Analyzing NBA Shooting Trends: A Season in Review

An analysis on shooting trends found throughout the course of an NBA season

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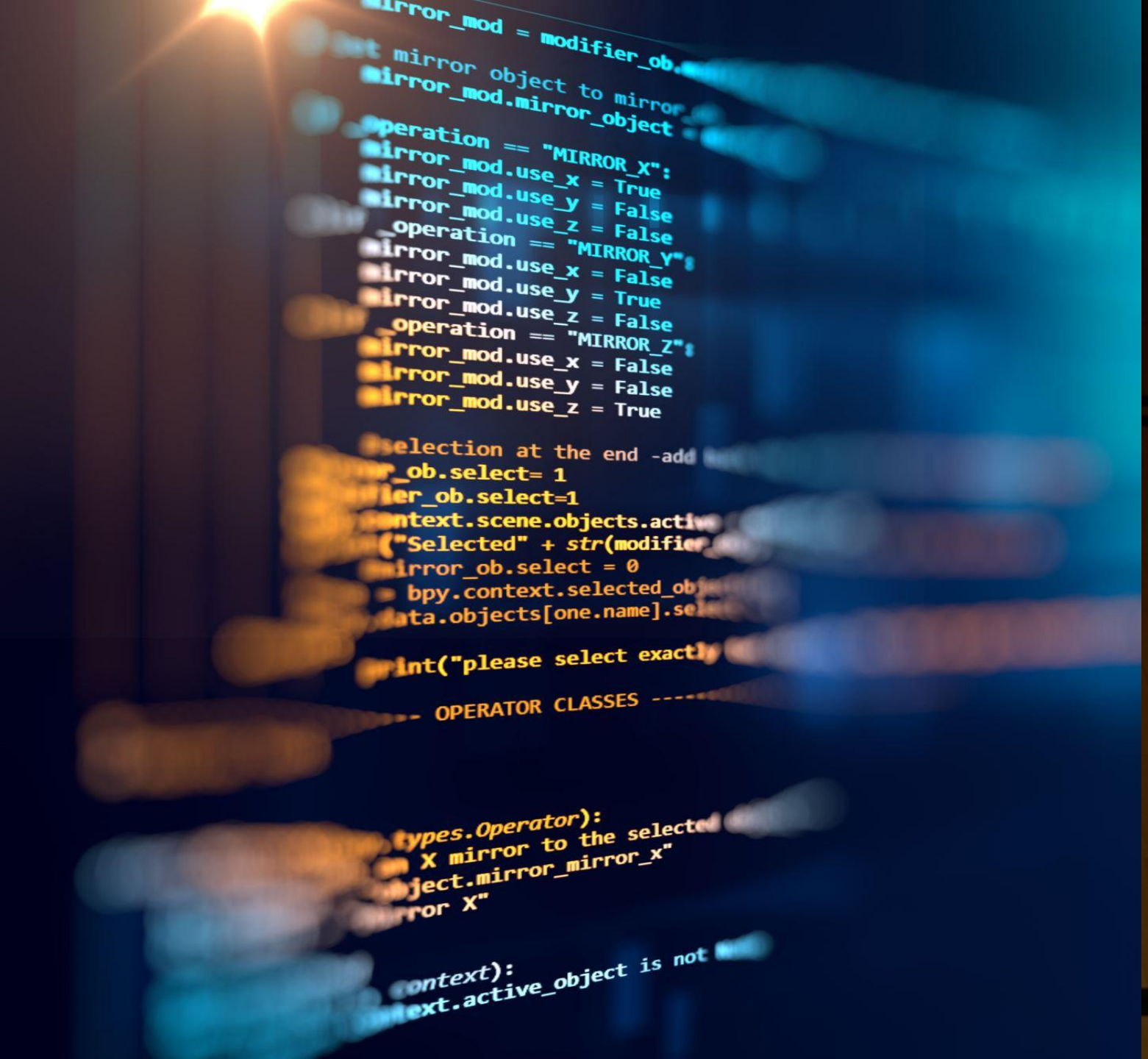


