COM-480 DATA VISUALIZATION

DUNK DATA

NBA VISUALISATIONS

TRAN MINH SON LE
AMEY KULKARNI
SOMESH MEHRA

https://com-480-data-visualization.github.io/project-2023-dunkdata/

OUR MOTIVATION

AS AVID NBA FANS AND COMPUTER/DATA SCIENTISTS, OUR MOTIVATION TO WORK ON NBA VISUALIZATIONS PRIMARILY STEMS FROM OUR FASCINATION WITH INTERPRETING THE MYRIAD OF STATS AND DATA AVAILABLE TO EXTRACT INTERESTING INSIGHTS. WHILE THERE ARE MANY EXISTING VISUALIZATIONS AND ANALYSES RELATED TO THE NBA, WE HAD SOME IDEAS OF THINGS THAT WOULD BE INTRIGUING TO SEE BUT (TO OUR KNOWLEDGE) HADN'T BEEN EXTENSIVELY EXPLORED YET.

SPECIFICALLY, OUR IDEAS STEMMED FROM THE FACT THAT THERE ARE MANY NARRATIVES IN NBA DISCOURSE SURROUNDING PLAYER/TEAM REPUTATIONS, BUT IT'S UNCLEAR AT TIMES IF THESE ARE ACTUALLY BACKED BY STATISTICS OR IF THEY'RE MOSTLY INFLUENCED BY FACTORS SUCH AS RECENCY BIAS OR GENERAL LIKEABILITY OF A PLAYER/TEAM. THUS, WE AIMED TO CREATE VISUALISATIONS WHICH COULD HELP INTEREPRET VARIOUS STATS TO ASSESS THE VALIDITY OF SOME OF THESE NARRATIVES.

OUR VISUALISATIONS

WITH THIS IN MIND, WE FOCUSSED ON THREE MAIN AXES FOR OUR VISUALISATIONS. NAMELY: 1) TEAM PERFORMANCE, 2) PLAYER PERFORMANCE AND 3) PLAYER MOVEMENT.

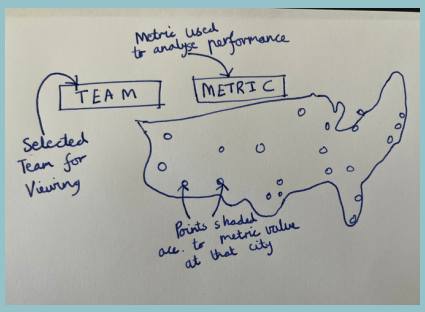
1) MANY TEAMS SEEM TO HAVE A REPUTATION FOR DOMINATING A CERTAIN MATCHUP, OR BEING ESPECIALLY POOR ROAD TEAMS/HAVING A STRONG HOME COURT ADVANTAGE, THUS WE WANTED A VIZ WHERE WE COULD CAPTURE BOTH HEAD-TO-HEAD AND HOME AND AWAY PERFORMANCE TO SEE IF THESE REPUTATIONS HOLD UP IN REALITY.

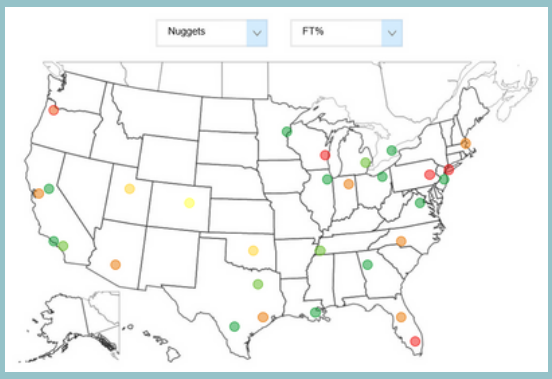
2) ONE OF THE BIGGEST POINTS OF DISCUSSION AMONGST NBA FANS IS SURROUNDING PLAYERS WHO SEEM TO STEP US THEIR PERFORMANCE IN THE PLAYOFFS VS REGULAR SEASON, AND THOSE WHO SEEM TO SHRINK ON THE BIGGEST STAGE. THUS WE WANTED A VIZ TO HIGHLIGHT DIFFERENCES IN PLAYOFF VS REGULAR SEASON PERFORMANCE TO SEE IF THESE NARRATIVES HAVE ANY MERIT.

