NBA PLAY STYLE EVOLUTION

AN EMPIRICAL ANALYSIS OF HOW NBA PLAY STYLE HAS CHANGED OVER TIME

Abhay Kothari, Arsh Gulati, Fernando Garcia De Llano, Jash Desai, Jay Maniyar

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INTRODUCTION

INTRODUCTION

DATA

We obtained our dataset from the website: Basketball-Reference.com which has data and statistics on all previous NBA seasons

Initial Data Entries: 14,798
Used Data Entries: 8,990

OBJECTIVE

Exploring the change in play style in the NBA by measuring the main statistical categories from the following eras: 2000-2009 & 2010-2019

LITERATURE

We referenced various articles which spoke about the following:

- Physicality - “The NBA is soft, 2023 ”
- Position evolution - “ The modernization of NBA offenses and why small ball is here to stay” (Fenichel, 2022)

HYPOTHESIS

Ho

There is no significant change in the main statistical categories between 2000–2009 & 2010–2019 which showcases no change in overall play style in the NBA.

Ha

There is a significant change in the main statistical categories between 2000–2009 & 2010–2019 which showcases a change in overall play style in the NBA.

Main Statistical Categories:
3 points attempted, 3 points made, 3 point percentage, 2 points attempted, 2 points made, 2 point percentage, Free throws attempted, Free throws made, Free throw percentage, Total rebounds, Assists, Steals, Blocks, and Personal fouls.