Tools and resources

Data source

- NBA.com via nba_api

Packages

- Pandas
- Seaborn

Project source code

- github/jcarmfran

Approach and Analysis

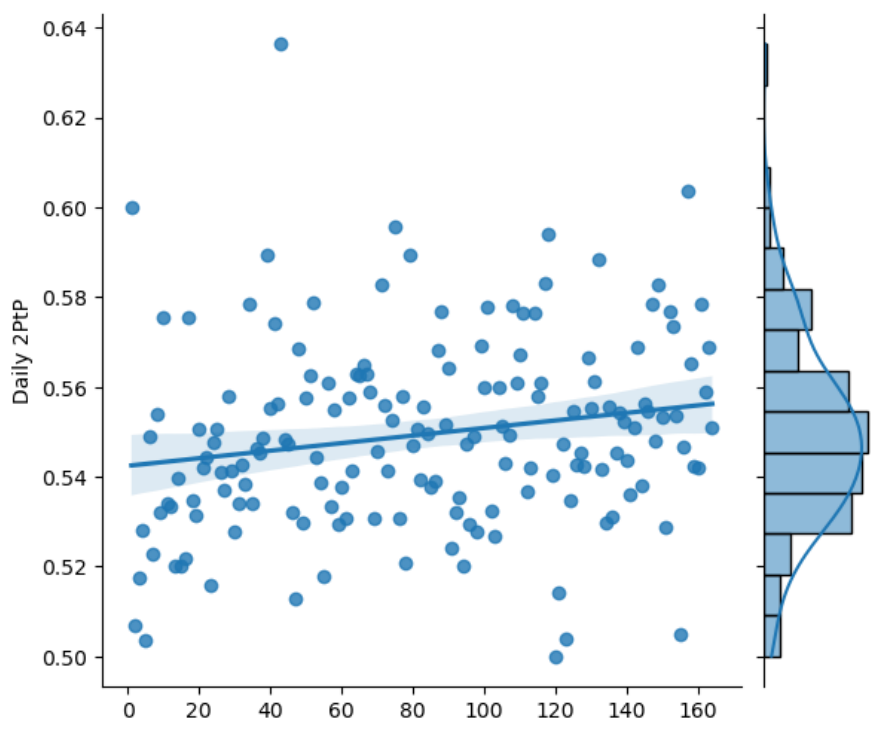
- Boxscore data downloaded using nba_api and used to assess daily shooting percentage averages throughout the course of the 2022-23 NBA season
- Seaborn will be used to help visualize data and guide inferences from gathered statistics
- Daily average

