TOP PLAYER RANKINGS IN THE PREMIER LEAGUE

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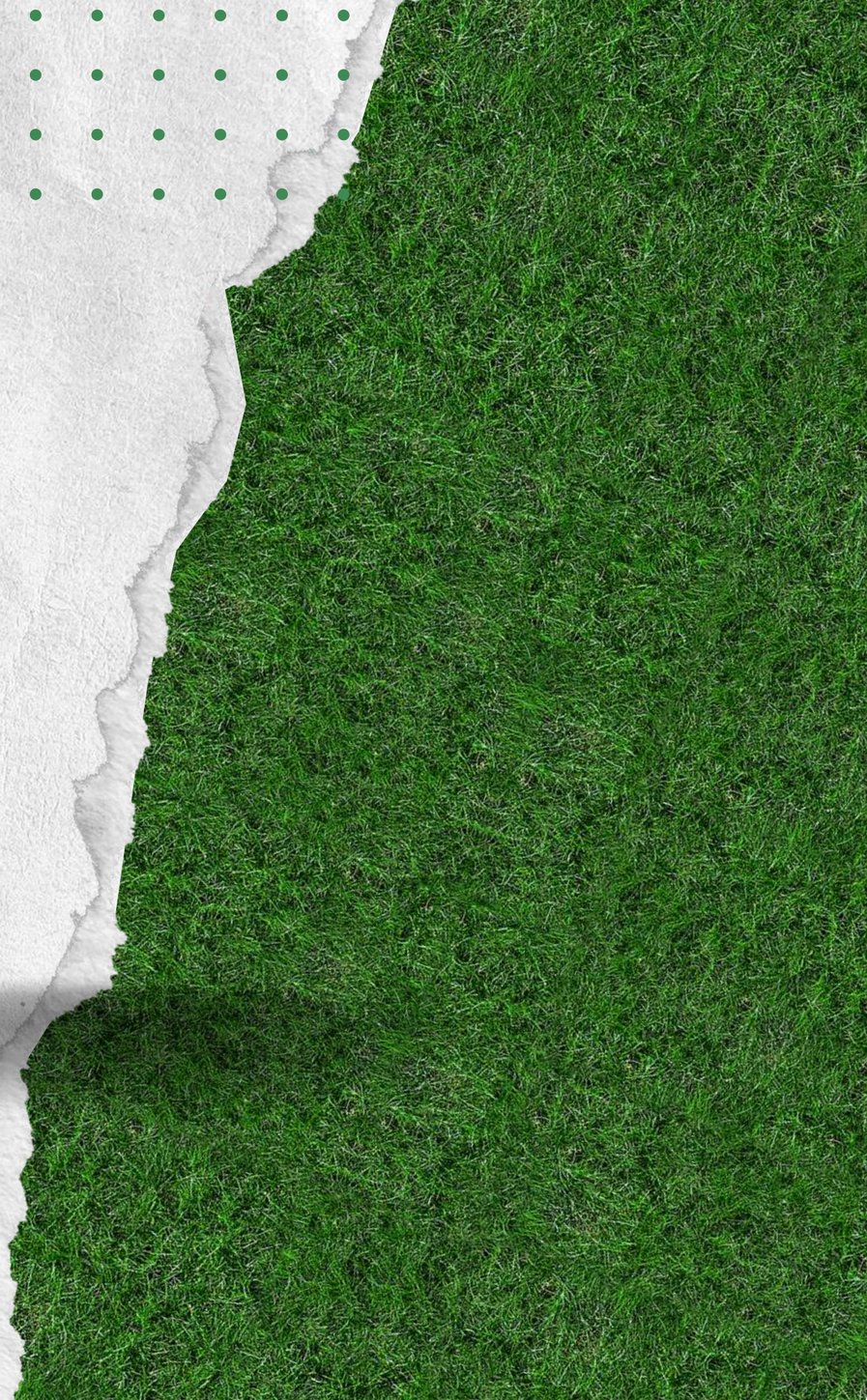
PLAY



INTRODUCTION

Objective: To predict whether a player is a "Top Player" based on their performance (goals, assists, and other metrics).

