EFFECTS OF SPACING ON OFFENSIVE EFFICIENCY IN THE NBA USING PLAYER TRACKING DATA

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WHAT IS SPACING?

Definition. The amount of open **space** created by the offense between offensive players and defenders in the half court.

Ingredients For Creating Space

- Screens
- Rim running (cuts)
- Driving
- Shooting

Spacing is created throughout the entire possession, not just at the time of the shot.

HOW DO WE DEFINE GOOD SPACING

Definition. Distance that is created between an offensive and defensive player in positions where they are offensively efficient and quickly able to get the ball.

Good Spacing Situations

- Near the ball **AND** distance between a defender
- High shooting percentage and shooting volume from current location

DATA

Player Tracking

Movement data tracking the 10 players and the ball at 25 frames per second over the duration of the entire game.

Feature Engineering

- Distance between an offensive player and the closest defender
- Distance between an offensive player and the ball
- Distance between an offensive player and the rim

Event Outcomes

Result of each possession in the game. Descriptions of who shot the ball and from were on the court

Feature Engineering

- Shooting percentages from distances
  - 0-8ft, 8-16ft, 16-24ft, 24+
- Shooting volume from distances
  - 0-8ft, 8-16ft, 16-24ft, 24+

SPACING METRIC

Player Tracking

- **Closest Defender**: standardized distance from an offensive player and the closest defender
- **Distance From Ball**: standardized distance from an offensive player and the ball

Shooting

- **Percentage**: Standardized shooting percentage given location on the floor
- **Volume**: Standardized shooting volume given location on the floor
- **Shooting Weight**: Normalized(Percentage + Volume)

Spacing = ABS(Closest Defender – Distance From Ball) * Shooting Weight

OFFENSIVE RATING

- In order to measure both player and team offensive efficiency we will use a well-known advanced NBA stat called **Offensive Rating**

- Point Produced Per 100 Possessions

Pros

- Tempo-free
- Eliminate factors like pace of play and minutes played

Cons

- Overvalues shooting percentage

RESULTS

- How correlated is our spacing metric to a teams and players offensive efficiency?

Overall

Correlation	Team	Player
Pearson	0.058	0.191
Spearman	-0.114	0.218
Kendall-Tau	-0.085	0.152

Position

Correlation	Guard	Forward	Center
Pearson	0.333	0.270	0.0984
Spearman	0.359	0.323	0.109
Kendall-Tau	0.256	0.226	0.080

RESULTS

Dashboard Visualizations

- **Game Level Information**
  - Averaging spacing for a player on made and missed shots for the game
- **Team Level Information**
  - Spacing and offensive rating rankings
- **Player Level Information**
  - Spacing and offensive rating rankings

CONCLUSIONS

- Extremely weak correlation between team spacing and offensive ratings

- Weak correlation between player spacing and offensive ratings overall
  - Stronger correlation with guards and forwards
  - Weaker correlation with centers

- Teams with better shooters and higher offensive ratings might be less dependent on needing space to make shots

FUTURE WORK

- Including shooters and time of shot information
  - Putting an emphasis on the spacing at the time of shot
  - Analyze which players need more space in order to be efficient

- Further iteration of the spacing metric
  - Currently not enough differentiation in spacing metric that captures all situations