Predicting Top Tiers of Forward Soccer Players
-
FIFA 2019

By Josiane Pafeng

Outline

- How can soccer players' performance statistics be used to identify top tiers best players?
- A look at the data
  - What is the overall score of the best players at each position?
  - Correlation between features and outcome
- How can we use unsupervised clustering techniques to identify the top tiers soccer players?
  - Dimensionality reduction
  - Clustering techniques
- Results
- Conclusion and the road ahead

How can soccer players' performance statistics be used to identify top tiers best players?

- Improve clubs' transfer strategy and profit.
- Identify strengths and weaknesses in the opposite team.
- Help picks and bets for Fantasy Soccer fans.

https://soccerlifestyle.com/what-is-the-weight-of-a-soccer-ball/

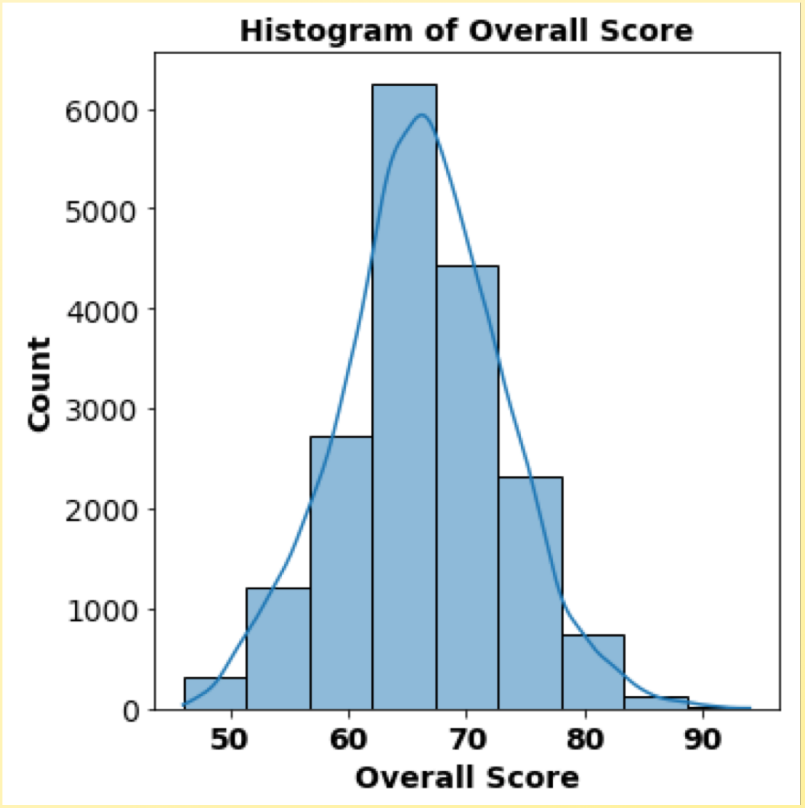
FIFA Positions

- **Forward**
- Midfielder
- Defender
- Goalkeeper

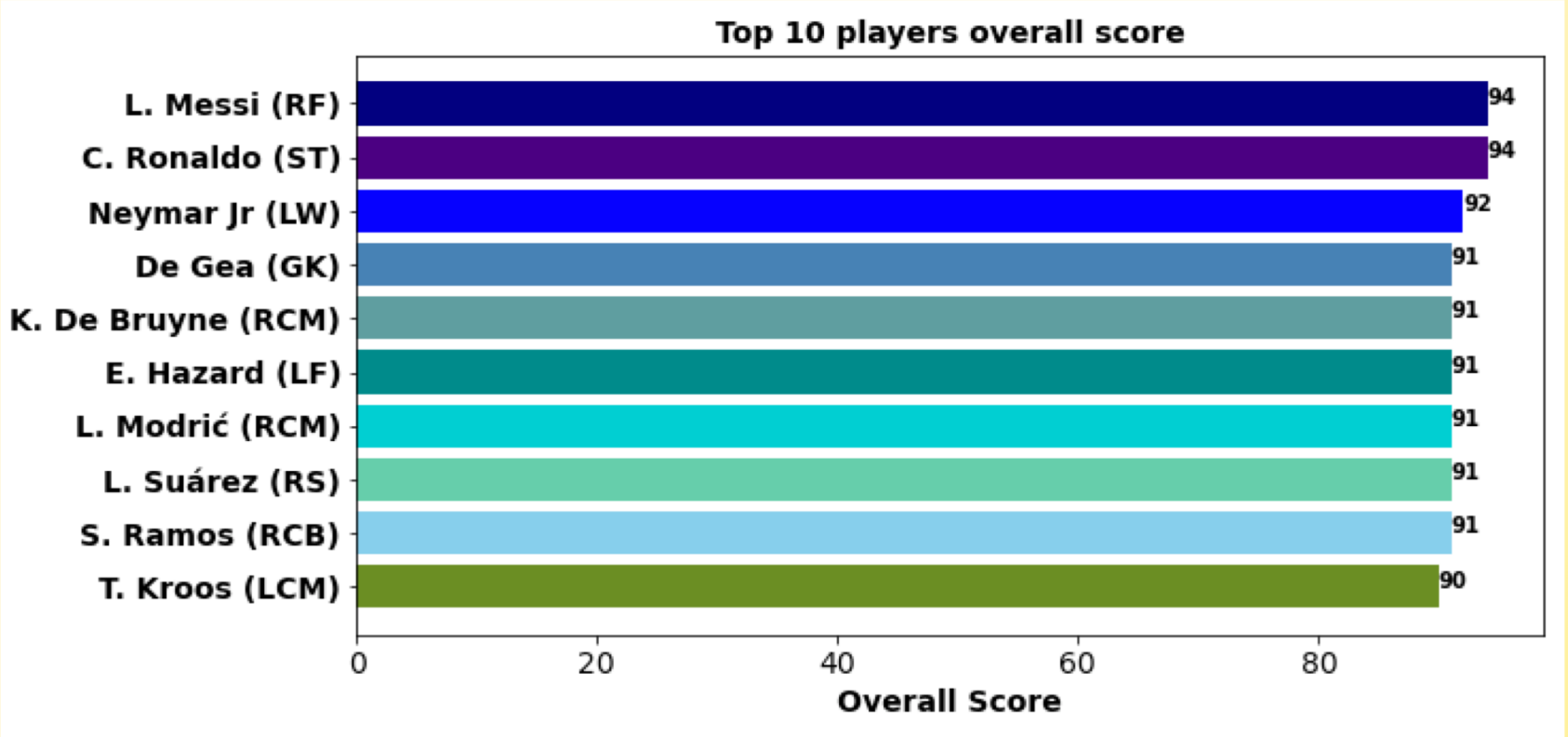
https://fifauteam.com/fifa-ultimate-team-positions-and-tactics/

A Look At The Data

- FIFA-19 dataset
  - Performance statistics from 18k+ international soccer players.
- 35 features and 1 outcome (overall score) variable.
  - No labelled data as we don't know the number of clusters or tiers.



