

Ranking the Most Versatile Scorers in the NBA

Will Powell and Zara Zetlin

Department of Mathematical Sciences, Carnegie Mellon University



Abstract

We will be using a ranking system to determine who the most versatile scorer in a sample of eleven NBA players is from the 2017-2018 season.

Introduction

To be a versatile scorer is an important quality for an NBA member to have as it reflects on the skills of that player. There are numerous types of shots which can be earned; the ones we look into are: post up, spot up, off screen, pick and roll ball handler, isolation, and transition. Analyzing these six shots, we look at the statistics of eleven NBA players in these categories in order to form a ranking system. The NBA players we examine are Anthony Davis, LeBron James, Giannis Antetokounmpo, Kevin Durant, Blake Griffin, Karl Anthony-Towns, Kristaps Porzingis, Kevin Love, Dirk Nowitzki, Khris Middleton, and Pat Connaghton.

Materials and Methods

We used online data resources to see the statistics for each of our eleven chosen NBA players. We chose players who we believe to be highly-skilled. Alongside them, Pat Connaghton, who we deem to be more of an 'average' player, is included to add some breath to the scale. We found the points per possession for each shot in each category. Then, we took the point differentials for each player's shot in each category. Using the Massey Method we will be using $Mr = p$ where M =Massey Matrix, p =vector of point differentials, and r =ranking vector. To find the ranking vector, which tells us the answer of which NBA player is the most versatile scorer, we will invert M and do $M^{-1}Mr = M^{-1}p \implies r = M^{-1}p$. We weighted this method two different ways, one way using the points per game ppg and the other way using the field goal attempts fga . The below matrices are created from the data in the table within the middle column of this poster.












Mathematical Section

$$M = \begin{bmatrix} 58 & -6 & -6 & -6 & -6 & -6 & -6 & -6 & -5 & -6 & -5 \\ -6 & 58 & -6 & -6 & -6 & -6 & -6 & -6 & -5 & -6 & -5 \\ -6 & -6 & 58 & -6 & -6 & -6 & -6 & -6 & -5 & -6 & -5 \\ -6 & -6 & -6 & 58 & -6 & -6 & -6 & -6 & -5 & -6 & -5 \\ -6 & -6 & -6 & -6 & 58 & -6 & -6 & -6 & -5 & -6 & -5 \\ -6 & -6 & -6 & -6 & -6 & 58 & -6 & -6 & -5 & -6 & -5 \\ -6 & -6 & -6 & -6 & -6 & -6 & 58 & -6 & -5 & -6 & -5 \\ -6 & -6 & -6 & -6 & -6 & -6 & -6 & 58 & -5 & -6 & -5 \\ -5 & -5 & -5 & -5 & -5 & -5 & -5 & -5 & 49 & -5 & -4 \\ -6 & -6 & -6 & -6 & -6 & -6 & -6 & -6 & -5 & 58 & -5 \\ -5 & -5 & -5 & -5 & -5 & -5 & -5 & -5 & -4 & -5 & 49 \end{bmatrix}$$

$$p = \begin{bmatrix} -.793 \\ 5.923 \\ 2.451 \\ 8.951 \\ -1.049 \\ 2.398 \\ -6.694 \\ -1.215 \\ -3.422 \\ -1.014 \\ -4.213 \end{bmatrix}$$

$$ppg = \begin{bmatrix} 28.1 \\ 19.3 \\ 26.9 \\ 26.4 \\ 21.4 \\ 21.3 \\ 22.7 \\ 17.6 \\ 12 \\ 20.1 \\ 5.4 \end{bmatrix}$$

$$fga = \begin{bmatrix} 19.5 \\ 19.3 \\ 18.7 \\ 18.0 \\ 16.7 \\ 14.3 \\ 18.5 \\ 12.4 \\ 9.8 \\ 15.5 \\ 4.8 \end{bmatrix}$$

Player	Name	Post up	Spot up	Off screen	Pick and roll	Isolation	Transition
	Anthony Davis	.969	.957	.802	1.148	.81	1.253
	LeBron James	1.036	1.08	1.263	1.02	.96	1.185
	Giannis Antetokounmpo	.881	.921	1.435	.921	.842	1.202
	Kevin Durant	.971	1.435	1.206	1.038	1.057	1.108
	Blake Griffin	.935	1.188	1.059	.833	.909	.96
	Karl-Anthony Towns	1.018	1.25	1	.6	1.03	1.286
	Kristaps Porzingis	.963	1.028	1.107	4	.703	1.133
	Kevin Love	.983	1.271	.8	.714	.857	1.192
	Dirk Nowitzki	.975	1.21	.824	0	.815	1
	Khris Middleton	.984	1.079	.8	1.034	.879	1.062
	Pat Connaghton	0	.892	1.235	.786	.895	.816

Results

Rank	Using PPG	Using FGA
1	Kevin Durant	Kevin Durant
2	Lebron James	Lebron James
3	Giannis Antetokounmpo	Giannis Antetokounmpo
4	Karl-Anthony Towns	Pat Connaghton
5	Pat Connaghton	Karl-Anthony Towns
6	Anthony Davis	Anthony Davis
7	Blake Griffin	Blake Griffin
8	Kevin Love	Kevin Love
9	Dirk Nowitzki	Dirk Nowitzki
10	Kristaps Porzingis	Kristaps Porzingis
11	Khris Middleton	Khris Middleton

There is a difference between these two ranks, seen by the fourth and fifth positions being reversed between the ranks. This variation is due to Karl Anthony-Towns averaging 21.4 PPG on 14.3 FGA while Connaghton averaged 5.4 PPG on 4.8 FGA. Since Towns is a superstar, his free throws made per game are almost 5 per game higher so he scores more points on relatively less shots.

Conclusions

- Out of our sample, Kevin Durant is the most versatile scorer in the NBA. This is probably due to the fact that he plays on the Warriors, who have the most prolific offense in the NBA, and gets a multitude of open shots in their motion offense system as Steph Curry and Klay Thompson deter double teams on Durant.
- Khris Middleton is the worst scorer out of these eleven in the sample. Middleton was primarily a midrange scorer in 2018, the least efficient shot area in NBA basketball. In 2019 Middleton has adjusted to increase his 3 point rate and improve his efficiency as the Bucks have moved into the elite teams in the Eastern Conference.
- Pat Connaghton, our 'average' player is ranked fifth and fourth out of the eleven players for his versatility as a scorer. This does not follow our predictions.

Further work that can be done is to extend this ranking system to all of the NBA. Different weightings can be used to change the outputs. Players can then be compared within an NBA team or across all of the members.

References

- [1] <https://www.basketball-reference.com/>
- [2] <https://corp.synergysportstech.com/>

Acknowledgements

We would like to thank Professor Howell for his passion in Mathematics and his support throughout this project and the course.