

The background of the slide features a large, semi-transparent silhouette of the NBA logo, which is a basketball player in mid-air. The silhouette is positioned centrally and is split vertically by a diagonal line. The left half of the silhouette is set against a dark blue background, and the right half is set against a dark red background. The overall background of the slide is a dark, textured surface that resembles a wooden basketball court floor.

Modern PlayStyles

Carlos B. Rivera
Data Scientist

NBA

Mission Statement

The NBA has been going through a revolutionary period in which players no longer fit traditional positional roles. Evidently, every position on the basketball court has adopted and evolved into new roles with more responsibilities. This project not only aims to reclassify traditional roles, it aims to create a recommender system to demonstrate that the current league is indeed positionless.

NBA

Process

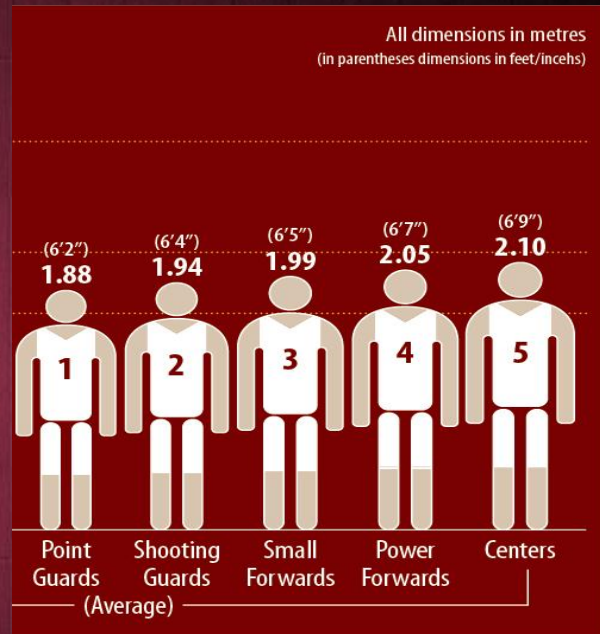
1. Mission Statement
2. Background (Traditional)
3. Background (Modern)
4. Data Collection
5. Modeling/Evaluate
6. EDA on Clusters
7. StreamLit APP
8. Infer Mission Statement

NBA

Background Info (Traditional)

Role Responsibilities

1. PG(1)
 - a. Distribute the basketball
 - b. Initiate and create plays
 - c. Score
2. SG(2)
 - a. Shoot the basketball
 - b. Distribute the ball
 - c. Backup PG
3. SF(3)
 - a. Score the basketball by shooting and/or penetration.
 - b. Offensively rebound
4. PF(4)
 - a. Set screens
 - b. Score by pick and roll
 - c. Offensively Rebound
5. C(5)
 - a. Protect the paint(Blocks)
 - b. Rebound
 - c. Set screens



Background Info (Modern)

A quick illustration of what happens when you don't adopt.

Mo Bamba:

- a. Height = 7.0ft
- b. Wingspan = 7.10
- c. Drafted No. 6, 2018

Tacko Fall:

- a. Height = 7.5 ft
- b. Wingspan = 8.4
- c. Undrafted



Data Collection

The background of the slide features the NBA logo, which is a silhouette of a basketball player in mid-air, set against a red and blue background. The word "NBA" is written in large, bold, white letters at the bottom of the logo.