METHODS

METHODS

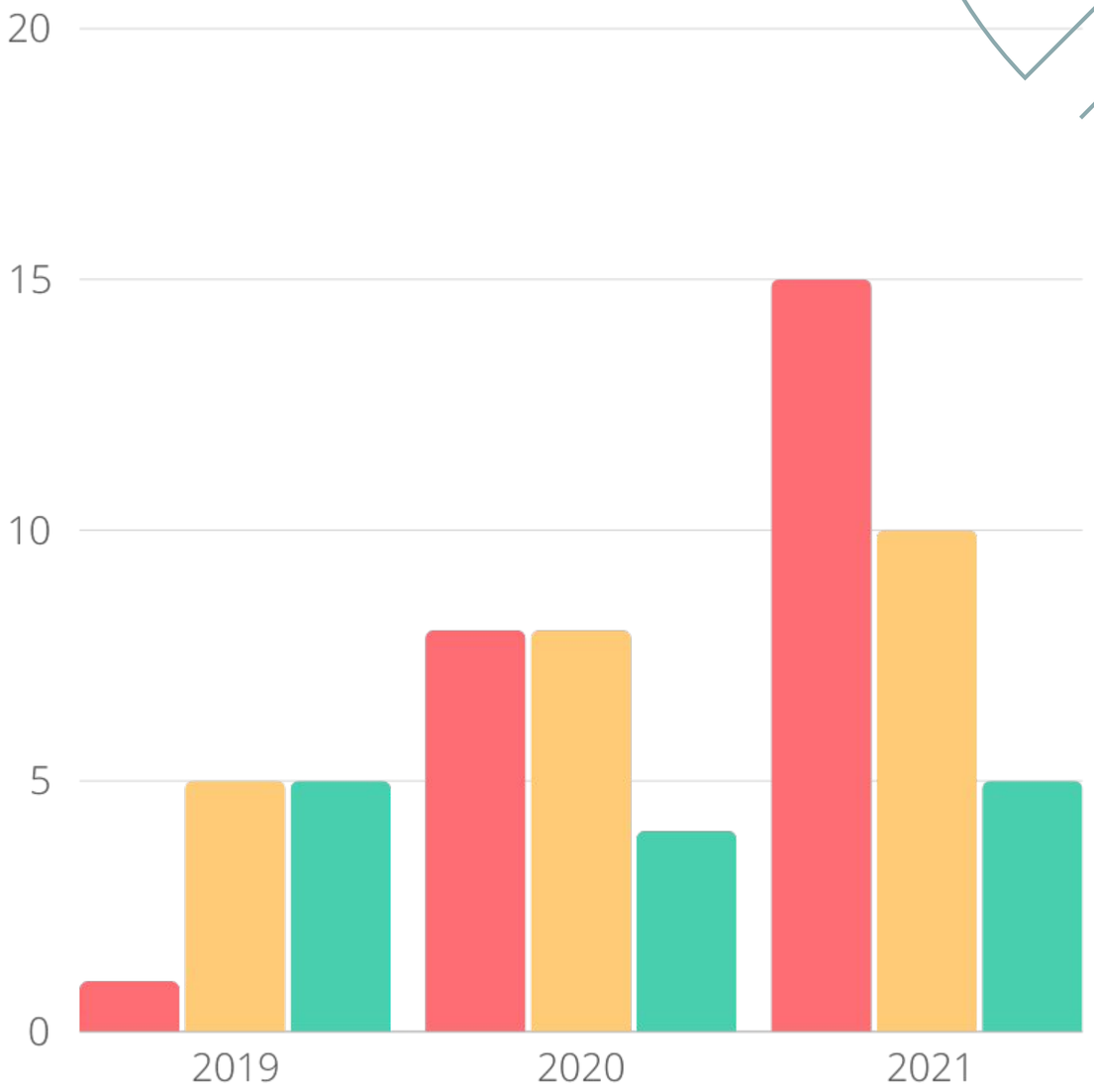
01 - EXPLORATORY DATA ANALYSIS

02 - HYPOTHESIS TESTING

03 - ANOVA ANALYSIS

04 - CLUSTER ANALYSIS

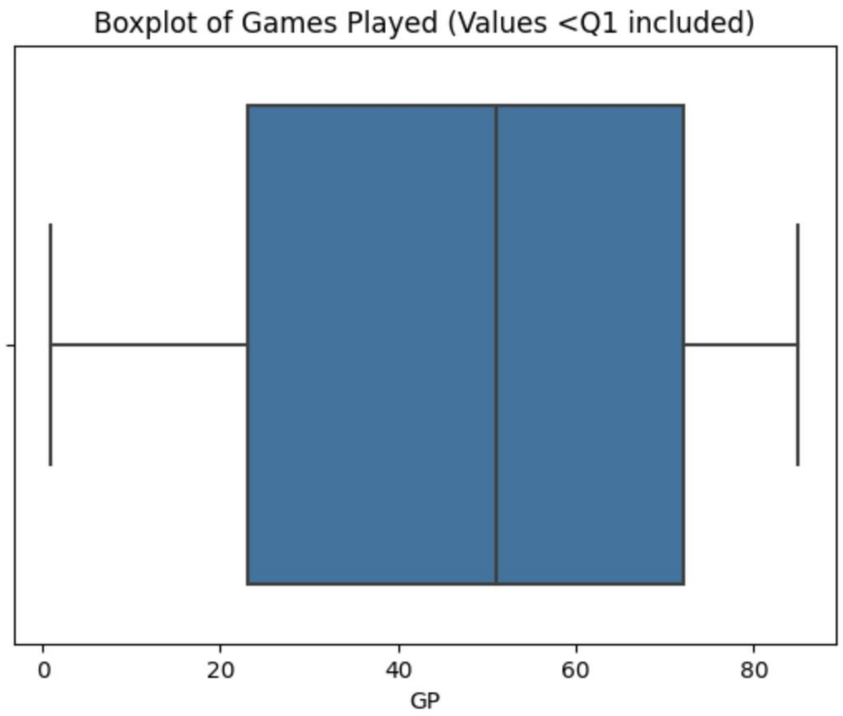
05 - TIME-SERIES ANALYSIS

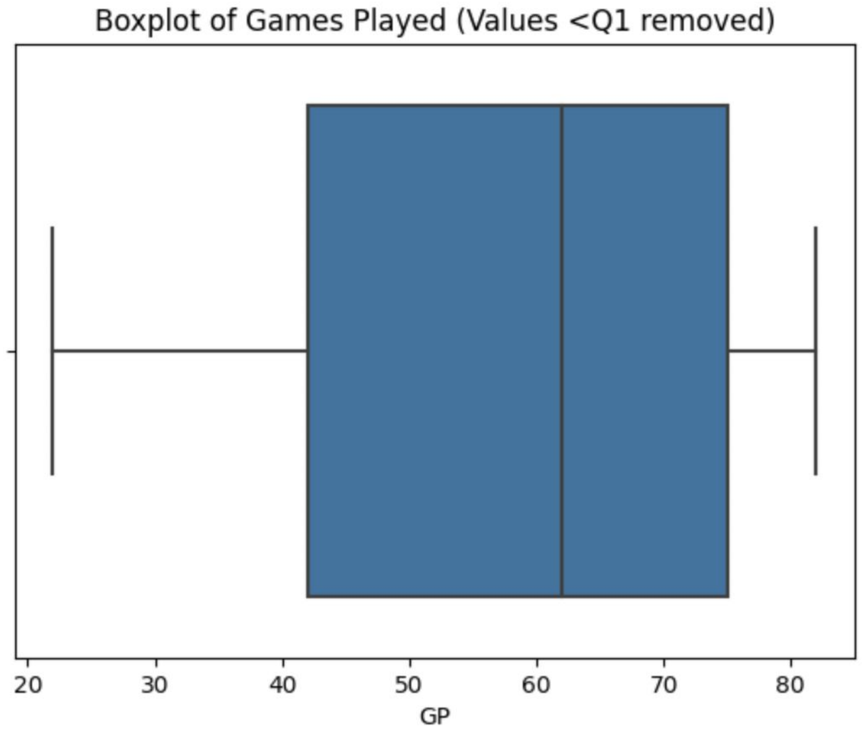


EXPLORATORY DATA ANALYSIS (EDA)

Purpose of EDA

- Assessing missingness in the data
- Removing unnecessary data based off of our thresholds for field goals and games played





HAS THE RISE OF SMALL-BALL LINEUPS AFFECTED WELL-ROUNDEDNESS?

