Results table (and the opposite), linking the visualizations.



Dashboard 2: Player Efficiency by Role

This dashboard focuses on identifying the most efficient players in the league by distinguishing between their roles as either starters or bench players. It helps to uncover hidden value from players who maximize their limited minutes on the court.

Player Efficiency by Role



Top 10 Players Game Score Per Minute This bar chart ranks the top 10 players based on their average Game Score Per Minute (GmScPM).

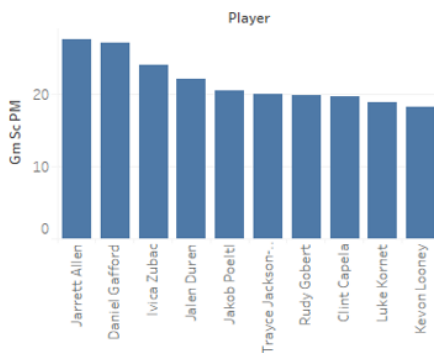
Interactions included:

- **Dynamic Ranking:** This ranking is dynamic and updates to show the top 10 most efficient players within the specific role you select from the treemap.

Data mappings:

- **Length of bar:** Mapped to the GmScPM value.
- **x-axis:** Mapped to the Player.

Top 10 Players Game Score Per Minute



Points Per Minute vs. Game Score This scatter plot shows the relationship between two efficiency metrics: **Points Per Minute** on the x-axis and **Game Score Per Minute** on the y-axis.

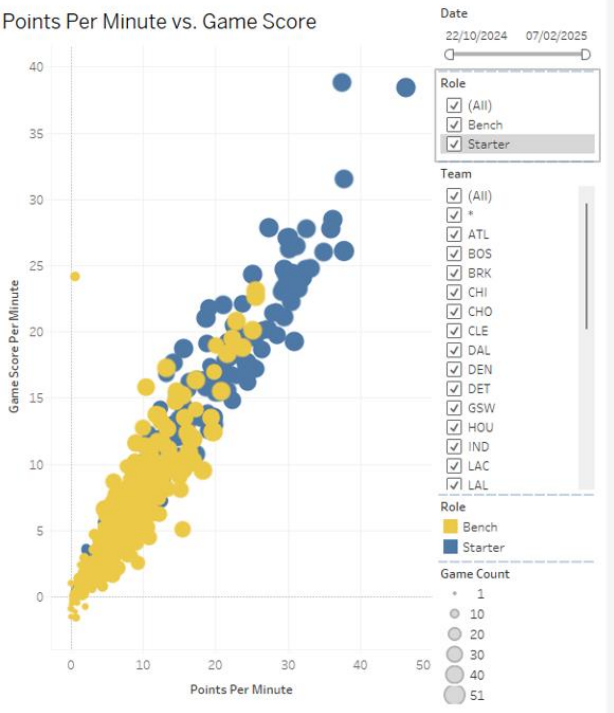
Interactions included:

- Filters: You can filter the data by Date, Role, Team (Tm), and Game Count using the filters on the right.
- Tooltip: Hovering over a data point will provide a tooltip with detailed information about that player's stats (Role ,Player, Team, Game Score Per minute, Points Per Minute, Game count).

Data mappings:

- x-axis: Mapped to the Points Per Minute value.
- y-axis: Mapped to the Game Score Per Minute value.
- Color: The color of each point indicates the player's role (blue for starters and yellow for bench players).
- Size: The size of each circle is mapped to the Game Count, which you can see in the legend.

Points Per Minute vs. Game Score



Total Minutes Played by Role This treemap visually represents the total minutes played by all players, broken down by their role as "Starter" or "Bench."