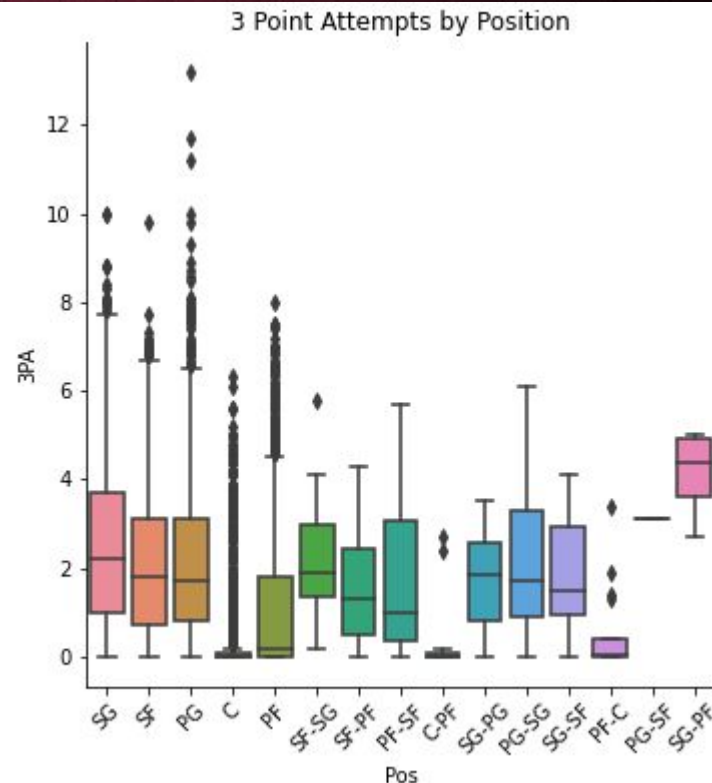
1. Initial EDA
 - a. Scraped traditional Stats from the last 20 years from [basketball-reference.com](https://www.basketball-reference.com)
 - b. 28 Features
2. Modeling/Evaluation/EDA
 - a. Scraped the entire 2021 season traditional, advanced, defensive, and offensive stats.
 - b. 83 Features

Initial EDA

Pos	
C	0.235480
C-PF	0.245833

Insight:

There are two types of centers, traditional and outliers.

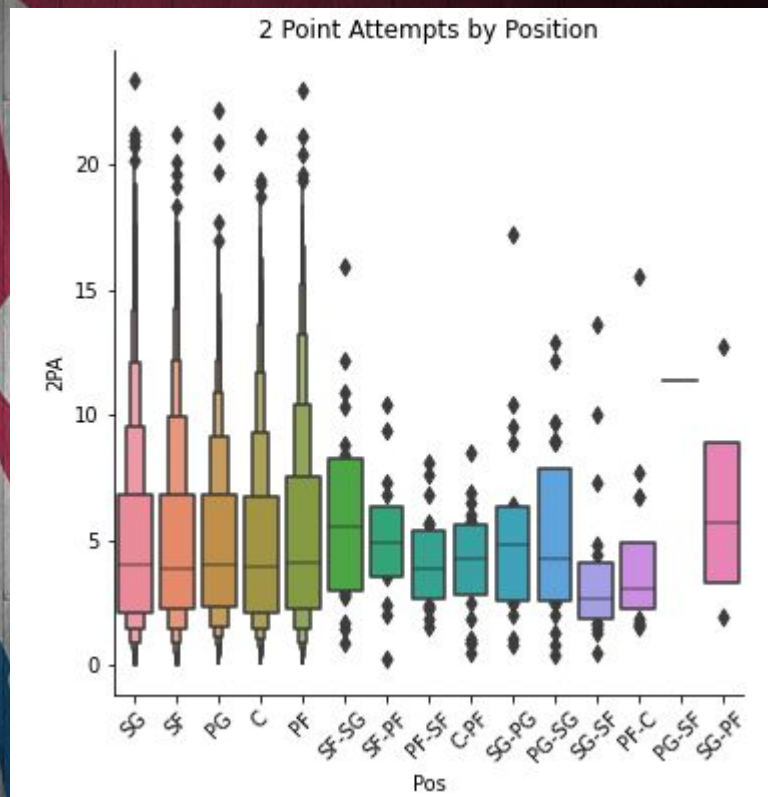


Initial EDA

Pos	
C	4.897503
C-PF	4.016667

Insight:

Centers typically take shots inside the 3 point range.



Models

Models will be trained on list of features separated by defensive, offensive, traditional, and pure offensive stats.

Clusters will be used to reclassify players into new categories.