a = 0.05

POINT GUARDS

BLK

TRB

STATISTICALLY SIGNIFICANT

CENTERS

AST

3P

3PA

3P%

STATISTICALLY SIGNIFICANT

POWER FORWARDS

3P

3PA

3P%

STATISTICALLY SIGNIFICANT

LEFT- TAILED T-TEST FOR EACH STAT FOR D1 VS D2

a = 0.05

FTA
FT
FT%

2P%

3P
3PA
3P%

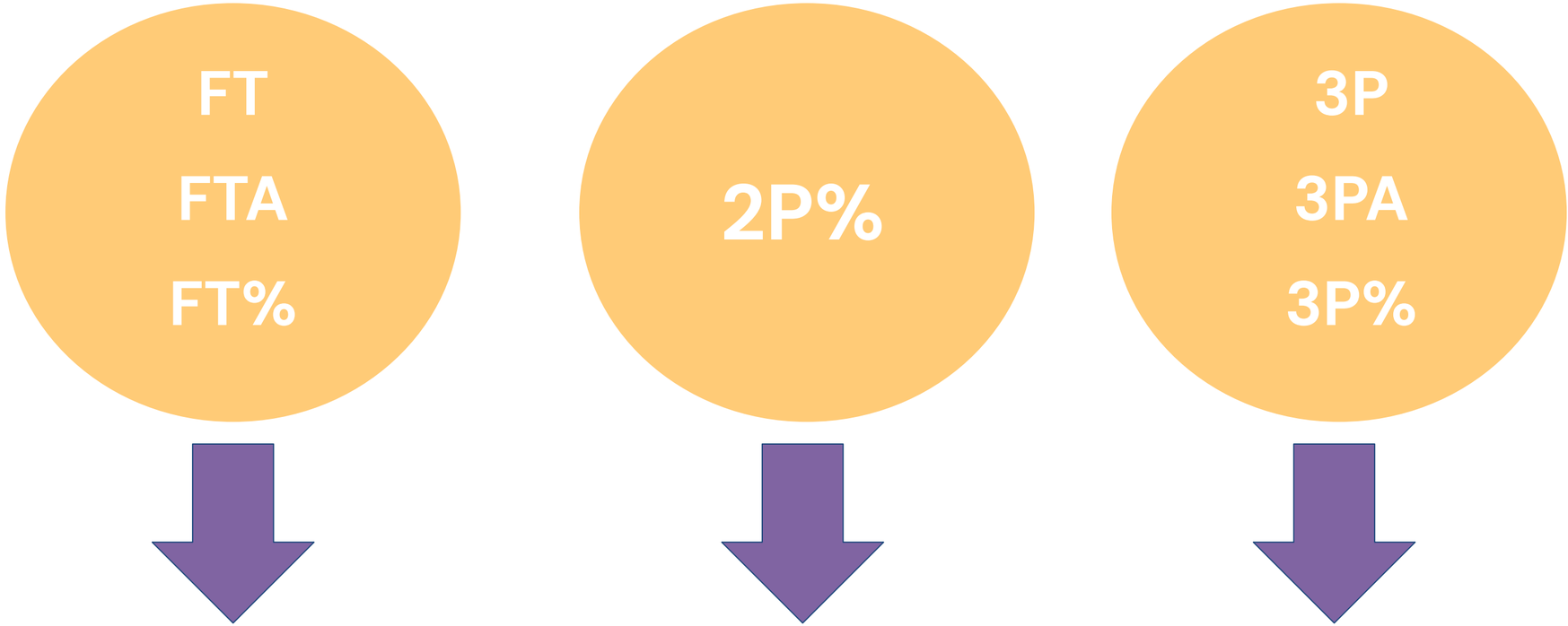
STATISTICALLY SIGNIFICANT

STATISTICALLY SIGNIFICANT

STATISTICALLY SIGNIFICANT

ANOVA ANALYSIS

a = 0.05

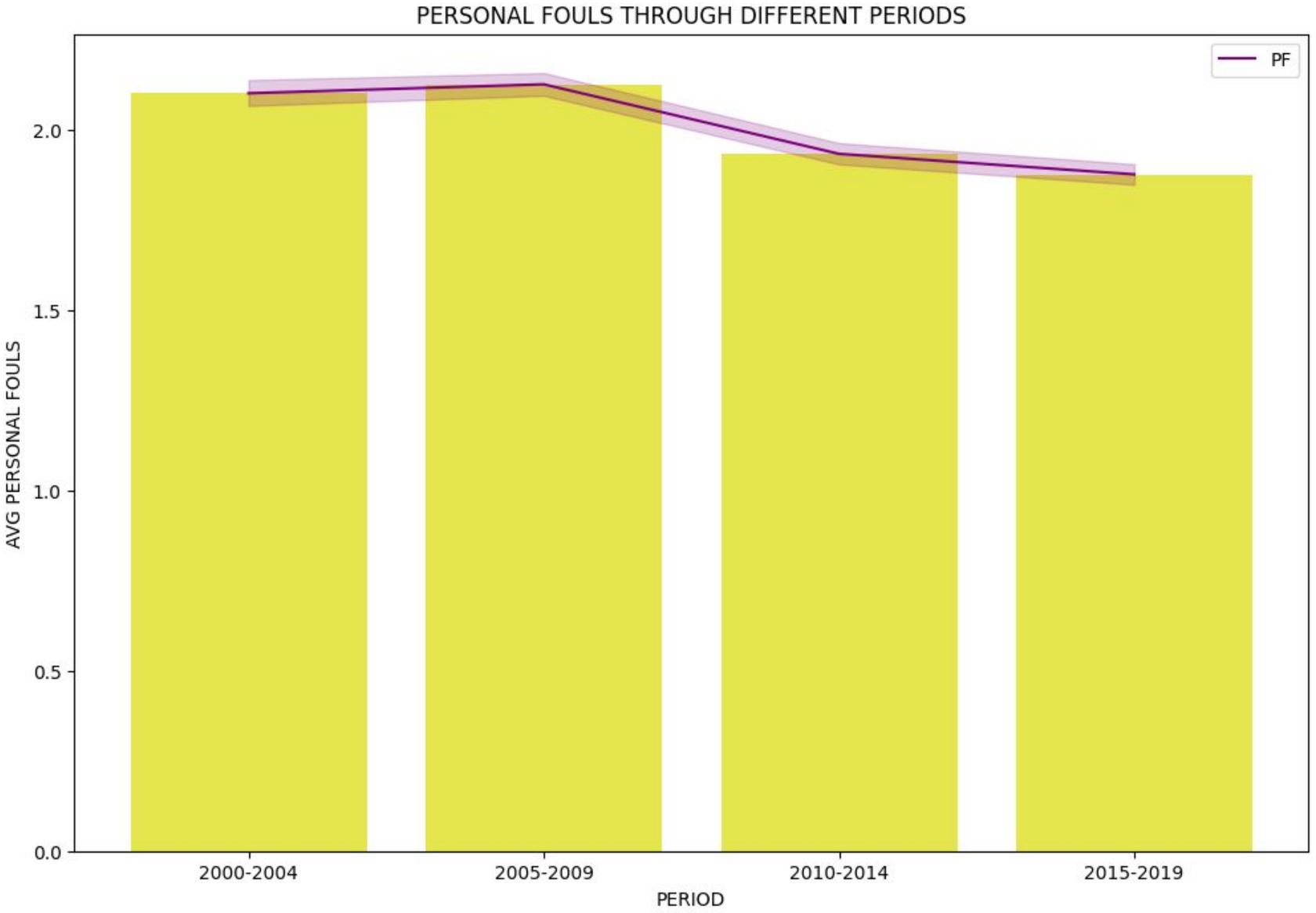


STATISTICALLY SIGNIFICANT

STATISTICALLY SIGNIFICANT

STATISTICALLY SIGNIFICANT

ANOVA ANALYSIS ON PERSONAL FOULS

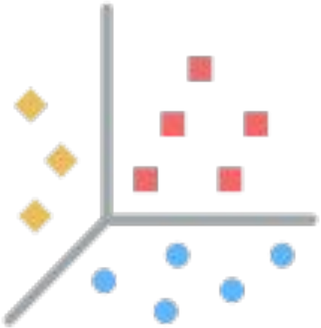


CLUSTER ANALYSIS

OVERVIEW

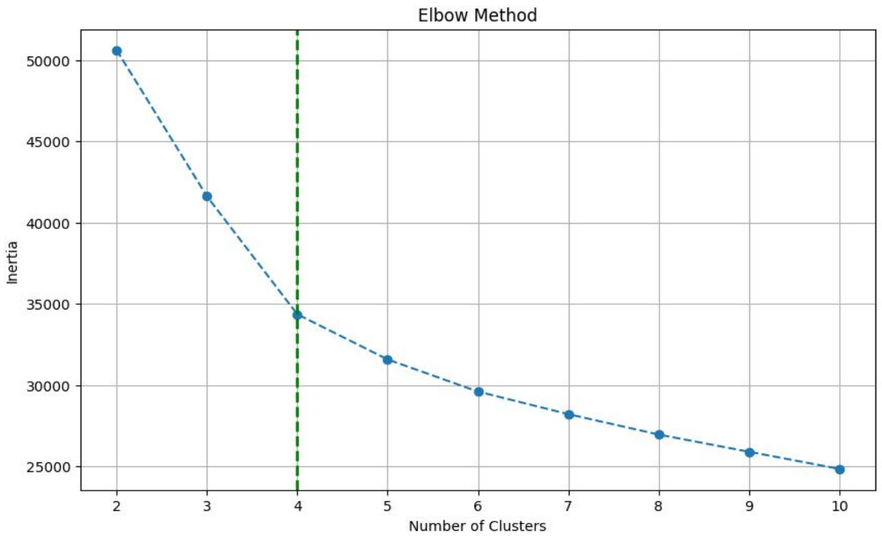
This method attempts to classify players from 2000-2009 and 2010-2019 based on personal performance.