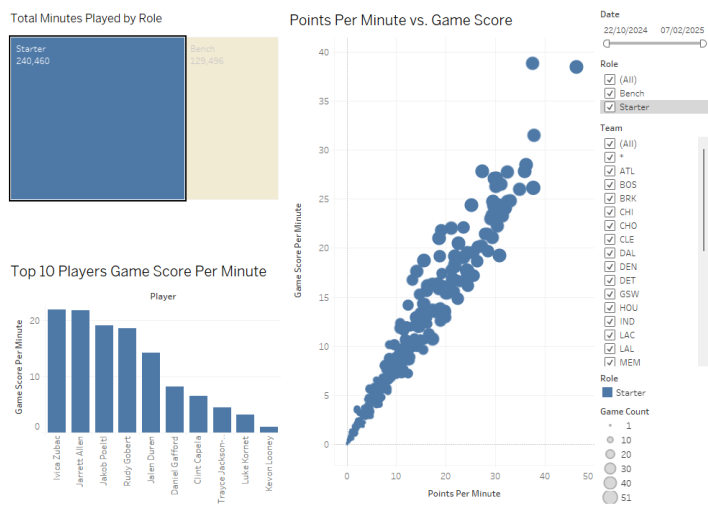
Interactions included:

- Treemap as a Filter: Clicking on either the "Starter" or "Bench" section of the treemap will act as a filter for the entire dashboard, showing you data relevant only to that specific group of players.

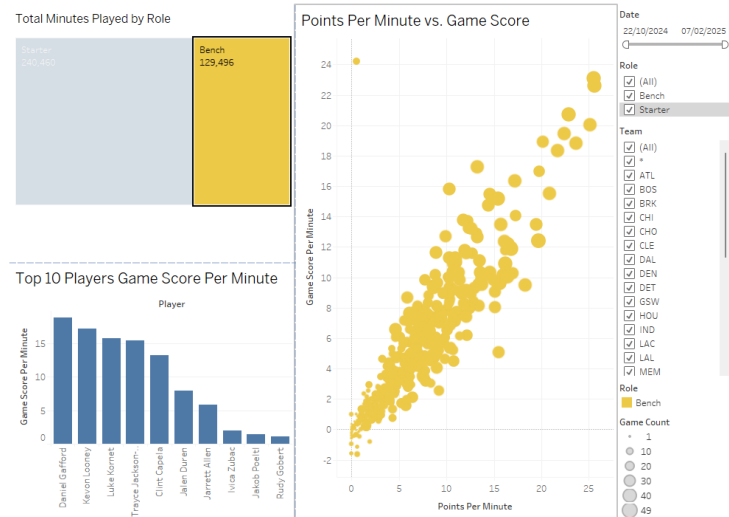
Data mappings:

- Size: The size of each section is mapped to the total minutes played by that role.
- Color: Each color is mapped to a role (Blue for Starter, Yellow for Bench).