Models Trained: KMean Clustering, PCA KMean Clustering

Baseline KMeans Models

Parameters

Standard scalar

n_clusters = 5

Defensive:

Sil Score: 0.1742

Inertia Score: 4416.8

Offensive:

Sil Score: 0.17495

Inertia Score: 8706.8

Pure Offensive:

Sil Score: 0.20842

Inertia Score: 2904.2

Traditional:

Sil Score: 0.20837

Inertia Score: 4322.9

PCA/KMeans GridSearch

Parameters

Scalars: Standard, Normalizer, MinMax

N_components: 2-30

N_clusters: 2-5

Defensive:

```
n_components = 3 (84% explained variance)
sil score = 0.361631
clusters = 2 (different types of players)
```

Offensive:

```
n_components = 4 (88% explained variance)
sil score = 0.723362
clusters = 3 (different types of players)
```

Pure Offense:

```
n_components = 3 (84% explained variance)
sil score = 0.315019
clusters = 3 (different types of players)
```

Traditional Stats:

```
n_components = 5 (97% explained variance)
sil score = 0.474175
clusters = 4 (different types of players)
```

KMeans GridSearch

Parameters

Scalars: Standard Scalar, Normalize, MinMax

N_clusters: 2-5

Defensive:

Best K clusters = 2
Best scalar = Normalize
Sil score = 0.36

Offensive:

Best K clusters = 4
Best scalar = Normalize
Sil score = 0.730029

Traditonal Stats:

Best K clusters = 3
Best scalar = Normalize
Sil score = 0.453440

Pure Offensive:

Best K clusters = 3
Best scalar = Normalize
Sil score = 0.320131

Winning Models Summary

A large, stylized silhouette of a basketball player in a jumping pose, colored in the NBA's blue and red. The silhouette is positioned in the background, with the word 'NBA' in large, bold, blue letters at the bottom.

For Offensive and Pure Offense Statistics Normalizer Scalar/KMeans yield best results.

1. Offensive Model:

- a. n_cluster: 4
- b. silhouette score: 0.73

2. Pure Offense:

- a. n_cluster: 3
- b. silhouette score: 0.32

For Traditional and Defensive Statistics Normalizer Scalar/PCA/KMeans yield best results.

1. Defensive Model:

- a. n_cluster: 2
- b. n_components: 3
- c. silhouette score: 0.36
- d. explained variance: 84%

2. Traditional:

- a. n_cluster: 4
- b. n_components: 5
- c. silhouette score: 0.47
- d. explained variance: 97%

Reclassifying Players based on Modern Play Style

A large, stylized silhouette of a basketball player in a jumping pose, colored in the traditional NBA blue and red. The silhouette is positioned in the background, with the word "NBA" in large, bold, white letters at the bottom.

Offensive Category

1. Practice Player
2. Super Stars
3. Work Horse
4. Diverse-Tall

Defensive Category

1. Unicorns
2. 1st Ballot HOF

Traditional Category

1. Corner Stones
2. Defender/Intentional Fouls
3. Star Protectors
4. Defensive Anchors

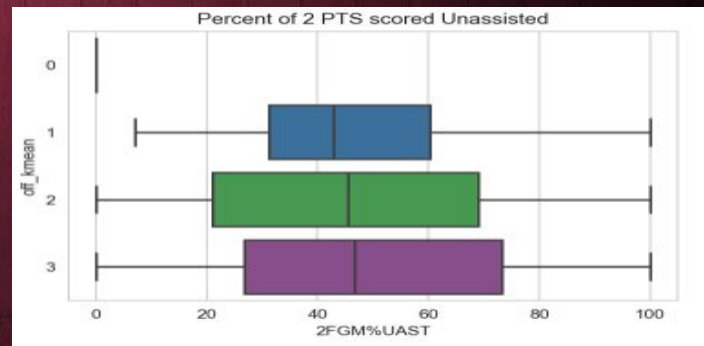
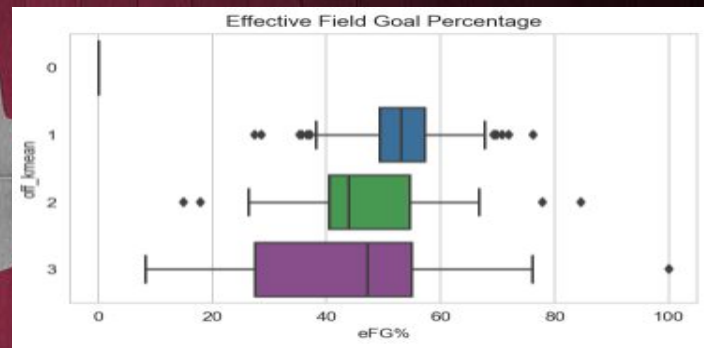
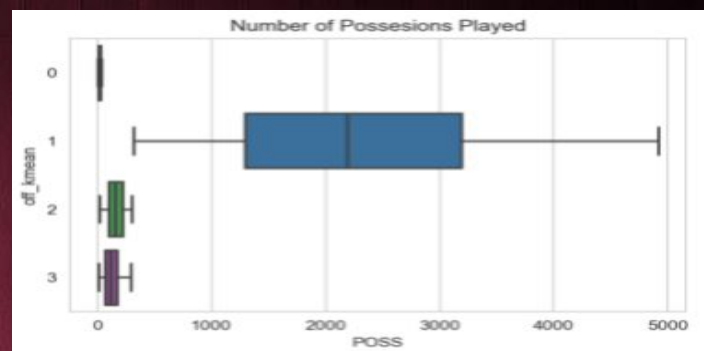
Pure Offense Category