Dataset: Premier League player statistics 2024-2025.

LIBRARY IMPORT

- Pandas, Numpy: Data manipulation.
- Matplotlib, Seaborn: Data visualization.
- Scikit-learn: Data preprocessing, model building, and evaluation metrics.

```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import (
    confusion_matrix, ConfusionMatrixDisplay,
    accuracy_score, precision_score, recall_score, f1_score
)
```

✓ 33.2s

DATA LOADING AND INITIAL EXPLORATION

- Loaded the CSV file.
- Displayed first rows, dataset structure, and data types.
- Checked for null values and columns with too many zeros.

	Player Name	Club	Nationality	Position	Appearances	Minutes	Goals	Assists	Shots	Shots On Target	...	Blocks	Tackles	Ground Duels	gDuels Won	gDuels %	Aerial Duels	aDuels Won	aDuels %	Fouls	Yellow Cards
0	Ben White	Arsenal	England	DEF	17	1198	0	2	9	12	...	6	20	231	116	50%	16	5	31%	10	2
1	Bukayo Saka	Arsenal	England	MID	25	1735	6	10	67	2	...	14	29	58	34	59%	45	23	51%	15	3
2	David Raya	Arsenal	Spain	GKP	38	3420	0	0	0	0	...	0	0	0	0	0%	0	0	0%	1	3
3	Declan Rice	Arsenal	England	MID	35	2833	4	7	48	18	...	5	53	342	121	35%	26	10	39%	21	5
4	Ethan Nwaneri	Arsenal	England	MID	26	889	4	0	24	0	...	0	11	0	0	0%	0	0	0%	9	1

Loads the original dataset (epl_player_stats_24_25.csv) and displays the first rows for a quick overview of the contents.

```
df = pd.read_csv('epl_player_stats_24_25.csv')
df.head()
```

Pytho

	Player Name	Club	Nationality	Position	Appearances	Minutes	Goals	Assists	Shots	Shots On Target	...	Fouls	Yellow Cards	Red Cards	Saves	Saves %	Penalties Saved	Clearances Off Line	Punches	High Claims	Goals Prevented
0	Ben White	Arsenal	England	DEF	17	1198	0	2	9	12	...	10	2	0	0	0%	0	0	0	0	0.0
1	Bukayo Saka	Arsenal	England	MID	25	1735	6	10	67	2	...	15	3	0	0	0%	0	0	0	0	0.0
2	David Raya	Arsenal	Spain	GKP	38	3420	0	0	0	0	...	1	3	0	86	72%	0	0	8	53	2.1
3	Declan Rice	Arsenal	England	MID	35	2833	4	7	48	18	...	21	5	1	0	0%	0	0	0	0	0.0
4	Ethan Nwaneri	Arsenal	England	MID	26	889	4	0	24	0	...	9	1	0	0	0%	0	0	0	0	0.0

Explore the dataset structure:
Displays size, data types, null values, and columns that might be irrelevant (with too many zeros).

```python
df.shape  # Ver cantidad de filas y columnas
df.dtypes  # Tipos de datos por columna
df.describe(include='all').T  # Estadísticas generales
df.isnull().sum().sort_values(ascending=False)  # Valores nulos
(df == 0).sum().sort_values(ascending=False)  # Columnas con muchos ceros
```

✓ 0.2s

```
Carries Ended with Goal      470
Carries Ended with Assist    437
Hit Woodwork                 397
Assists                      362
Carries Ended with Shot      334
Through Balls                323
Successful Crosses           321
Carries Ended with Chance    302
Goals                        301
Blocks                       299
Crosses                      281
Offsides                     280
Shots On Target              279
Big Chances Missed           278
aDuels Won                   268
Aerial Duels                 267
Ground Duels                 267
Possession Won               267
Interceptions                267
Carries                      267
Passes                       267
Successful Passes            267
gDuels Won                   267
Successful fThird Passes     267
Progressive Carries          267
```