Player Efficiency by Role

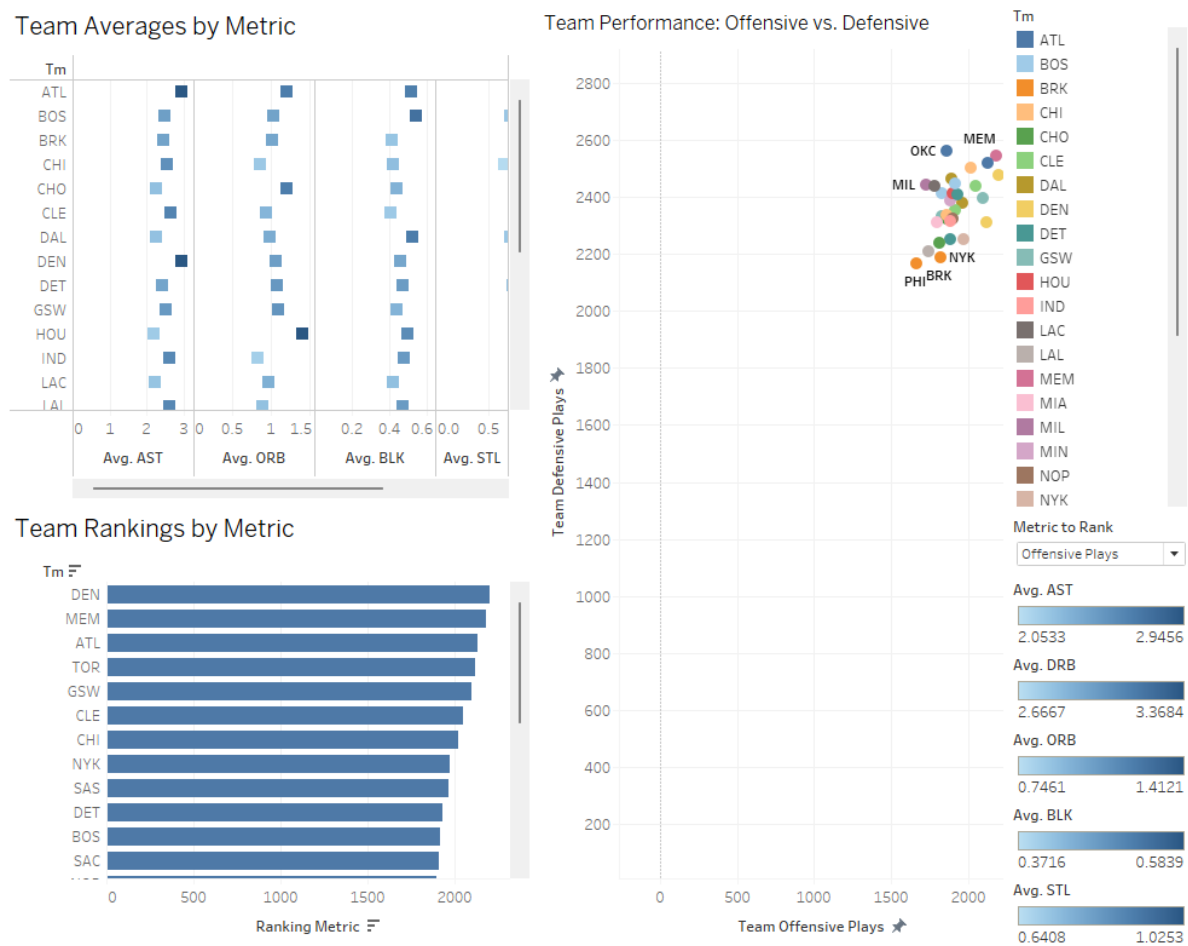


Player Efficiency by Role



Dashboard 3: Team Strategy Profiles

This dashboard is designed to explore the strategic profiles of each team by comparing their key offensive and defensive statistics. It helps to visualize how teams prioritize different aspects of the game.



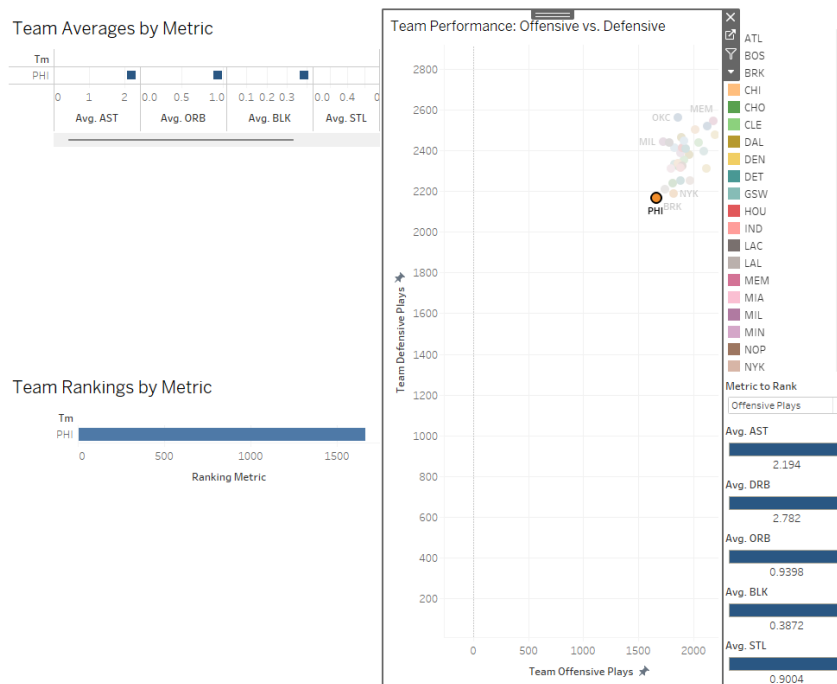
Team Performance: Offensive vs. Defensive This central scatter plot is the core of the dashboard. Each point represents a team, and its position is determined by its offensive and defensive metrics. The x-axis shows the team's offensive plays, and the y-axis shows its defensive plays, which allows you to visually identify which teams have a more offensive-focused strategy and which are more defensive.

