

## **DEFENDER IMPACT on METRIC OVER TIME**

<http://nbahackathon.ngrok.io/home/>

### **Prompt:**

Develop a new method or tool for evaluation of defensive performance in the NBA. Some ideas include evaluation of players by age (e.g. older players' tendencies vs. younger players' tendencies), a visualization / video tool to aid in tracking the associated data, and / or a new and tested metric (e.g. "Defensive PER")

### **Methods Used:**

Our solution evaluates the effect of a player's defensive presence on an offensive player. By determining the player closest by using Euclidian distance as the "responsible" defender, we then calculate the FG% and points scored by that offensive player and graph the change over the course of the game. Using the SV raw data we can track players positions every second and using the play-play datasheet we're able to track field goal percentage and total points- thus directly reflecting the impact of the defender on the player.

After analyzing the data, we passed it to our web application which visualizes how the offensive player is affected by different defenders over the course of the game. For example, Stephen Curry's FG% is drastically reduced when guarded by Iman Shumpert & we have graphed the trend of Stephen Curry's performance. Using different colors to represent different defenders we can directly visualize the impact of a defender on his opponent.

### **Applications:**

The Defender Impact visualization solves the age-old problem of deciding who to match up with. It is immediately apparent that coaches can analyze this data to see who is the most effective defender on a certain player. On top of that, coaches can see how players react to a certain defender as the game progresses, and who is missing assignments. If a coach assigns a player to defend someone and they are not shown as the closest defender in that timespan, the defender is being ineffective, and which could be compounded by the offensive player's efficiency in this timespan.

Another way to look at this is from an offensive perspective. If a coach sees that their player is ineffective when guarded by a certain defender, he can choose to call for more screens, when being guarded, or perhaps implement a more fast pace offense so the defense has less time to set up.

### **Further Research:**

The code for this algorithm was designed to be scalable. Although the demo and current functionality only highlights one team in one game, it would be easy to abstract the problem to handle the game and team as parameters from a user. This would lead to a significant gain in functionality of course.

In addition, the current statistics that are being kept track of are FG% and points scored, however some other metrics like PER and +/- are important to today's statisticians. The addition of these stats and many more could be useful, along with the ability to superimpose the stats on the same graph.

**How to Run:**

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