3) WITH THE BUSY TRADE AND FREE AGENCY PERIODS IN THE NBA, PLAYERS ARE MOVING FROM TEAM TO TEAM VERY OFTEN. CERTAIN TEAMS SEEM TO HAVE MORE STABLE ROSTERS, WHILST OTHERS SEEM MORE HEAVILY INVOLVED IN THE OPEN MARKET. SOME PLAYERS ALSO HAVE A REPUTATION AS BEING JOURNEYMEN. THUS, WE WANTED TO SHOW PLAYER'S PATHS THROUGH DIFFERENT TEAMS IN THE NBA IN A NOVEL AND INTERESTING WAY.

TEAM PERFORMANCE VIZ

NBA games are played between two teams, where one of the teams is the home team and the other is the away team. This can be a huge factor in deciding the outcome of a game. Therefore, we planned to create a visualization which allows the user to select a team whose away performance they want to analyze. We also let the user select the metric they want to use to visualize their selected team. The sketch on the right shows the idea as we originally conceived it. Note that we planned to shade the circles based on the metric value at that team.





This is how our idea looked in the second milestone. We completely reproduced the idea from the sketch for this one. We can clearly see that the colors give us a good indicator of the team's performance. For example, the Denver Nuggets are shown to be red at the Miami Heat, but they are green at the San Antonio Spurs, which would mean that they perform differently at these locations. However, we do not know how they actually perform there without a legend telling us the meaning of each color. Since Milestone 2, we have made quite a few additions to enhance the idea. These changes are-

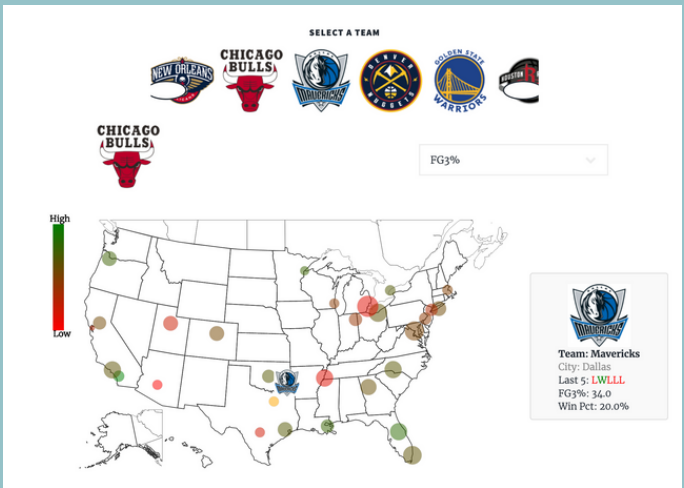
- Adding a legend to our plot: We added a gradient legend for the map. The color scheme we followed was as follows: Red if the team does badly according to that metric at the destination team, and green if it does well, and a gradient of values in between. This lets a user see the performance of their favorite team at all the different teams at a glance.
- Recent Record / Streak: For a given match-up, it is very interesting to see the recent record. For example, it is fun to know if a given team is on a winning streak against some other team. For this, we allow the user, who has already chosen a team, to select an away team. We will display the latest five results when the current team has traveled to the selected away team in this streak element. We color the wins green and losses red.
- Away Team Card: We display a card containing the logo, Recent Record, the metric value and win percentage for every away team that the user hovers over. This gives the user a preview of the current match-up so that he can decide whether he wants to click on this team to get a more in-depth analysis of this fixture.
- Sizing the Circles: We realized that the away teams do not need to be all of the same size, and that we can use some interesting way to size them. We decided that the win percentage of the current team at the given location would be a great way to size these circles, since getting an idea of how often your team wins / loses a given fixture away from home tells you if they enjoy traveling to that team.