Interactions included:

- Tooltip:** Hovering over a team's point will show a tooltip with detailed information about that team's stats.
- Highlighting:** Selecting a team on the scatter plot will highlight its data in all other visualizations on the dashboard.

Data mappings:

- **x-axis:** Mapped to the team's average offensive plays (based on Avg. AST, AVG. Offensive Rebounds).
- **y-axis:** Mapped to the team's average defensive plays (based on Avg. BLK, Avg. STL and AVG.Defensive Rebounds).
- **Color:** The color of each point is mapped to the team.



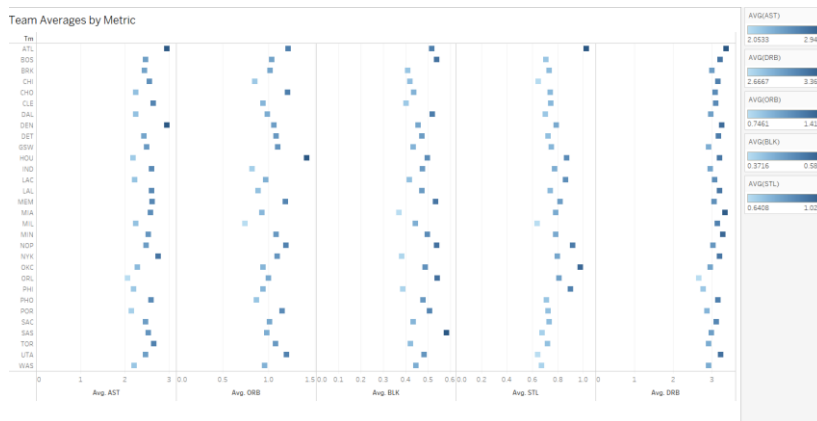
Team Averages by Metric This small multiples bar chart provides a side by side comparison of several key team metrics, including Avg. AST, Avg. ORB (Offensive Rebounds), Avg. DRB (Defensive Rebounds), Avg. BLK, and Avg. STL. You can easily see how each team performs across these different categories.

Interactions included:

- **Highlighting:** This chart is linked to the scatter plot, so selecting a team there will highlight its bar data here.

Data mappings:

- **Length of bar:** Mapped to the average value of each metric.
- **Color:** The color intensity is mapped to the value of the metric, with a darker color indicating a higher value.



Team Rankings by Metric This bar chart dynamically ranks all teams based on the metric selected in the **Metric to Rank** filter. You can choose to rank by an offensive metric like Avg. AST or a defensive metric like Avg. STL.

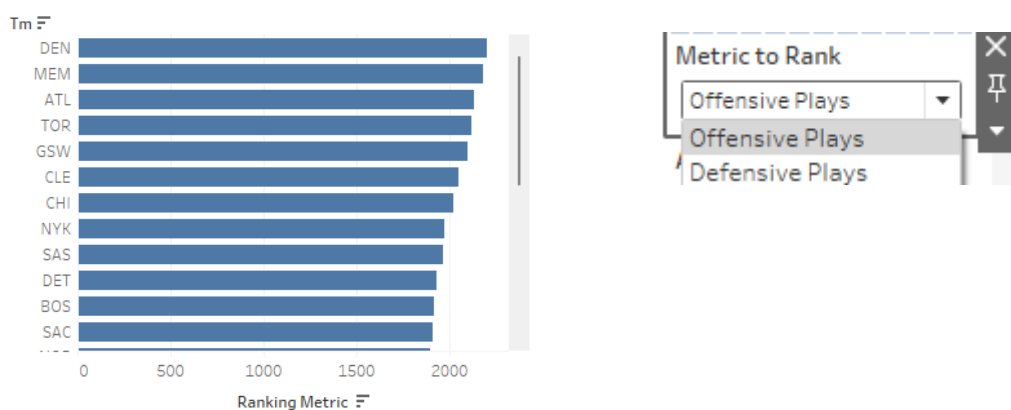
Interactions included:

- **Metric to Rank Filter:** This dropdown filter is the main interactive feature of this visualization. By choosing a metric from the list, the chart will automatically update to rank the teams based on your selection.