1. Creator
2. Heat Checkers
3. Driver

Offensive Category

Cluster 1: The Super Star

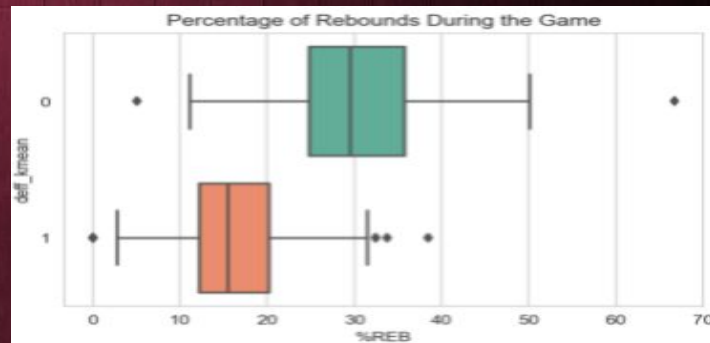
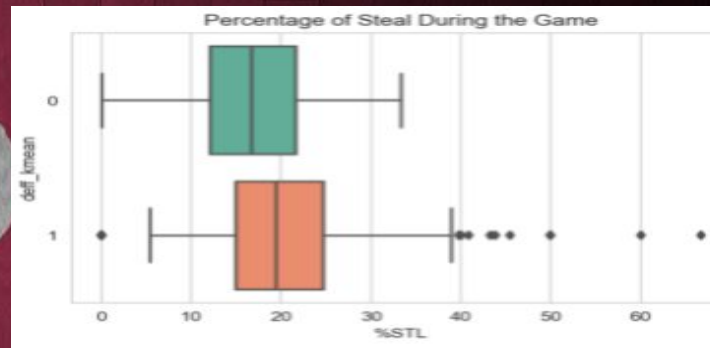
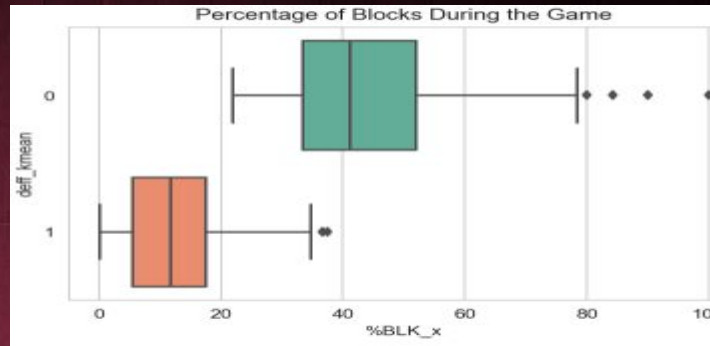
- Has the highest mean of possessions played.
- Lethal Shooter from anywhere on the court.
- Scores the basketball very well inside the arc.
- Ex. Luka Doncic, Bradley Beal, Stephen Curry