DATA CLEANING

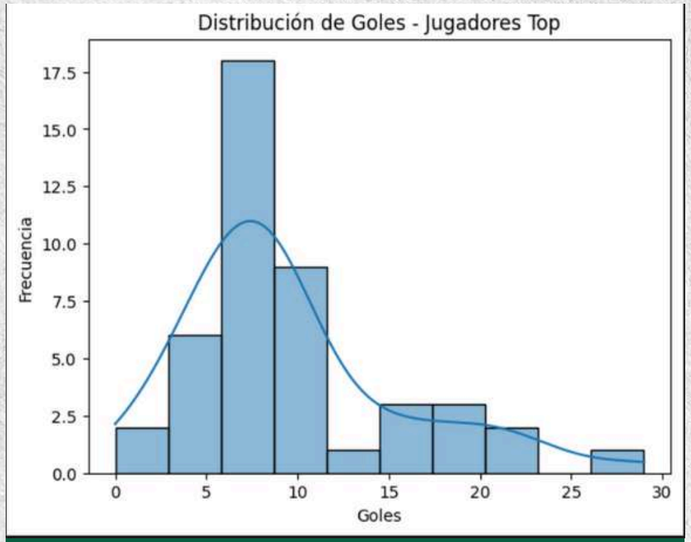
- Dropped irrelevant columns (mainly goalkeeper stats).
- Created the target variable is_top_player (players with ≥10 goals + assists).
- Filtered the dataset to work only with top players.

	Player Name	Club	Nationality	Position	Appearances	Minutes	Goals	Assists	Shots	Shots On Target	...	Tackles	Ground Duels	gDuels Won	gDuels %	Aerial Duels	aDuels Won	aDuels %	Fouls	Yellow Cards	is_top_player
1	Bukayo Saka	Arsenal	England	MID	25	1735	6	10	67	2	...	29	58	34	59%	45	23	51%	15	3	1
3	Declan Rice	Arsenal	England	MID	35	2833	4	7	48	18	...	53	342	121	35%	26	10	39%	21	5	1
7	Gabriel Martinelli	Arsenal	Brazil	MID	33	2300	8	4	55	12	...	23	237	111	47%	72	25	35%	16	1	1
11	Kai Havertz	Arsenal	Germany	FWD	23	1874	9	3	53	2	...	16	127	59	47%	30	8	27%	38	5	1
13	Leandro Trossard	Arsenal	Belgium	MID	38	2550	8	7	72	2	...	31	167	89	53%	59	35	59%	27	2	1

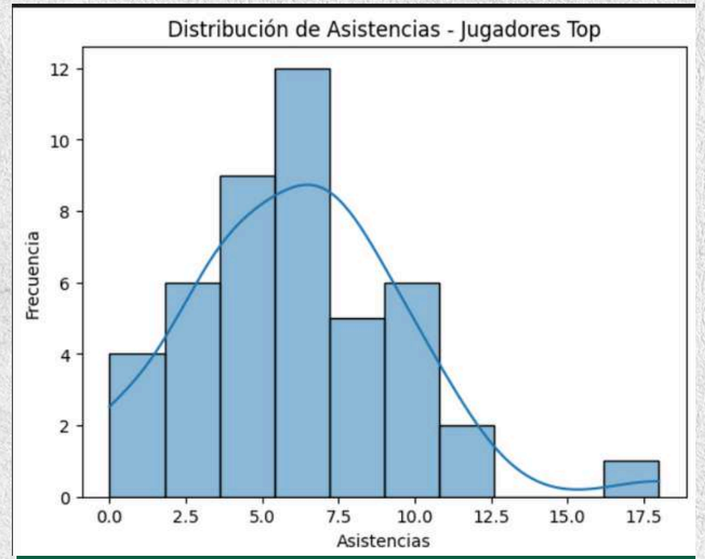
EXPLORATORY DATA ANALYSIS - EDA

- Individual Distributions:
- Goals Histogram
- Assists Histogram
- Minutes Played Histogram