Data mappings:

- **Length of bar:** Mapped to the Ranking Metric value.
- **x-axis:** Mapped to the Ranking Metric value.
- **y-axis:** Mapped to the team.

Team Rankings by Metric



Dashboard 4: Best and Worst Individual Games

This dashboard is designed to highlight the most extreme individual performances of the season, allowing you to quickly identify both historic nights and off-games.

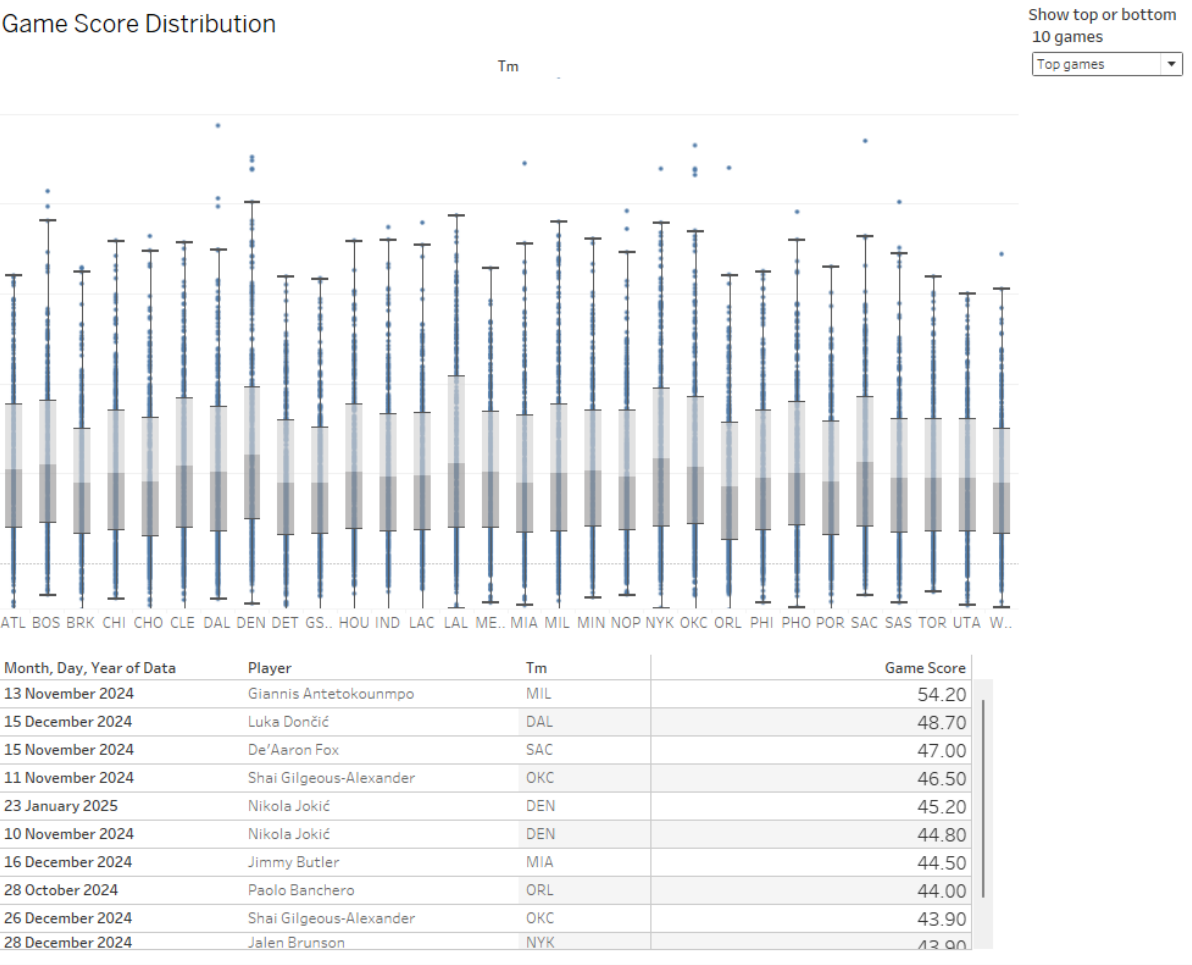
Game Score Distribution This boxplot visualizes the distribution of Game Score across all teams. The box for each team shows the range of most performances, while the individual dots or circles represent single games. These dots are particularly useful for spotting outliers—the games with the highest and lowest scores, which correspond to the best and worst individual performances.