TEAM PERFORMANCE VIZ

Besides this, we made a couple of major changes

CAROUSEL

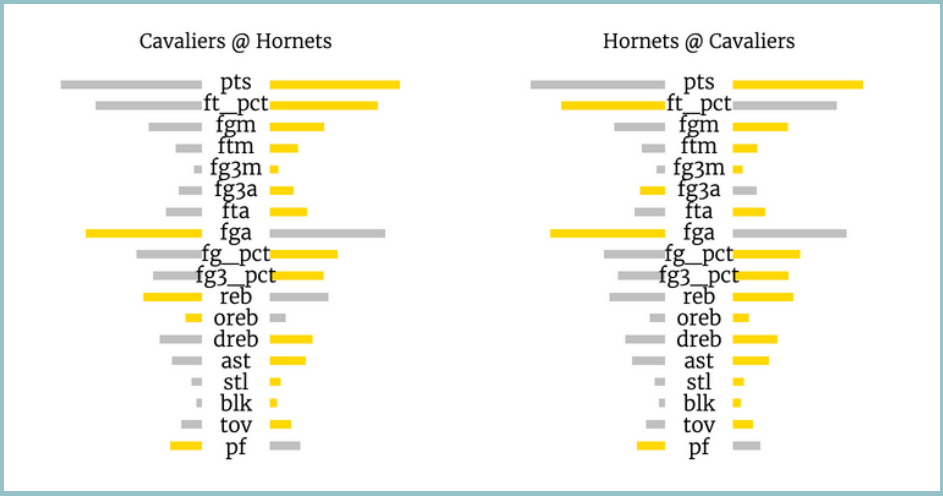
Instead of a drop-down to select a team, we have a carousel that lets the user view all the team logos, slide through them and click on the logo to select the team. This is a much more interactive way for users to select a team, since most people would prefer to look at logos and find the team they are interested in rather than looking for their team name through a list of 30 teams.



DIVERGING BAR CHART

The modern NBA fandom is big on numbers. They understand the significance of numbers to explain their team's performance. For example, if they have identified a team as their "Bogey Team", i.e, a team they find hard to beat, they can look into the statistics of the match-up to find an explanation. They can do a stat-by-stat comparison to see who won in the different areas of the game and recognize their team's weakness. For example, in the visualization below, we see that the home teams score more. However, the Cavaliers fans have reason to be worried about their free-throw percentage, since the Hornets have a higher percentage both at home and on the road. We have plotted the bar charts side by side for the given fixture and the reverse fixture (at the home of the selected team). For every pair of the same stat, we have highlighted the higher one with golden.

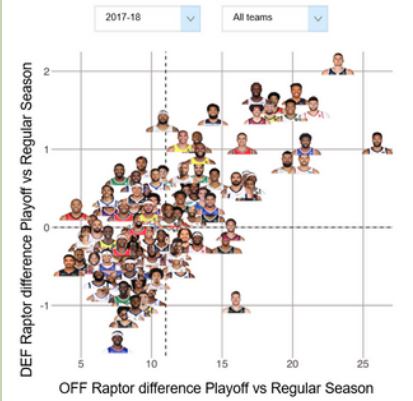
The team that wins most of these small stat battles is usually the team that emerges on top. In this example, we can clearly see that each team does better when they're the home team.



PLAYER PERFORMANCE VIZ

The NBA is a league driven by Superstars and MEGA-STARS. NBA fans love to look up to their favorite players to deliver in the biggest moments. And the biggest moments of them all are during the playoffs. NBA fans are particularly inspired by those players that rise up to the occasion. These are the players who are solid during the regular season, but they elevate their game during the post-season.

To investigate this, We planned to show the differences between the player performance in the regular season and playoffs for two stats, ie, plot this difference for two metrics, one on the x-axis and the other on the y-axis.



Limitations and revisions

We soon realized that plotting the differences of two metrics would help us capture more metrics in one plot, but it would not be very interpretable, since it is the difference of two metrics each, we are essentially dealing with four numbers in one plot.

The other problem with this was that the difference in playoff vs regular season could capture players that were not the goal. For example, we may end up with players that are poor in the regular season but do average during the playoffs. These players would appear towards the top of our plot, but not because they were great players who elevated their game when it mattered the most, but rather because they were simply BAD during the regular season.

For this reason we decided to go ahead with the simpler, easier to interpret, and functional plot, where we show the regular season performance on the x-axis and the playoff performance on the y-axis. This is easy to interpret and gives natural meaning to the four quadrants

- 1st Quadrant: Great during the Regular Season and Great in the Playoffs
- 2nd Quadrant: Poor during the Regular Season and Great in the Playoffs
- 3rd Quadrant: Poor during the Regular Season and Poor in the Playoffs
- 4th Quadrant: Great during the Regular Season and Poor in the Playoffs

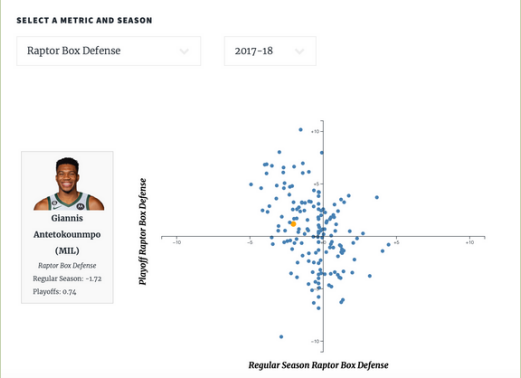
This plot also allows you to easily see how much better the players were during the playoffs than the regular season just by looking at how far above the point is with respect to the y=x line.