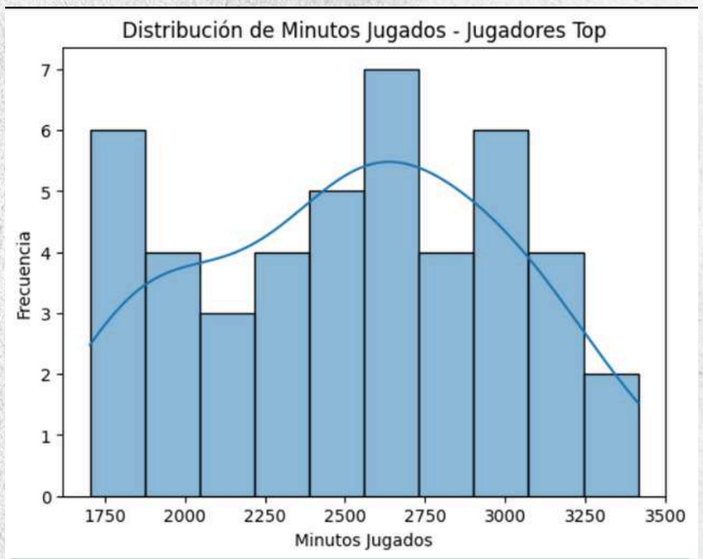
VISUALIZATIONS



Goals Histogram



Assists Histogram



Minutes Played Histogram

EXPLORATORY DATA ANALYSIS - EDA

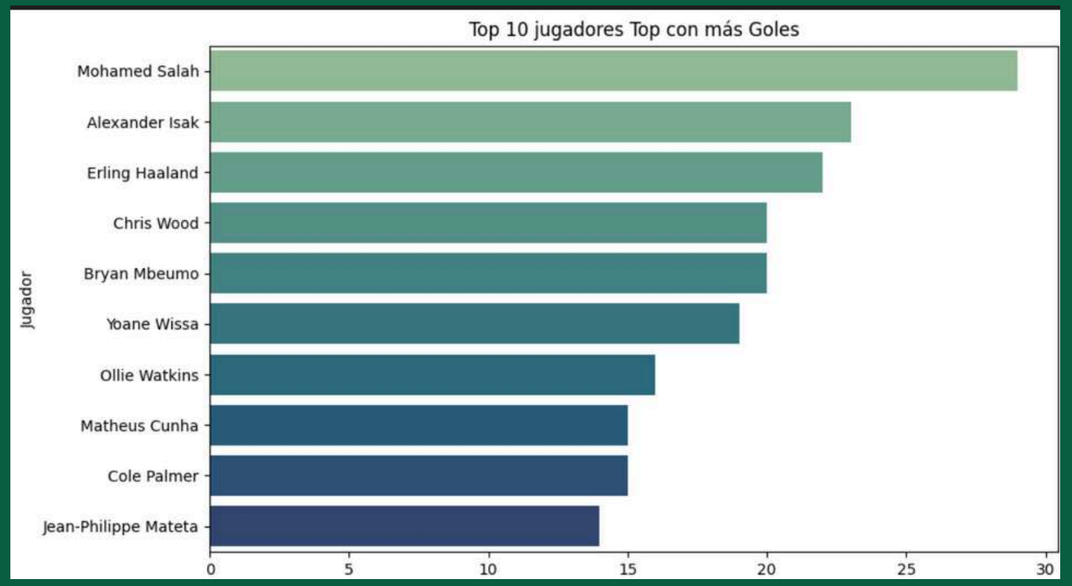
Ranking:

- Top 10 players with most goals

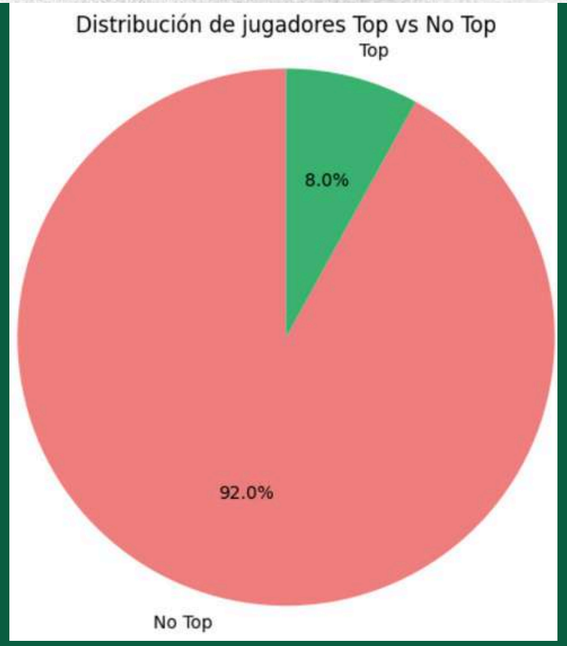
Class Distribution:

- Pie chart: Top vs Non-Top players

VISUALIZATIONS



Top 10 players with most goals



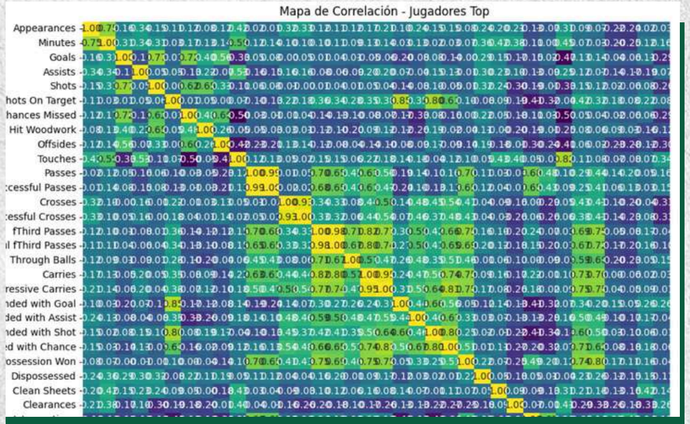
Pie chart: Top vs Non-Top players

EXPLORATORY DATA ANALYSIS - EDA

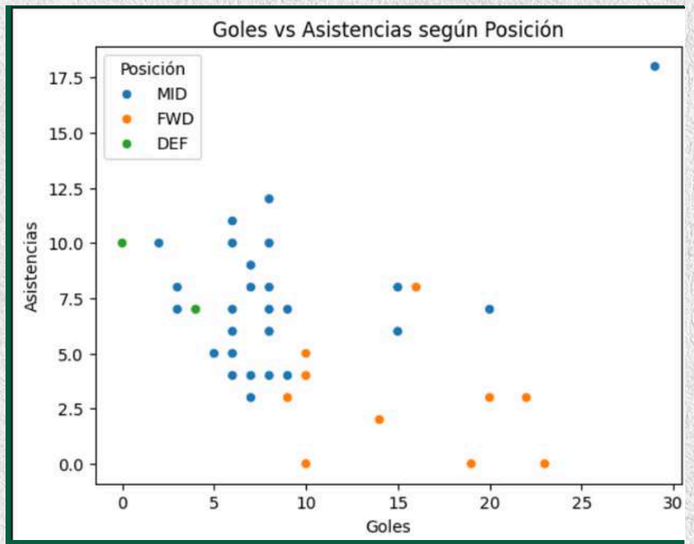
Variable Relationships:

- Correlation Heatmap
- Scatterplot: Goals vs Assists by position
- Average Goals by Position