Interactions included:

- Tooltip:** Hovering over any individual data point (circle) on the boxplot will display a tooltip with the specific date of the game including the player and the exact game score.
- Highlighting:** Hovering a team game in the table will highlight it on the boxplot.

Data mappings:

- x-axis:** Each team is on the x-axis.
- y-axis:** Mapped to the Game Score value.
- Dots:** Each dot represents a single game played.



Top 10 Games & Bottom 10 Games These two tables are part of a dynamic view that lists the top 10 best and bottom 10 worst individual game performances. They provide a clear and concise summary of the season's most memorable statistical nights.

Interactions included:

- Parameter Control:** The **Show top or bottom** parameter is the main interactive feature. By selecting either "Top games" or "Bottom games" from the dropdown menu, the table will automatically update to show the corresponding list.

Data mappings:

- Table Contents:** The table displays the exact date of the game,player, team, and game score for each game.



Top 10 Games

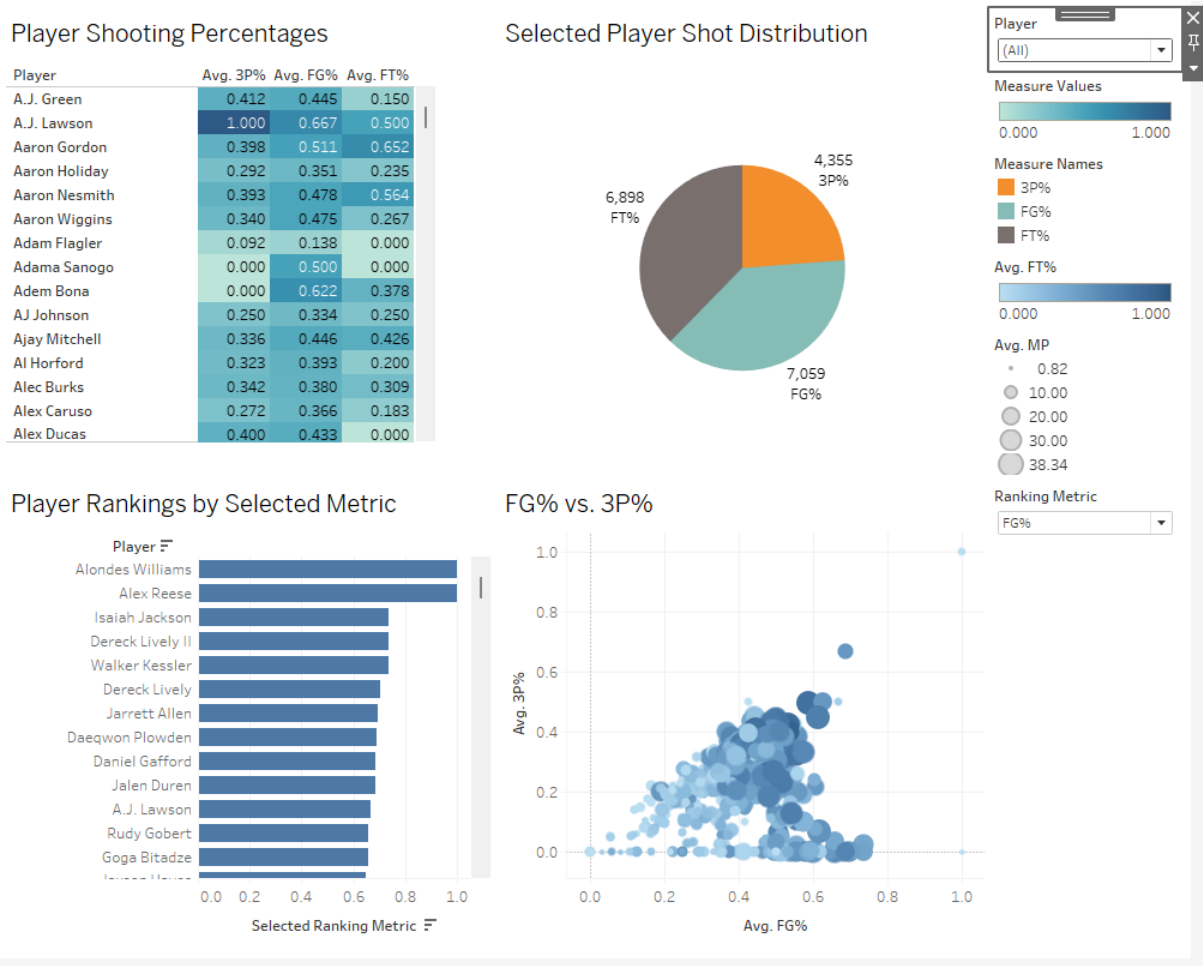
Month, Day, Year of Data	Player	Tm	Game Score
13 November 2024	Giannis Antetokounmpo	MIL	54.20
15 December 2024	Luka Dončić	DAL	48.70
15 November 2024	De'Aaron Fox	SAC	47.00
11 November 2024	Shai Gilgeous-Alexander	OKC	46.50
23 January 2025	Nikola Jokić	DEN	45.20
10 November 2024	Nikola Jokić	DEN	44.80