Defensive Category

Cluster 0: The Unicorn

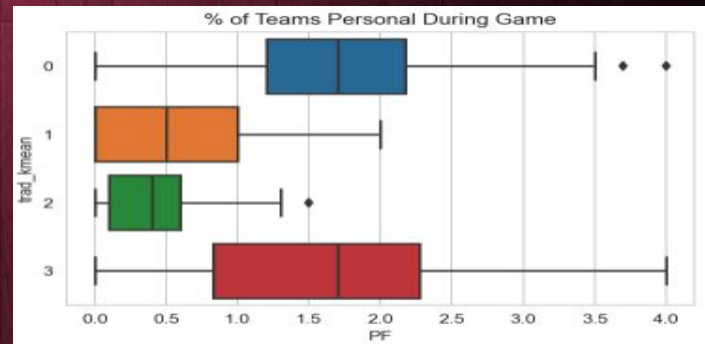
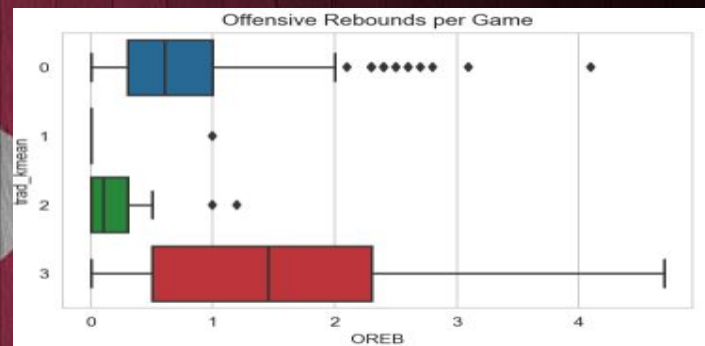
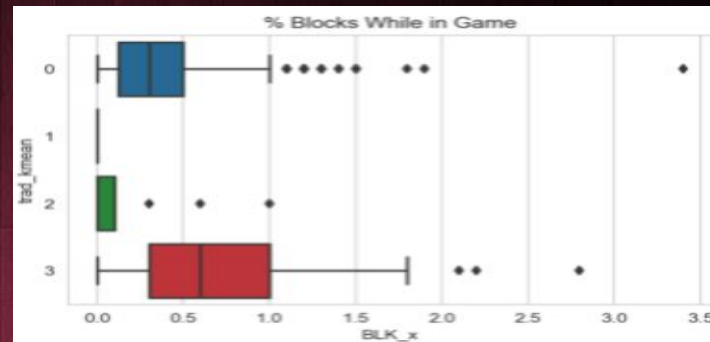
- Besides being a complex problem on the offensive end of the court, they still play above outstanding defense.
- While on the floor they account for:
 - 16% of steals
 - 45% of blocks
 - 28% of rebounds
- Ex. Kevin Durant, Giannis Antetokounmpo



Traditional Category

Cluster 3: Defensive Anchors

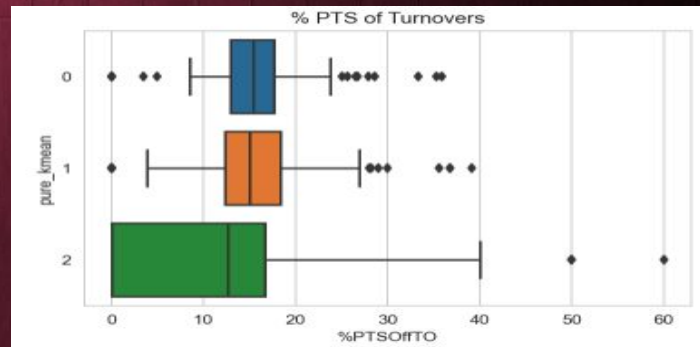
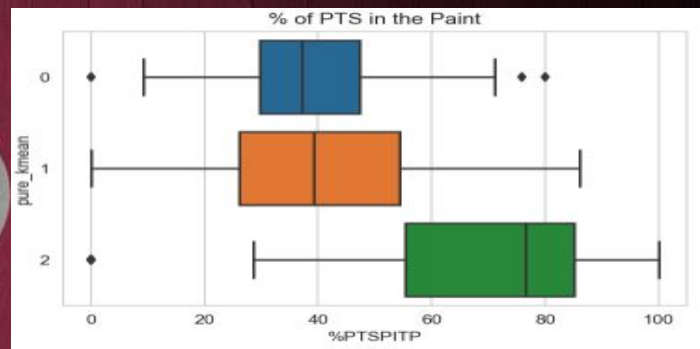
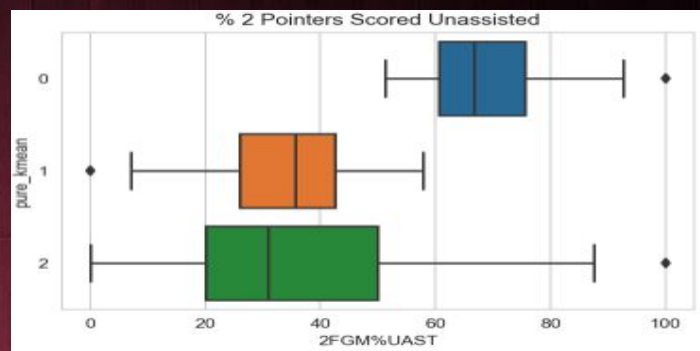
- Typically play 32 Mins a game.
- Account for 70% of blocks while in the game.
- Account for 2 offensive rebounds a game.
- Ex. Rudy Gobert, Enes Kanter