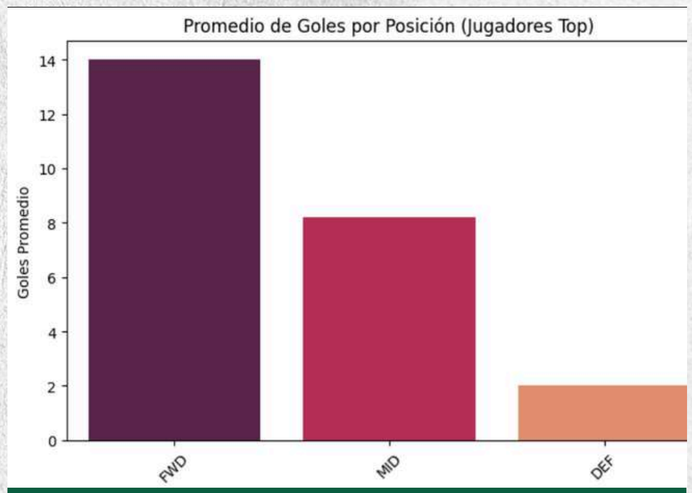
VISUALIZATIONS



Correlation Heatmap



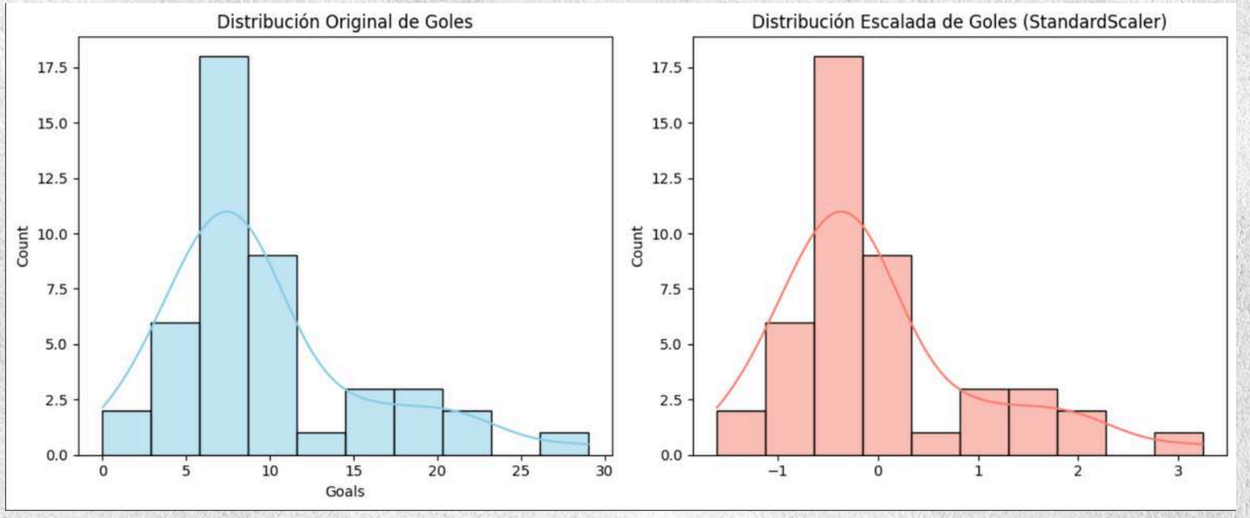
Scatterplot: Goals vs Assists by position