16 December 2024	Jimmy Butler	MIA	44.50
28 October 2024	Paolo Banchero	ORL	44.00
26 December 2024	Shai Gilgeous-Alexander	OKC	43.90
28 December 2024	Jalen Brunson	NYK	42.90

Bottom 10 Games

Month, Day, Year of Data	Player	Tm	Game Score
2 January 2025	Norman Powell	LAC	-7.600
19 December 2024	Draymond Green	GSW	-7.400
24 November 2024	Georges Niang	CLE	-7.000
10 January 2025	Jalen Wilson	BRK	-6.900
5 February 2025	Caris LeVert	CLE	-6.800
27 November 2024	Dillon Brooks	HOU	-6.400
20 January 2025	Bogdan Bogdanović	ATL	-6.200
2 November 2024	Derrick Jones	LAC	-6.200

Dashboard 5: Player Shooting Efficiency

This dashboard provides a focused analysis of individual player efficiency by looking at the three key shooting percentages. It helps to identify the most reliable and effective shooters in the league.



Player Shooting Percentages (Heatmap)

This heatmap offers a comprehensive overview of all players. The color coded table helps you quickly spot which players excel or struggle in key shooting categories.

Interactions included:

- **Tooltip:** Hovering over any cell in the heatmap will display a tooltip with the exact metric value for that player.

Data mappings:

- **Rows:** Each row is mapped to a player.
- **Columns:** Each column is mapped to a key shooting metric (FG%, 3P%, FT%).

- **Color:** The intensity of the color in each cell is mapped to the average value of the metric, with darker colors representing a higher percentage.

