# K-Means Clustering on FIFA 22 Player Data

This project applies the K-Means clustering algorithm to FIFA 22 player data, grouping players based on certain attributes. The key steps include data preprocessing, scaling, initializing centroids, labeling data points, updating centroids, and visualizing the results.

## Requirements

* Mojo
* Python 3.x
* NumPy
* Pandas
* Matplotlib
* Scikit-learn

## Installation

1. Install mojo from the modular website.
2. Install python 3.x from python website
3. Install the required Python libraries using pip: **pip install numpy pandas matplotlib scikit-learn**

## Data

The data is sourced from the **players\_fifa22.csv** file. It includes various attributes of FIFA 22 players such as **Overall**, **Potential**, **WageEUR**, **Age**, and **ValueEUR**.

## Steps

1. **Load Data**: Read the CSV file and drop rows with any null values in the specified columns.
2. **Data Preprocessing**: Scale the data from 1 to 10 using Min-Max scaling.
3. **Initialize Centroids**: Randomly initialize centroids for the clusters.
4. **Label Data Points**: Assign each data point to the nearest centroid.
5. **Update Centroids**: Recalculate centroids based on the geometric mean of assigned points.
6. **Iterate**: Repeat steps 4 and 5 until centroids do not change.
7. **Visualization**: Use PCA to reduce dimensions from 5d to 2d and plot the clusters.

## Execution

1. Ensure that the **players\_fifa22.csv** file is in the same directory as the script.
2. Run the script in a Python environment.
3. The script will display the clustering process and save the final plot as **plot\_image.png**.

## Summary

This project clusters FIFA 22 players based on key attributes using the K-Means algorithm. The clusters are visualized with PCA to show the groupings in a two-dimensional space. This approach provides insights into the characteristics and potential groupings of players based on their attributes.

## output

1. Iterations of the plotted clusters
2. Time taken to run the finish the clustering