Questions and hypothesis

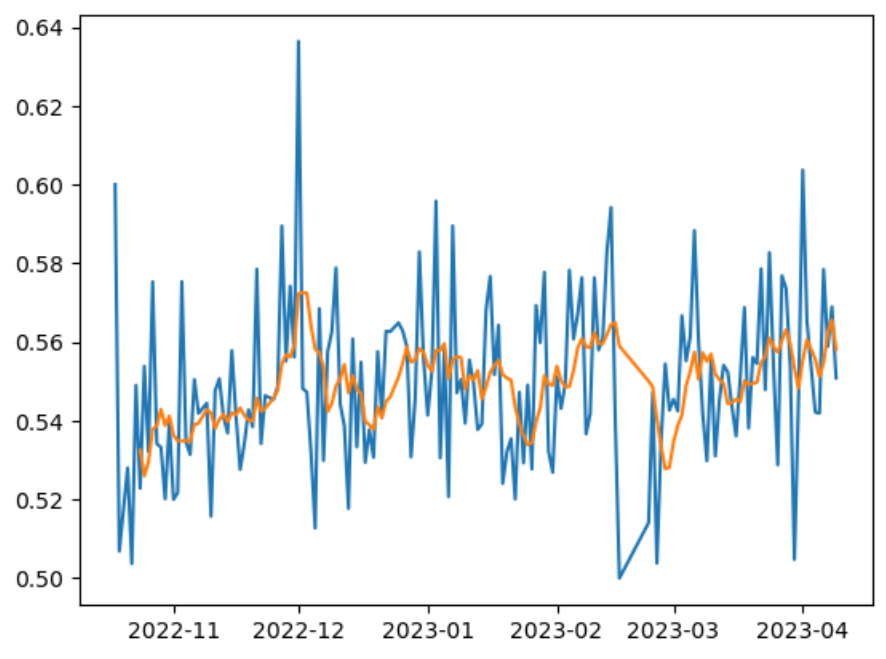
- Are there shooting trends that appear as the season progresses?
  - 2P%
    - Two-point percentages should stay about the same as the season progresses
  - 3P%
    - Players should get more comfortable shooting threes as the season progresses, resulting in a higher proportion of shots beyond the arc to go in.
- Is there data that can help assess if “streaky” labels of players are warranted?
  - So called “streaky” players should revert back to mean more often throughout the course of the season often enough to debunk this notion.
- What kind of patterns should we expect as far as free-throw percentage is concerned?
  - As the season progresses, we should expect to see players convert a larger proportion of their free-throw attempts.

Technical challenges

- The nba_api can be cumbersome to use and is still subject to typical data collection roadblocks/limitations (timeouts, temp. blocks, etc.)
- Seaborn is simply a visualization tool and is limited in more in-depth statistical charting
- Much of the data we are looking for has simply not been aggregated for and needs to be calculated ad-hoc



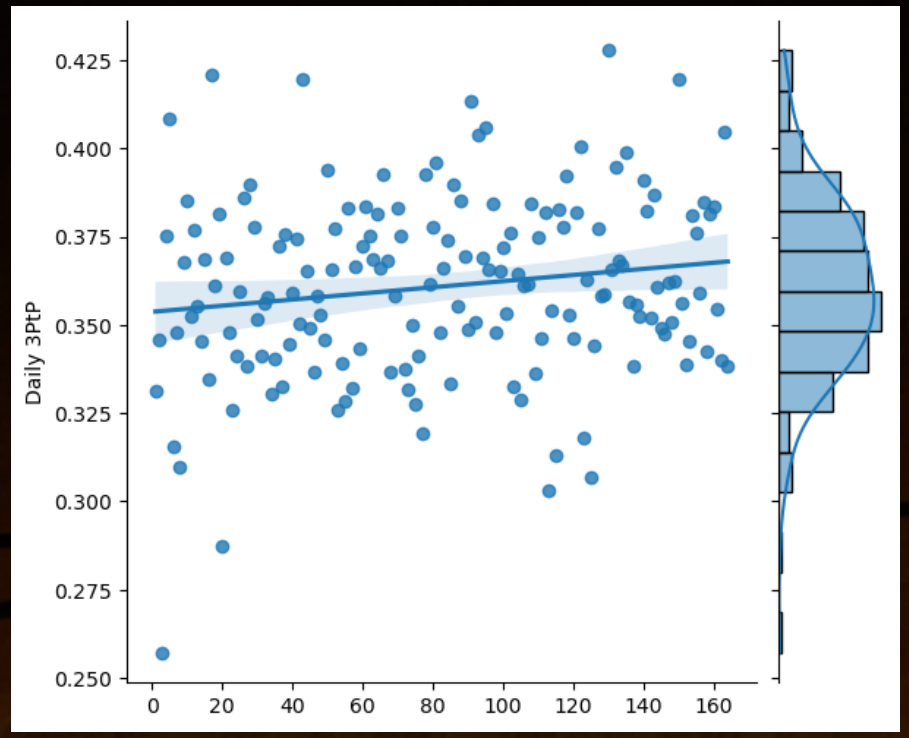
Scatter plot of daily two-point shooting percentages show