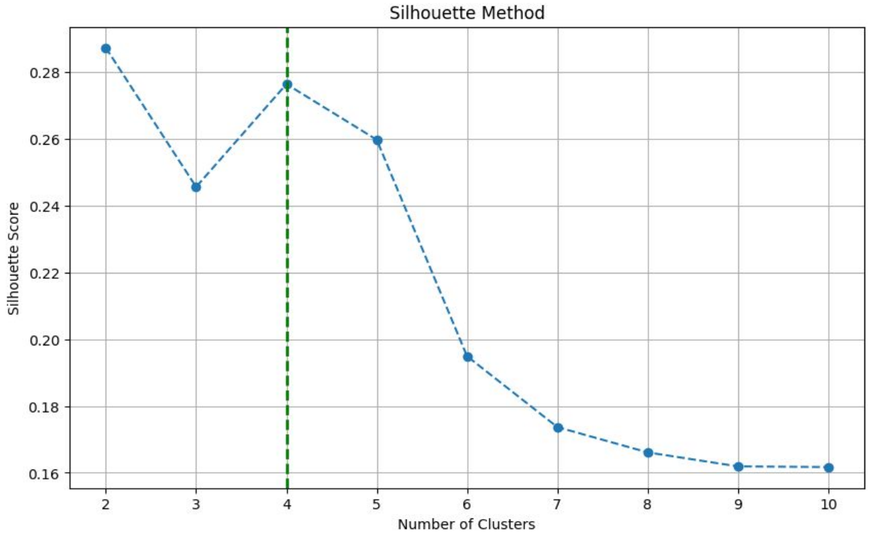
- Can statistical performance lead to unique player classifications?
- If so, are there differences in player classifications between the two decades?



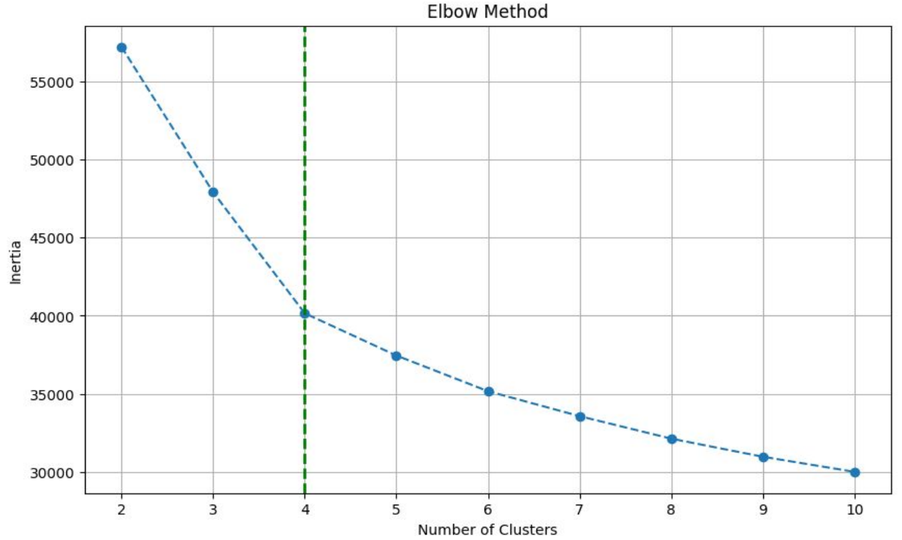
ELBOW AND SILHOUETTE VISUALIZATIONS

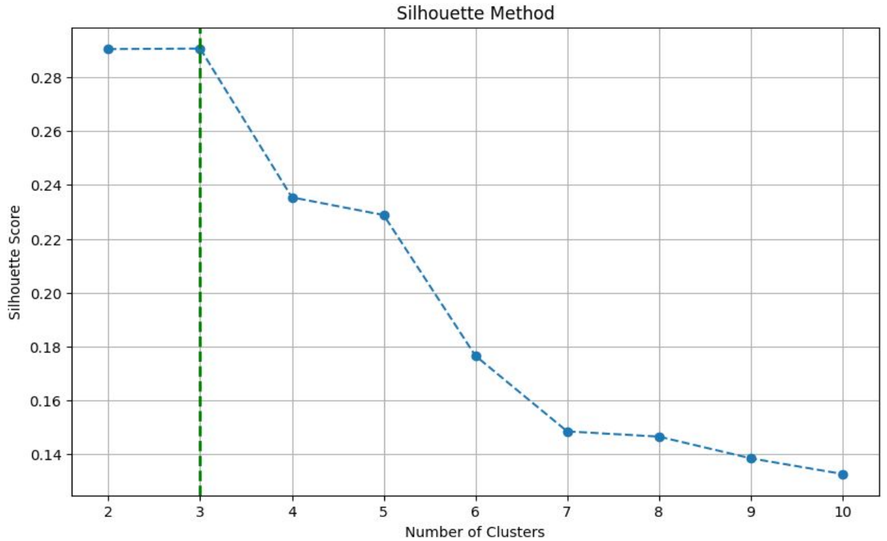
DECADE 1 (2000–2009)





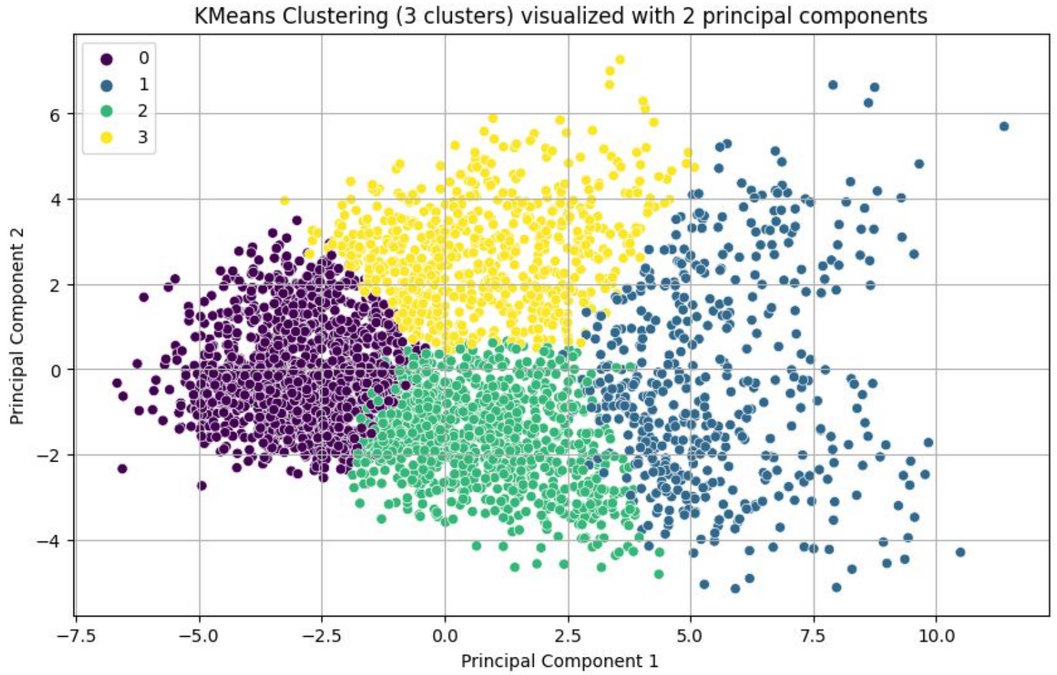
DECADE 2 (2010–2019)