Player Shooting Percentages

Player	Avg. 3P%	Avg. FG%	Avg. FT%
A.J. Green	0.412	0.445	0.150
A.J. Lawson	1.000	0.667	0.500
Aaron Gordon	0.398	0.511	0.652
Aaron Holiday	0.292	0.351	0.235
Aaron Nesmith	0.393	0.478	0.564
Aaron Wiggins	0.340	0.475	0.267
Adam Flagler	0.092	0.138	0.000
Adama Sanogo	0.000	0.500	0.000
Adem Bona	0.000	0.622	0.378
AJ Johnson	0.250	0.334	0.250
Ajay Mitchell	0.336	0.446	0.426
Al Horford	0.323	0.393	0.200
Alec Burks	0.342	0.380	0.309
Alex Caruso	0.272	0.366	0.183
Alex Ducas	0.400	0.433	0.000

Selected Player Shooting Breakdown (Pie Chart)

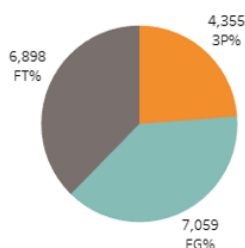
This pie chart focuses on a single player selected through the dashboard's filters. It visualizes a breakdown of that player's average FG%, 3P%, and FT%, providing a unique representation of their overall shooting profile.

Interactions included:

- **Highlighting:** The pie chart is linked to the other charts, so selecting a player will update the pie chart to reflect their specific shooting breakdown.

Data mappings:

- **Size of Slice:** The size of each slice is mapped to the average value of the shooting metric.
- **Color:** Each color is mapped to a specific metric (FG%, 3P%, FT%).



Player Rankings by Selected Metric (Bar Chart)

This dynamic bar chart ranks players according to a metric chosen by the user via a dropdown filter.

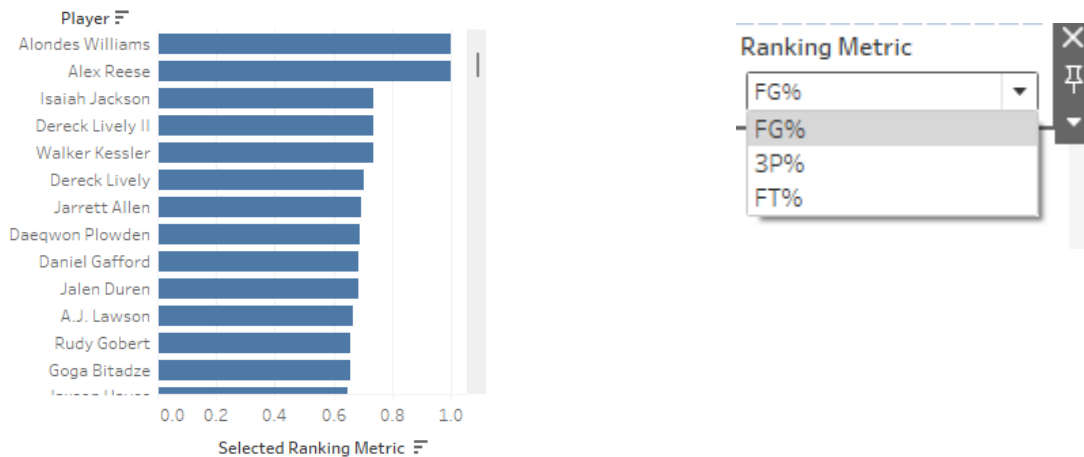
Interactions included:

- **Metric to Rank Filter:** A dropdown filter lets you choose which metric to rank players by, updating the chart in real-time.

Data mappings:

- **Length of bar:** Mapped to the average value of the selected metric.
- **x-axis:** Mapped to the average value of the selected metric.
- **y-axis:** Mapped to the player.
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Player Rankings by Selected Metric



FG% vs. 3P% (Scatter Plot)

This scatter plot visualizes the relationship between a player's FG% and their 3P%.

Interactions included:

- **Tooltip:** Hovering over a data point will show a tooltip with detailed information about that player's stats.
- **Filters:** This chart is affected by the player selection from other visualizations.

Data mappings:

- **x-axis:** Mapped to the player's average FG%.
- **y-axis:** Mapped to the player's average 3P%.
- **Color:** The color of each data point is mapped to the player's average FT%.
- **Size:** The size of each data point is mapped to the player's average Minutes Played.

FG% vs. 3P%