7-day 2P% moving average

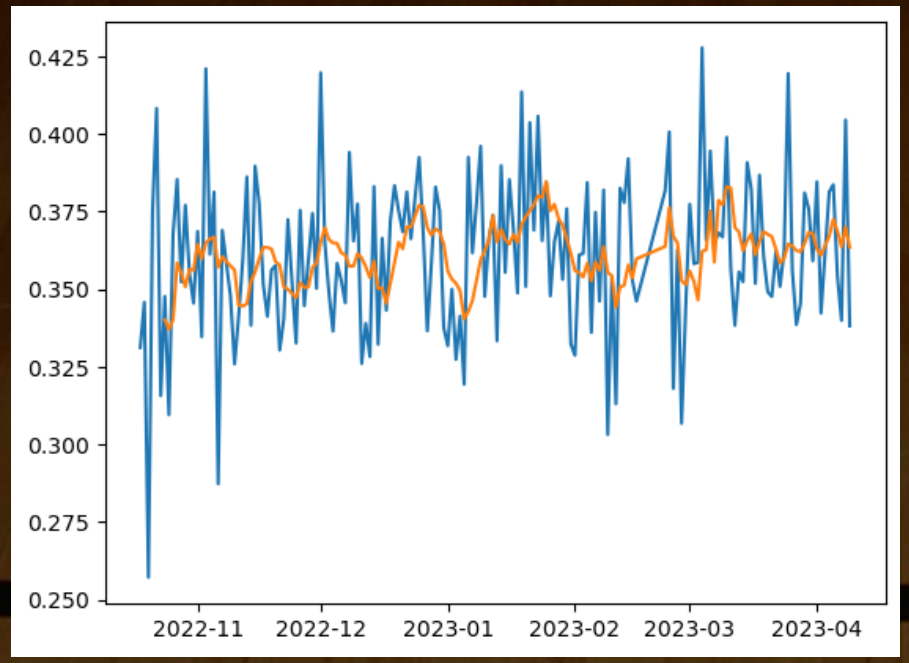
Q1-A. Are there league wide 2P% shooting patterns throughout the course of a season?

1. Normal distribution among percentage of two-point shot makes
2. Upward trending regression + 7-day MA
3. Upward trending 7-day moving average of shots made as