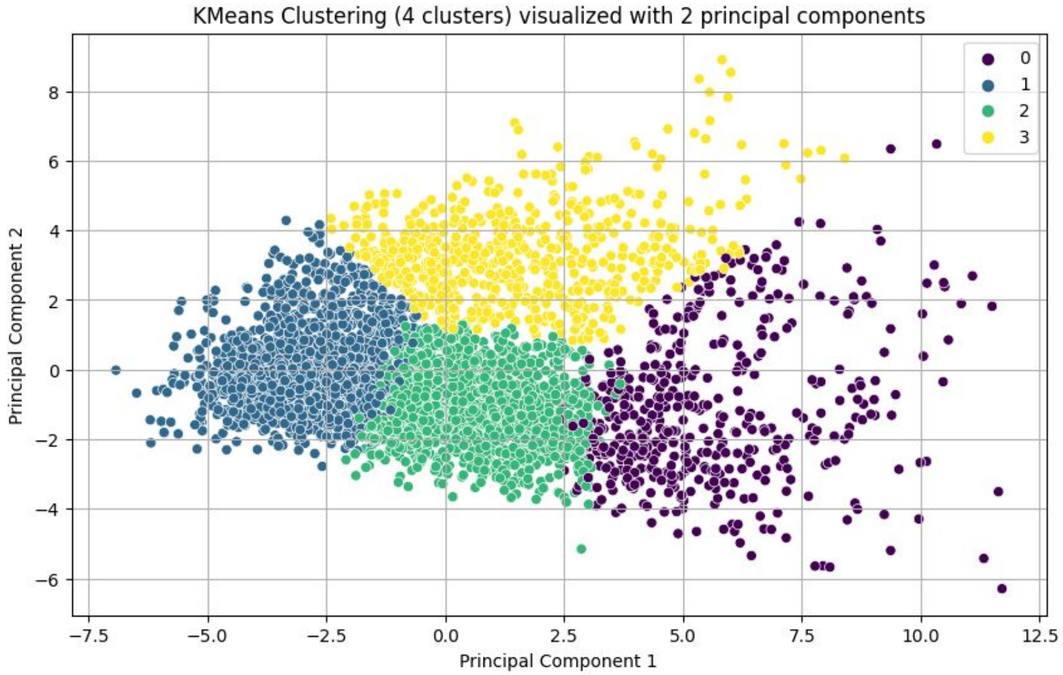


PCA SCATTER PLOT VISUALIZATION OF 4 PLAYER CATEGORIES

DECADE 1 (2000–2009)



DECADE 2 (2010–2019)



CLUSTER INTERPRETATIONS

DECADE 1 (2000-2009)

Cluster	PTS	AST	TRB	BLK	STL	3PA	3P%	2PA	FTA	FT%
0	4.558650	1.278433	2.050970	0.192552	0.473002	1.057719	0.273662	3.166874	1.024515	0.730565
1	20.437449	3.911317	6.829835	0.766667	1.238477	2.545267	0.303140	13.599177	5.888272	0.782632
2	11.862025	3.358439	3.521835	0.265084	0.988291	3.298523	0.363585	6.685338	2.502215	0.798395
3	8.867766	1.229385	5.976162	0.856672	0.685157	0.269865	0.126238	6.928336	2.579010	0.692066

Bench Warmer (Cluster 0)

- Players in Cluster 0 provide moderate scoring (4.56 PTS), lack in defensive prowess coming in last for STL and BLK

The Best Player (Cluster 1)

- Players in this cluster are likely to be the star, scoring 20+ PTS, and leading the clusters in AST, TRB, STL, and 2PA
- Cluster Player Example: ***Kobe Bryant***

Sharpshooter (Cluster 2)

- Players in this cluster contribute moderately in points, excel in 3-point shooting accuracy (1st in 3P%), and have decent AST and STL averages
- Cluster Player Example: ***Steve Nash***

Big Man (Cluster 3)

- Players in this cluster came in 1st for BLK, 2nd in TRB, but lacked heavily in 3-Point shooting accuracy (12.6%)

DECADE 2 (2010-2019)

Cluster	PTS	AST	TRB	BLK	STL	3PA	3P%	2PA	FTA	FT%
0	20.596281	4.684711	6.033678	0.610950	1.216529	4.163430	0.336620	11.865289	5.336364	0.807824
1	4.843829	1.203936	2.263909	0.235957	0.465377	1.589993	0.303199	2.752702	0.927885	0.725650
2	11.333842	2.791801	3.655225	0.325884	0.893730	3.848875	0.362581	5.686254	2.110450	0.793117
3	10.026202	1.414262	6.785406	0.938143	0.687396	0.457711	0.166430	7.383914	2.535158	0.687181

The Best Player (Cluster 0)

- Players in Cluster 0 excel in scoring (20.6 PTS), with a balanced game having high averages for assists, rebounds, steals, and FT%
- Cluster Player Example: ***Kevin Durant***

Bench Warmer (Cluster 1)

- Players in this cluster demonstrate decent 3-point shooting, but average last in PTS, AST, TRB, BLK, STL - supportive role

Sharpshooter (Cluster 2)

- This cluster represents players who are well-rounded, scoring 11.33 points (2nd), 0.89 steals (2nd), 1st in 3P%,
- Cluster Player Example: ***Ray Allen***

Big Man (Cluster 3)

- Players in Cluster 3 lead average BLK, TRB; are 2nd in 2PA, FTA
- Lacking in 3-point shooting and FT shooting accuracy