Pure Offense Category

Cluster 0: The Creator

- They can slash and take you off the dribble to score, or collapse the defense to create opportunities for teammates.
- Account for 70% of the teams unassisted 2pts while on the floor.
- Accountable for 15% of points scored on turnovers.
- Ex. Luka Doncic, Ben Simmons



Streamlit App

NBAPlayerAnalyzer

- Requires 1 input of a 2021 NBA player
- Existing Recommender Dataframe makes finding similar players fast
- Online Tool for teams to use during offseason for team building
 - [GO!](#)

NBA

So What...

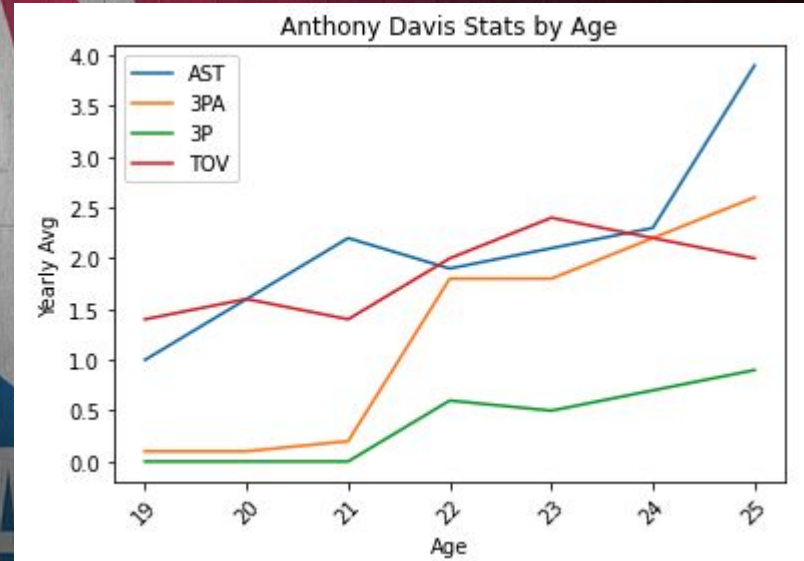
The NBA has clearly revolutionized into a positionless game where the majority of players do not fit their traditional roles.

Driving the point home

- Player: Anthony Davis
- Height: 6'10 ft
- Wingspan: 7'6"
- Traditional Position: C
- Modern Position: SF-C

Recommended Similar Players based on Pure Offensive statistics

- Jarrett Culver
 - Height: 6'6 ft
 - Wingspan: 6'9"
 - Traditional/Modern Pos: SF



Future Plans

- Enhance Streamlit app to incorporate incoming College/G-league /Over-Seas prospects, and then provide recommendations based on current similar players rookie stats!
 - Ex. How does prospect X compare to LeBron James when he was a rookie?
 - Ex. What is prospect X's potential ceiling? Potential floor?
- Train more and different Models
 - Possible Models
 - DBSCAN
 - Hierarchical Clustering

NBA

A large, semi-transparent silhouette of the NBA logo is centered in the background. The logo is a white silhouette of a basketball player in a jumping pose, set against a blue and red background. The word "NBA" is written in white capital letters at the bottom of the silhouette.

**Chuck, Varun, and Grant you are extremely
Appreciated!!!**

Thank you to all my GA classmates who helped me out, even if it was to hear me vent for 5 minutes! This has been an amazing experience, and i'm glad it happened with you all!