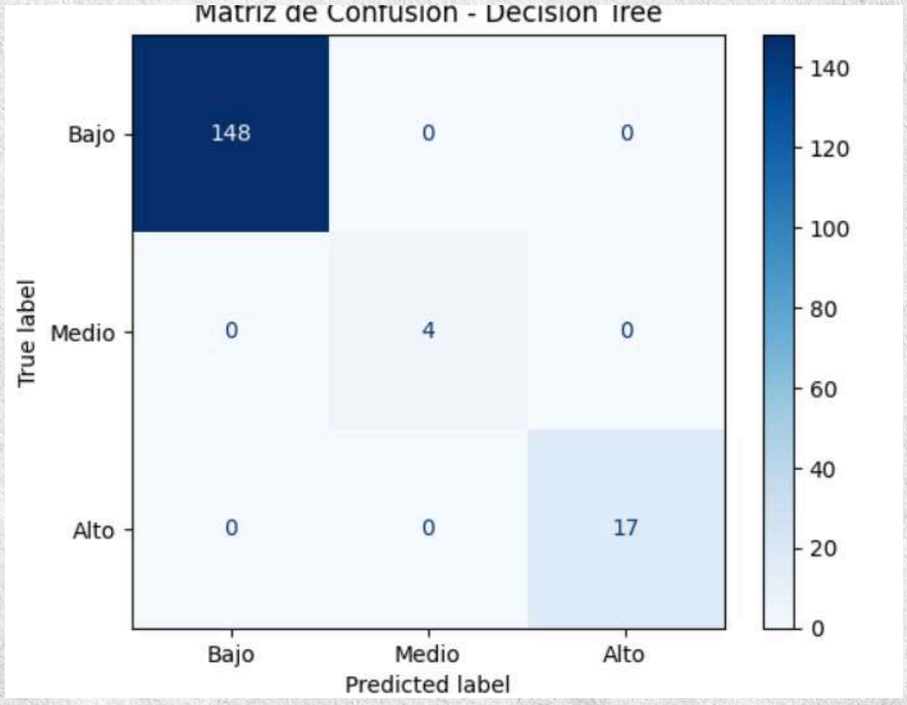
Average Goals by Position

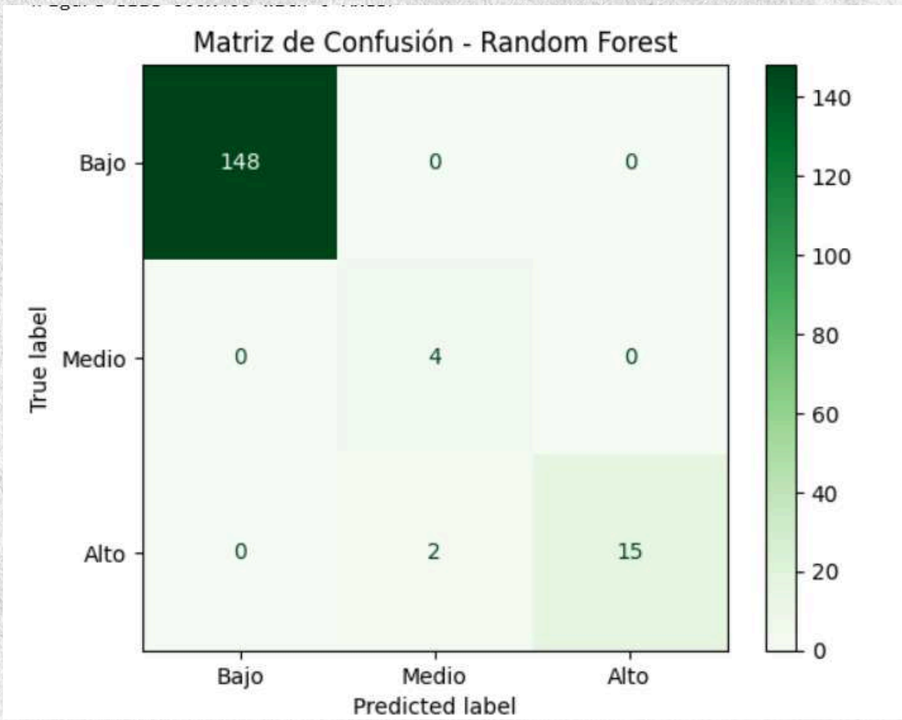
DISTRIBUTION

We chose Random Forest because it offers an excellent balance between performance and simplicity. It is especially effective on small data sets like this one (45 top players), and handles the mix of coded categorical and numerical variables well. It also has good generalization capabilities and allows for interpreting feature importance.