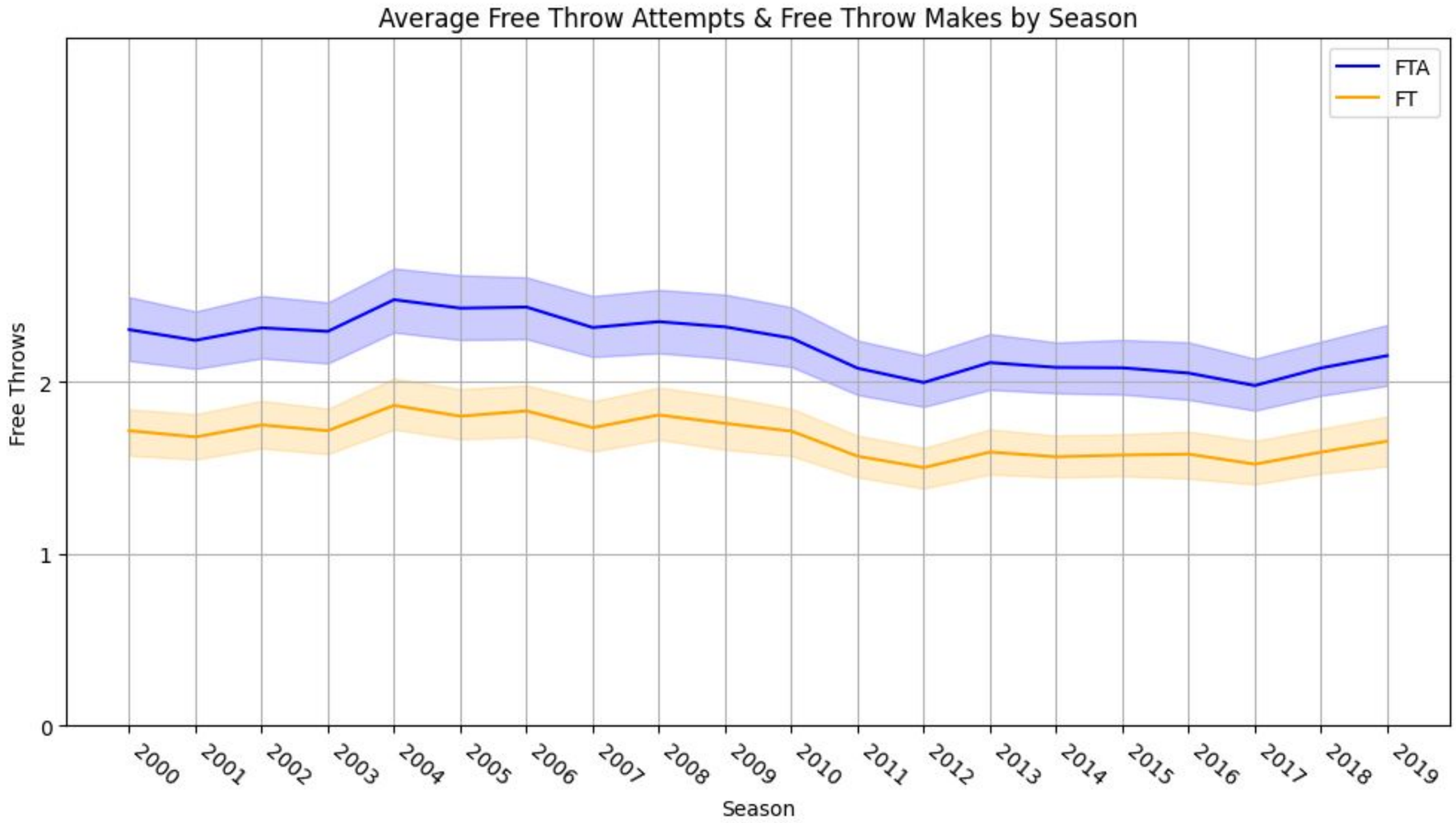
FREE THROWS - TIME SERIES GRAPH

FTM Decade 1 = 1.77

FTM Decade 2 = 1.59

FTA Decade 1 = 2.35

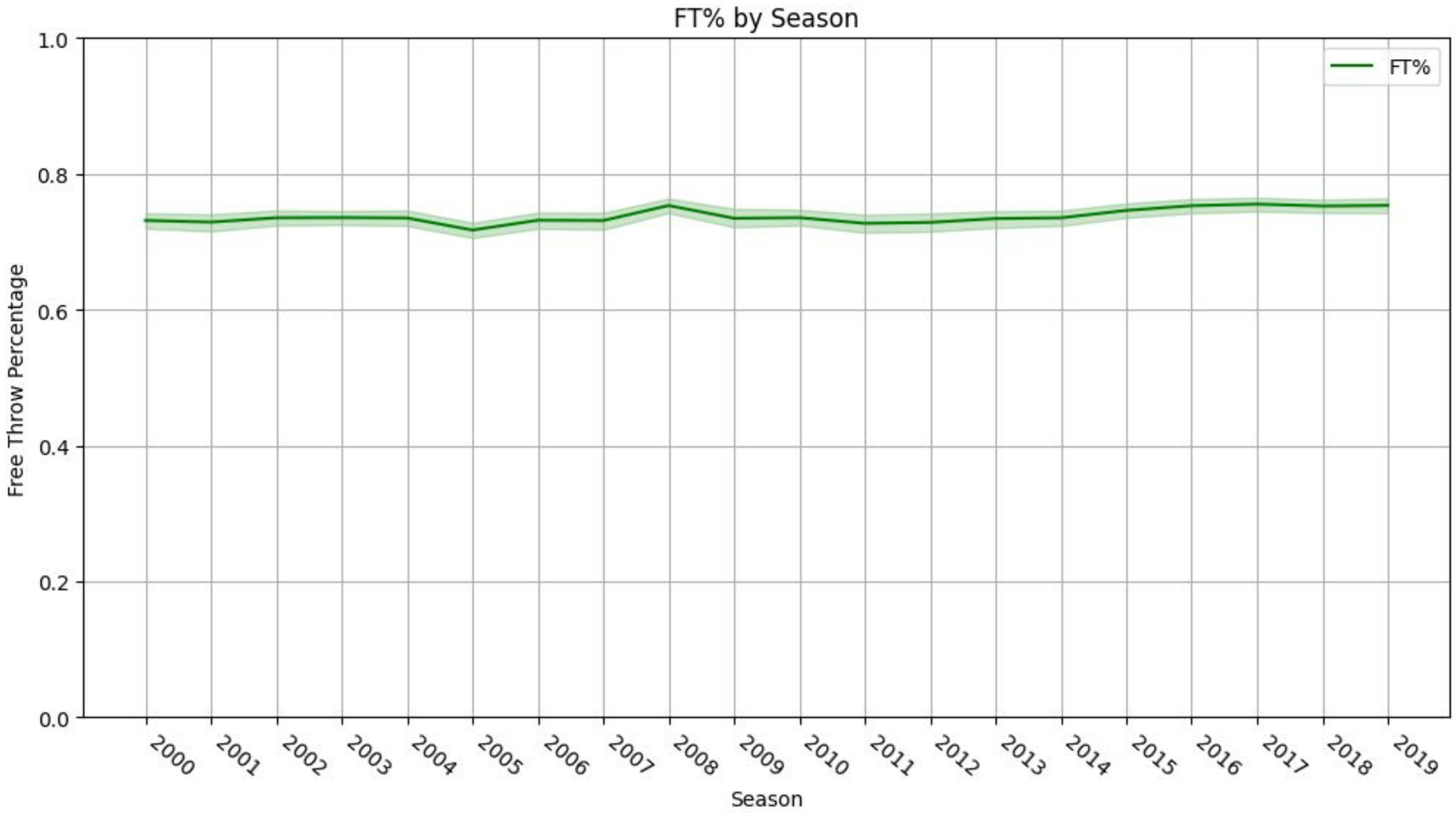
FTA Decade 2 = 2.09



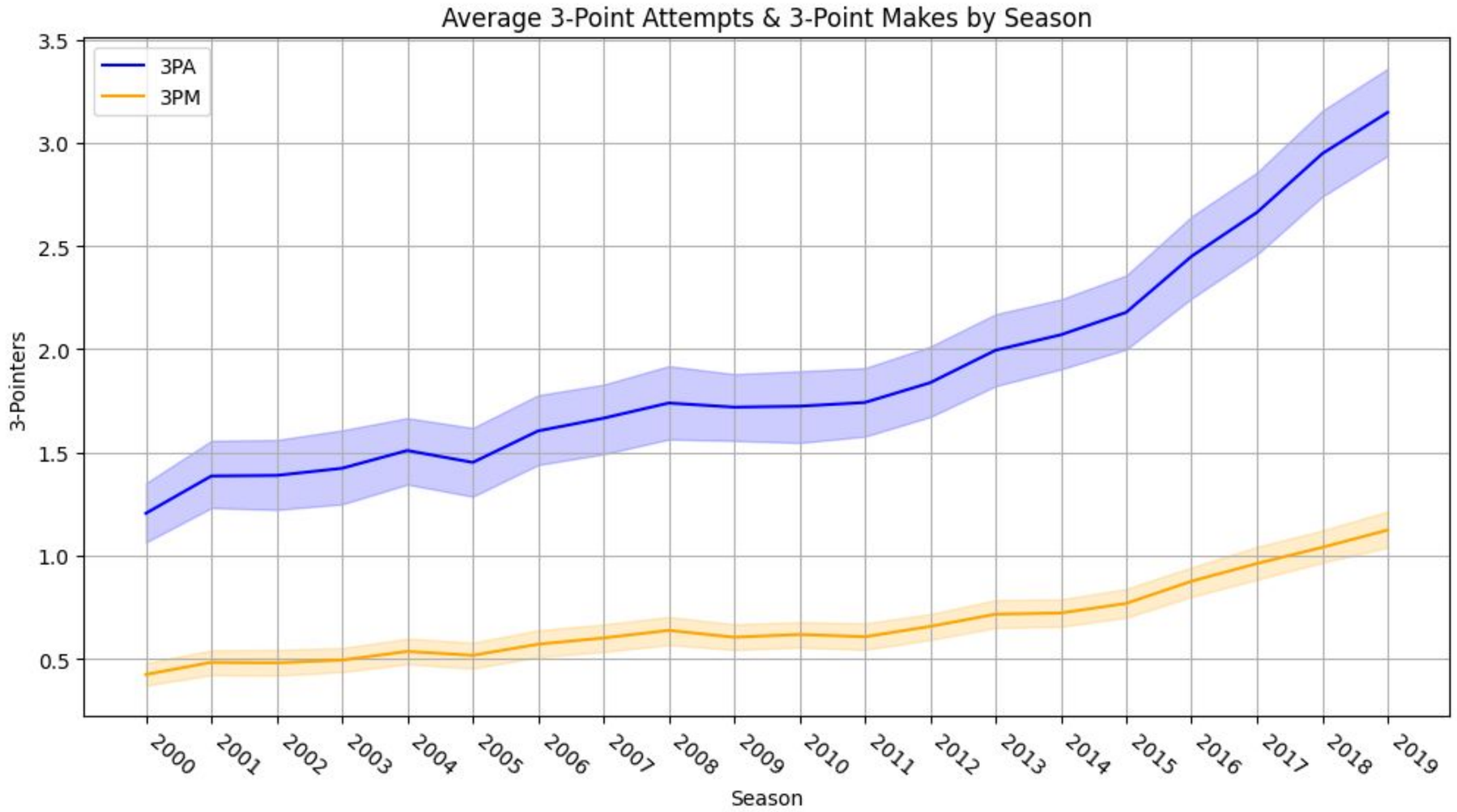
FREE THROW % - TIME SERIES GRAPH

FT% Decade 1 = 0.73

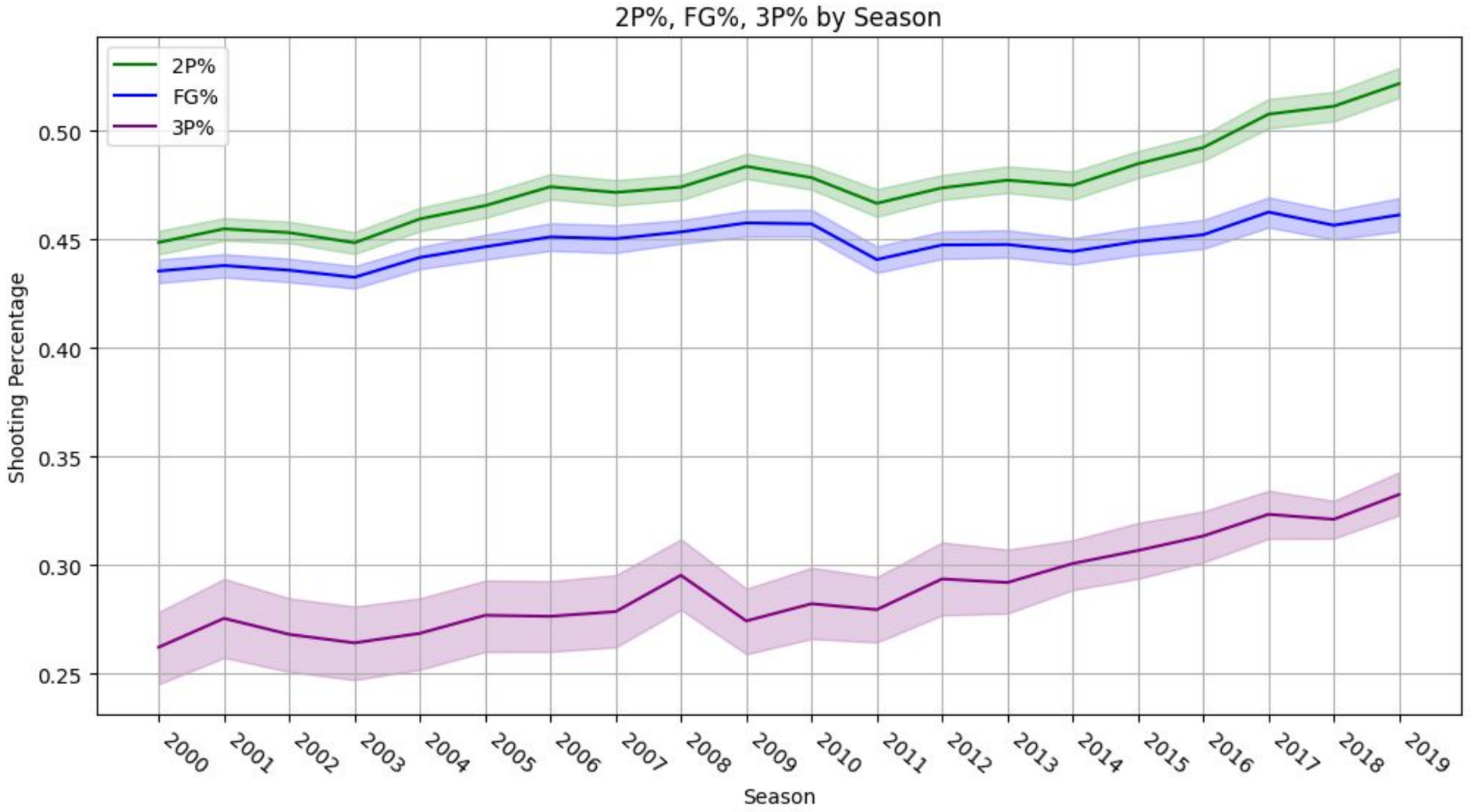
FT% Decade 2 = 0.74



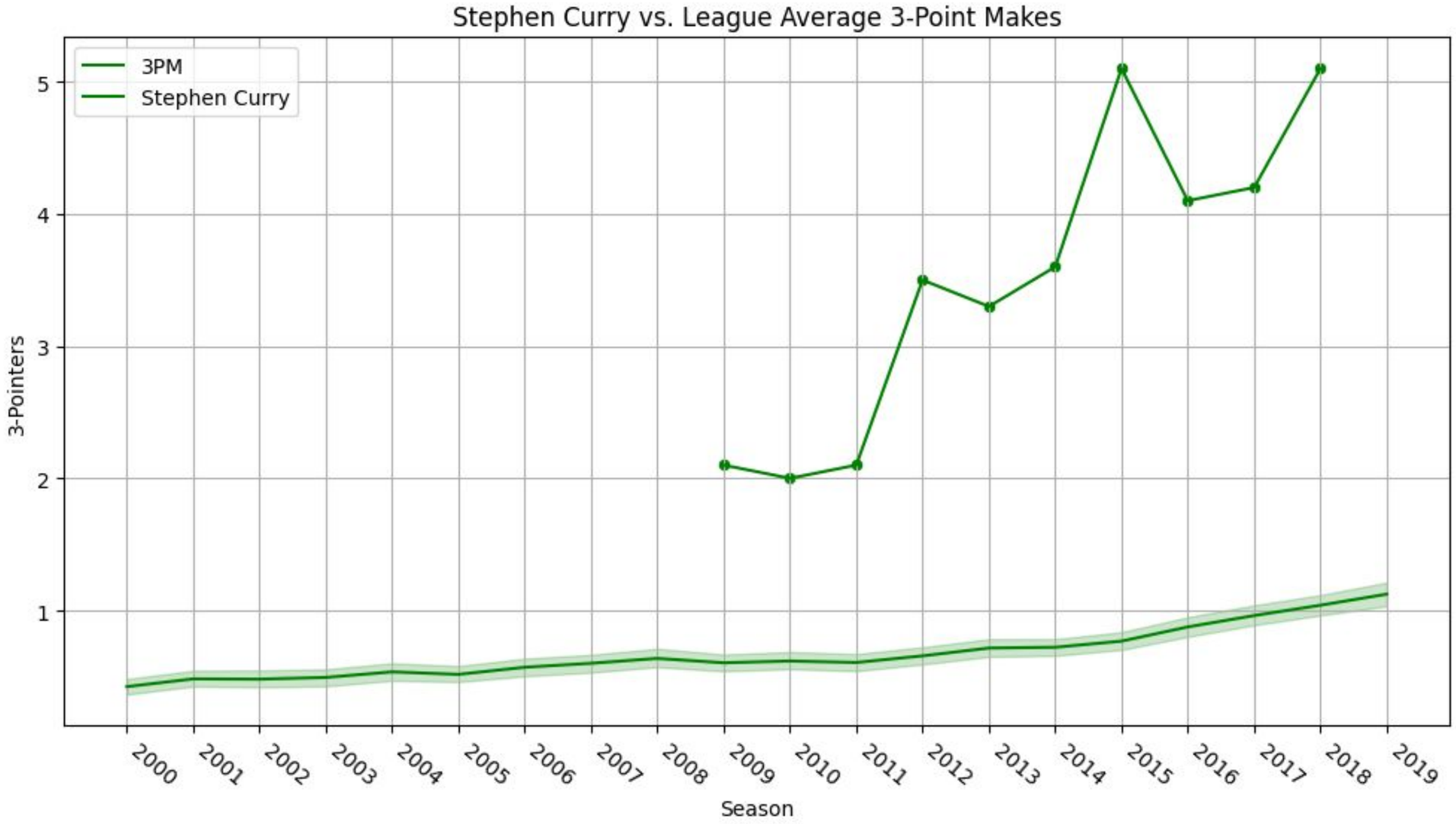
3 POINTERS - TIME SERIES GRAPH



SHOOTING AVERAGES - TIME SERIES GRAPH



STEPHEN CURRY - TIME SERIES GRAPH



RESULTS

KEY TAKEAWAYS

1. General roles have not changed in the NBA (Lead Scorer, Big Man, Sharp Shooter).

    a. **Players are gaining skills in multiple facets of the game**, regardless of their traditional position responsibilities.

2. **Players have gotten better**. Their shot-making ability has significantly improved, suggested by the increase in 2P%, 3P% and FG% across both decades.

3. **Rise of longer-range shots** - all 3 points statistics have significantly increased regardless of position.

4. Personal fouls have decreased, suggesting **less physical playstyle**.

5. Free Throws Attempts have significantly decreased which is supported by personal fouls decreasing as well.

DISCUSSION

LIMITATIONS

Coaching Style

Diet

Rules

Technology

INTERESTING FINDINGS

Three Point Revolution

Less Aggressive Play Style

Positionless Basketball

RECOMMENDATIONS

RECOMMENDATIONS

Value Shooting

Drafting More Versatile Players

Defensive Spacing for 3 PT Shooting

THANK YOU

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