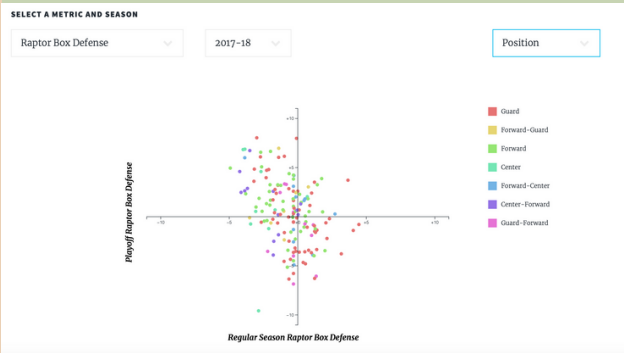
This plot show the box defense of players in the regular season and the playoff of the 2017-18 season.

PLAYER PERFORMANCE VIZ

Limitations, Improvements and Enhancements

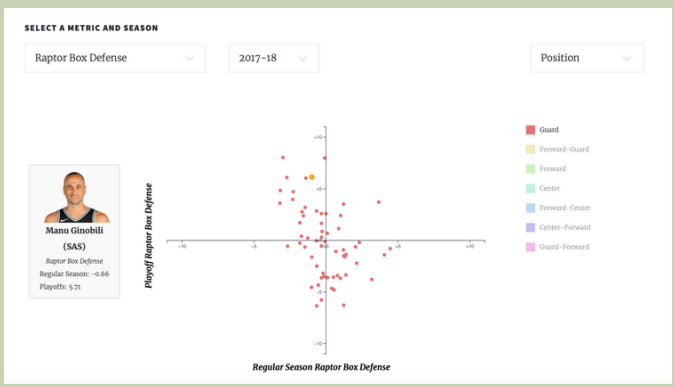
Before we talk about our improvements, one thing that we realized we did not want to do is replace the circles by player-icons . This is because there are too many points that we are going to plot, and to fit the icons, we would have to make them very small. So small in fact, that we wouldn't be able to make them out.
However, instead, we decided to use a create a card for each player that would show up once you hovered over the player's circle. This is shown in the adjacent plot.





Next, we allowed for a category to be chosen to further view the players. This is because the original number of points for every playoffs can be overwhelming. Hence, we group them by meaningful categories, such as the position they play (this decides their role on the court), height, team and age. We give the players from the same category the same colour

We allow the user to select the group of their choice from the category, to look at them through a microscope. We group players that have something in common, and then compare how well they did compared to the others who share the same features as them in this respect.



PLAYER MOVEMENT VIZ

As with other sports leagues, the NBA consists of many teams, who frequently trade players with each other. As such, we aim to display a player's team movement history in a novel way, showing the path of a certain player through different teams they played for leading up to a given team/season.

In terms of the design, we have not deviated much from our sketch from milestone 2. However, we added significantly more functionality to display the player's career journey through different NBA teams in a fun and engaging way.

First, there are three options to pick: the season, the teams participating in that season, and the players playing for that team during that season. If no player has been selected, all player trajectories are displayed. Then, one can either click on one of the paths or select a player from the dropdown menu to visualize an animated trajectory. To reset the canvas, one can select the first option in either of the dropdown menus.

In addition, the user can interact with the plot by hovering the mouse over paths and team logos, which will react accordingly.

Furthermore, when a player is selected, all other paths are hidden, and a player card shows up, giving information about his pre-NBA affiliation. If there is no path for a player, this means up until that season, the player has not moved to another team yet.

Even though the concept sounds simple, implementing this plot took a lot of effort because of many technical details: curved paths, smooth path animations, and team logo animations.

PEER ASSESSMENT

SON: Took care of the plot involving the player Journey and HTML templates

Amey: Took care of the plot involving team performance

Somesh: Took care of the plot involving Player Performance