

Using ML to find a key Player Replacement

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The Problem

- Player Injuries



- Retirement



- Transfers & Trades



Dataset



**2024-2025
Season**



**Top 5 Euro
leagues**



2500+ Players

The screenshot displays the FBRef website, a comprehensive football statistics platform. The header includes navigation links for Sports Reference, Baseball, Football (current), Basketball, Hockey, Soccer, Blog, Stathead, and Inmaculate Footy. A search bar at the top allows users to find players, teams, or sections. Below the header, a banner highlights the most viewed player and club in a specific state/city. The main content area is divided into three columns: 'Football Players' with a grid of player portraits and a search bar for over 234,000 players; 'Football Squads' featuring men's and women's squads with club logos and a 'View a Club' section; and 'Stathead FBRef Powered By FBRef' promoting a sports search engine and offering a free trial. A 'Learn More' button is visible at the bottom right of the Stathead section.

Feature Selection

Organic features include:

- Goals
- Assists
- Passes
- Age
- Shots
- Shots on goal



Feature Engineering

Important engineered features may include:

- Goals per 90 minutes
- Assists per 90 minutes
- xG: Expected goals
- xA: Expected Assists



Model: Random Forest

- Label:
 - Targeted player → Yes(1)
 - Other player → No(0)
- Training:
 - Learns non-linear rules
 - Each tree captures a different aspect of the player profile
 - Identify key playing-style attributes

onG	0.100000
Succ	0.085714
Att_stats_possession	0.068445
PPA	0.066662
TO	0.057143
TB	0.054292
FK	0.029784
Att 3rd_stats_possession	0.028571
GCA	0.028571
Sh	0.024984



Output

- Top 5 Players similar to the targeted player
- Comparison on key data(Goals, Assists, Shots)

	Player	Squad	Age	Pos	RF_Score	Gls	Ast
2304	Mohamed Salah	Liverpool	32.0	FW	0.05	29	18
1960	Michael Olise	Bayern Munich	22.0	FW,MF	0.04	12	15
1356	Joshua Kimmich	Bayern Munich	29.0	MF	0.02	3	7
1691	Kylian Mbappé	Real Madrid	25.0	FW	0.02	31	3
757	Jeremy Doku	Manchester City	22.0	FW,MF	0.02	3	6



Validation Process

- Cloning: Add a clone of target player into current dataset
- Run RF model on “new” dataset
- Compare the result between two dataset.

2792	Lamine Yamal	Barcelona	0.70
2854	Clone_Lamine Yamal	Barcelona	0.57
2304	Mohamed Salah	Liverpool	0.05
1960	Michael Olise	Bayern Munich	0.04
1691	Kylian Mbappé	Real Madrid	0.02
1356	Joshua Kimmich	Bayern Munich	0.02
757	Jeremy Doku	Manchester City	0.02



Future Work

Ideas to improve:

- Incorporate market value and contract info
- Use time-series trends for performance prediction
- Add team tactical fit metrics (Possession vs Counter)
- culture background



Demo Video:

<https://www.youtube.com/watch?v=kHUYCva1sxY>



Contribution

- Ruizhang Chen:
 - Data preprocessing
 - Model validation
- Yuezhang Chen:
 - Model training
 - Presentation

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Reference:

<https://www.kaggle.com/code/mm6891/looking-for-a-replacement-for-my-retire-midfielder/notebook>

<https://www.kaggle.com/datasets/vivovinco/20222023-football-player-stats>