Scatter plot of daily three-point shooting percentages show

1. Normal distribution
2. Regression line indicating upward tendency as season progresses



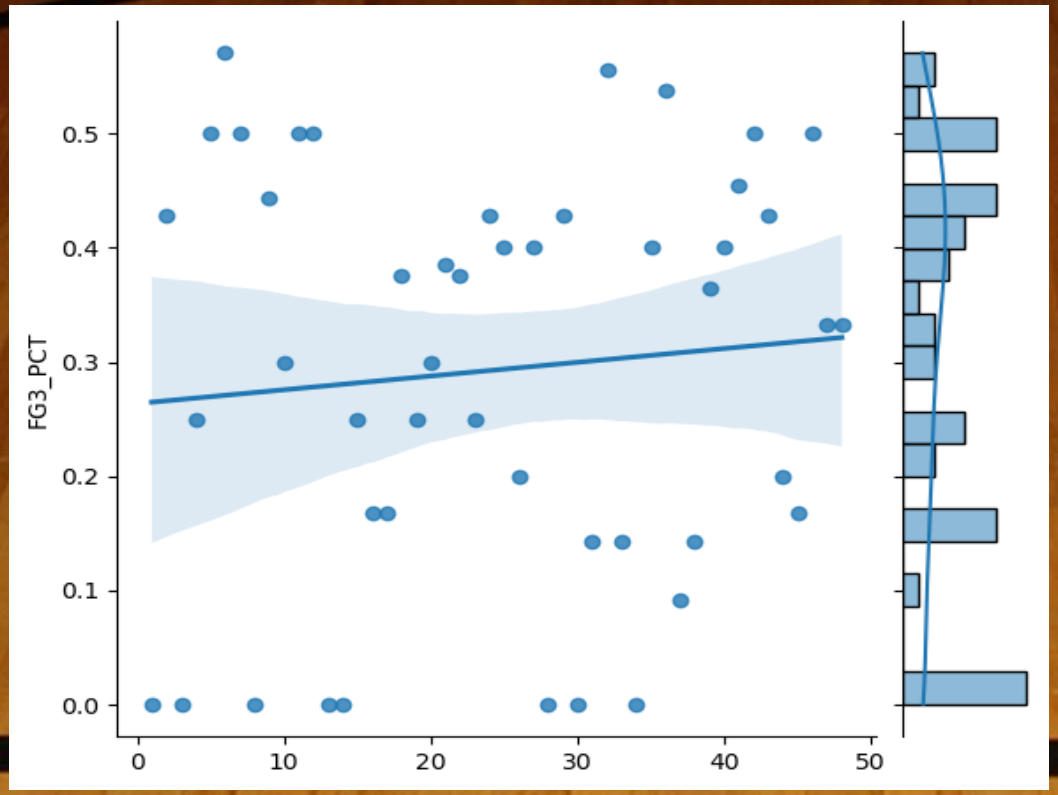
7-day 3P% moving average

Q1-B. Are there league wide 3P% shooting patterns throughout the course of a season?

1. Normal distribution among percentage of three-point shot makes
2. Upward trending regression + 7-day MA
3. Upward trending 7-day moving average of shots made as

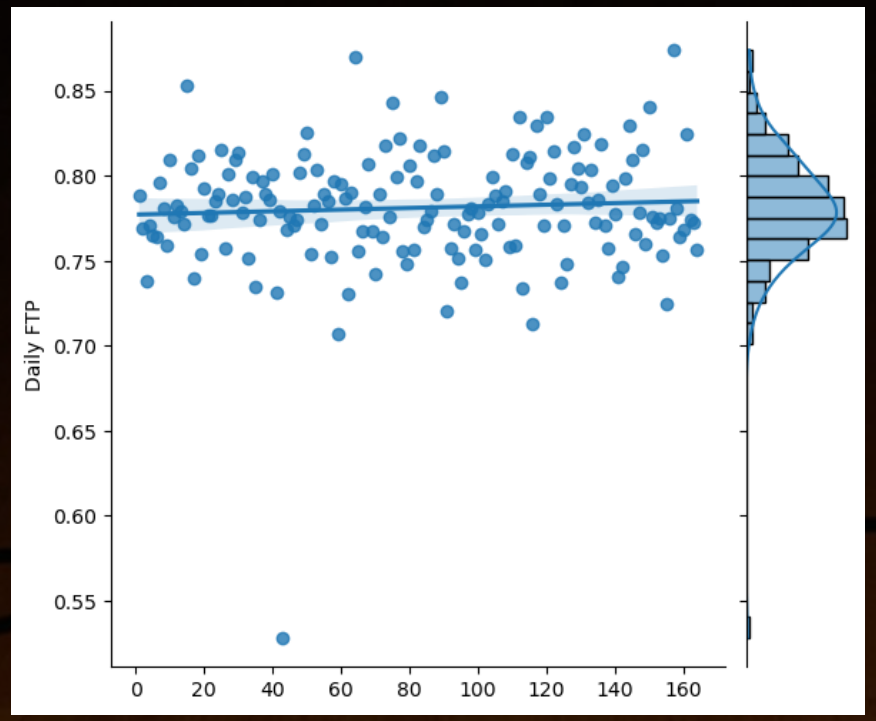
Q2. Are there players in the league who are deserving of their "streaky" label?

The stats seem to back up the claim that Kelly Oubre Jr. (widely considered one of the streakiest shooters in the league) is either red hot from beyond the arc or down right ice cold.