GOAL RANKING

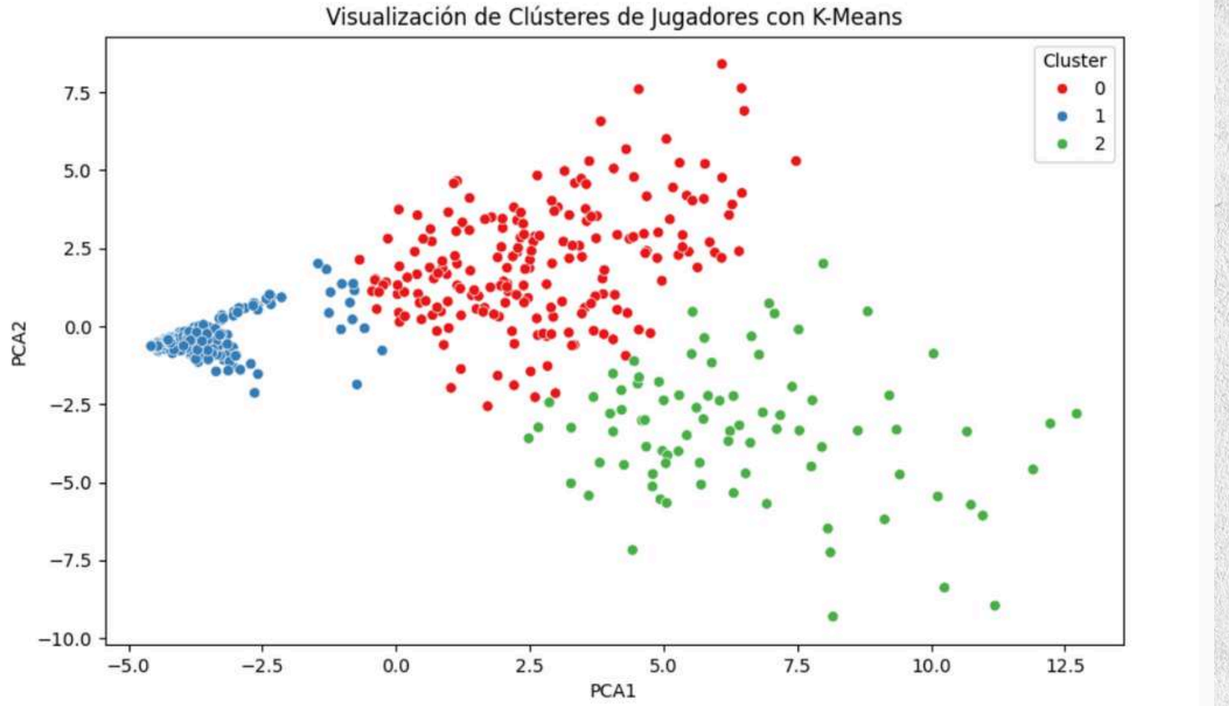




We created a new variable (Goals_Class) that classifies players according to the number of goals scored: 0 (Low): 3 goals or less 1 (Medium): 4 to 5 goals 2 (High): 6 goals or more With this variable, we trained two classification models: Decision Tree: builds simple decision rules. Random Forest: uses multiple trees to improve accuracy and generalization. Both models were evaluated with confusion matrices and metrics such as precision, recall and F1-score. The Random Forest had better overall performance in class prediction, so it is recommended as the more efficient model.

CLUSTERS

```
plt.show()
```



We applied the K-Means algorithm to group players into 3 clusters according to their overall statistics (minutes, shots, passes, dribbles, etc.), without using goals. Before clustering: Irrelevant variables such as name, club or position were removed. The data were standardized to compare them correctly. PCA was then used to visualize the clusters in a 2D graph. The analysis revealed three distinct profiles of players according to their style and performance.

THANKS YOU

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