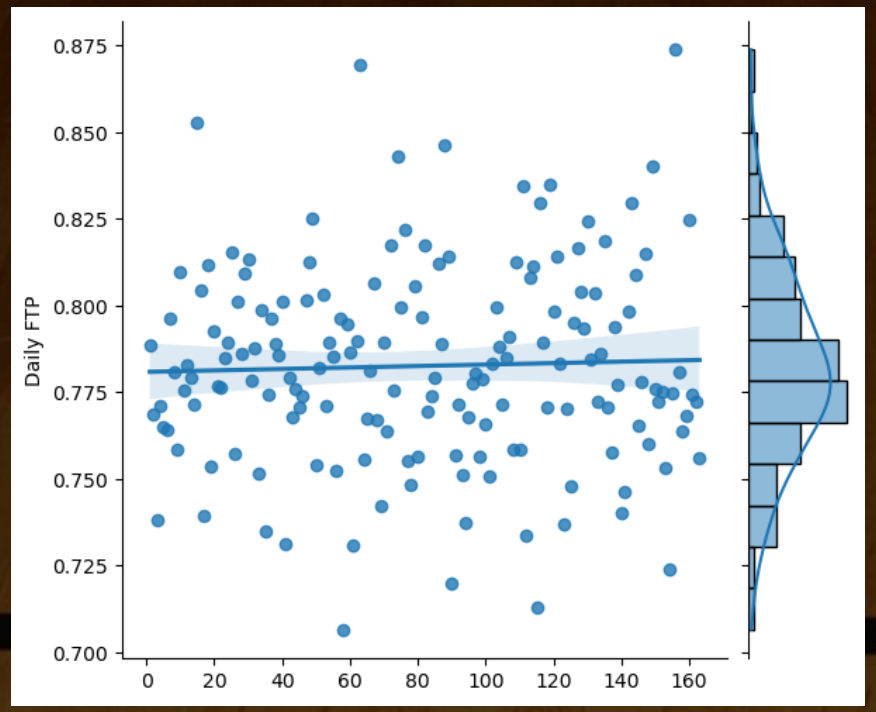
Of the 48 games Kelly Oubre played in the 2022-23 season, the five most likely 3P% outcomes we should come to expect...

1. 0% - 8 times – 16.7% of games
2. 50% - 6 times – 12.5% of games
3. 42.9% - 4 times – 8.3% of games
4. 25% - 4 times – 8.3% of games
5. 40% - 4 times – 8.3% of games



Joint plot of daily FT% throughout the course of the season

1. Normal distribution
2. Regression line indicating upward tendency as season progresses



Joint plot excluding anomalous low FT% scoring days

Q3. Are there league wide FT% patterns throughout the course of a season?

The plots to the left indicate that if there is a trend to be observed as far as FT% conversion rate is concerned, it is only a gradual increase of the conversion rate of FT attempts as the season progresses.

Conclusions

1. Q1 A+B: Are there league-wide shooting patterns that develop over the course the season?
   - Yes, there is a noticeable trend where players tend to make a higher proportion of their shots as the season progresses. Though two-points shot percentage increased, the most noticeable increase in shot conversion could be seen in three-point attempts.
2. Q2: Is the notion of “streaky” players in the NBA outdated?
   - There is reason to believe that some players do indeed exhibit a tendency to be erratic in their 3PT%.
   - More analysis needed on this question as methodology could be improved.
3. Q3: Are there league-wide free-throw patterns that develop over the course the season?
   - The conversion rate of free-throws does increase throughout the course of the season does seem to increase, albeit it very small.
4. As a general rule of thumb, you should expect players to shoot better as the season progresses.

Next Steps

- Continue collecting the box scores of previous seasons to further determine if this trend is something we can rely on happening every season.
- Reassess two-point attempts with categorized distances from the basket.
- Develop a better model to categorize who has been labeled “streaky”.
- Formulate a model that helps gauge if a shooter is likely to hit their next shot given the success/failure of their most recent attempts (in game streakiness).
- Develop a more robust data pipeline
  - Python → API → Data → SQL → Processing