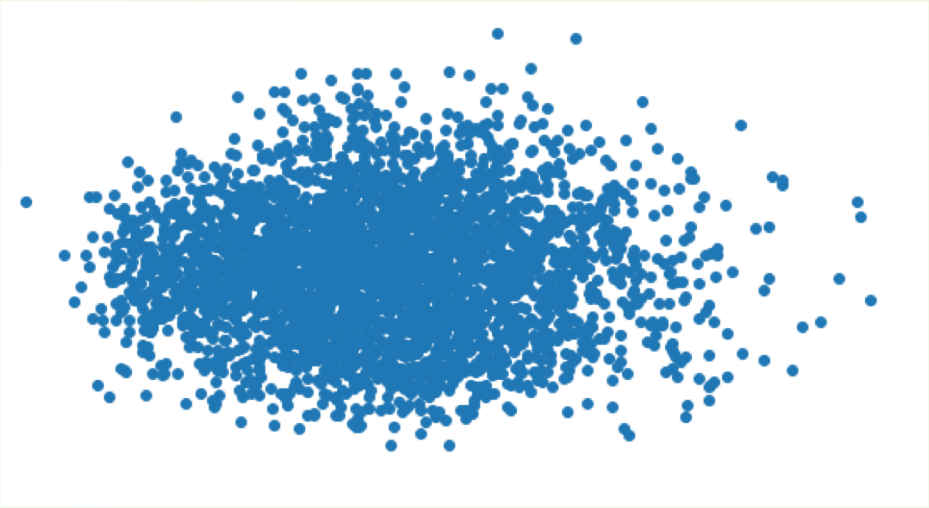
What is the overall score of the best players at each position?



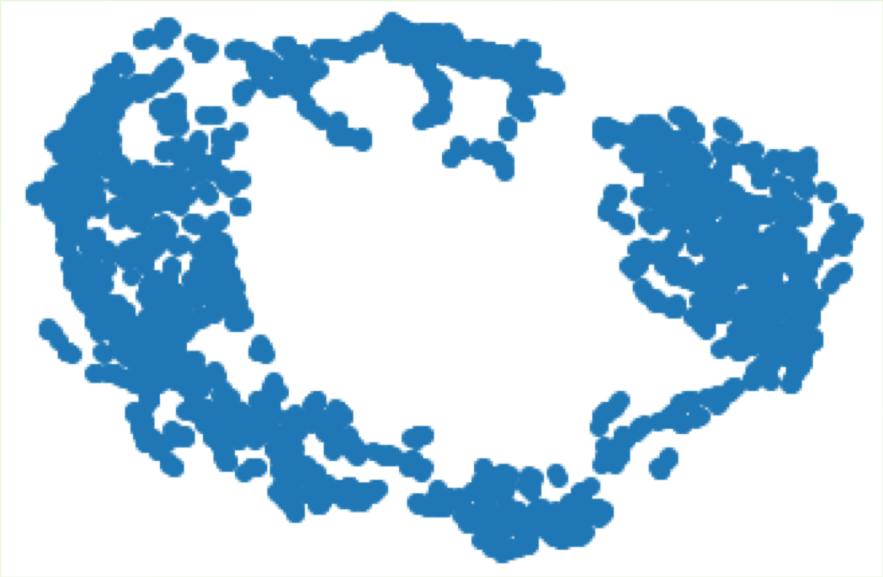
Correlation between features and outcome

Dimensionality reduction

- PCA (Principal Component Analysis)
  - Finds low-dimensional representation of high-dimensional data by retaining as much information in the data as possible.

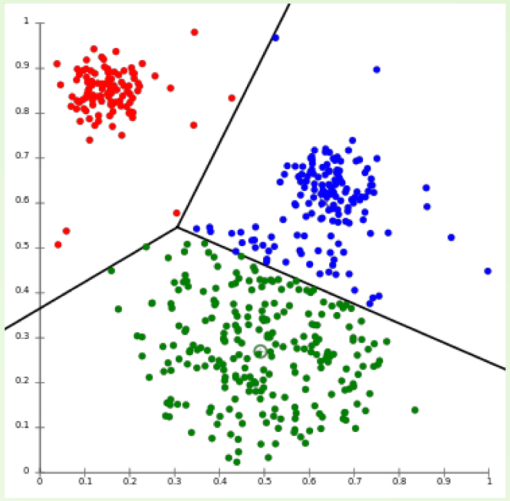


- UMAP (Uniform Manifold Approximation and Projection)
  - Computationally fast, useful for visualization and feature engineering.
  - Preserves local and global structure of the data.



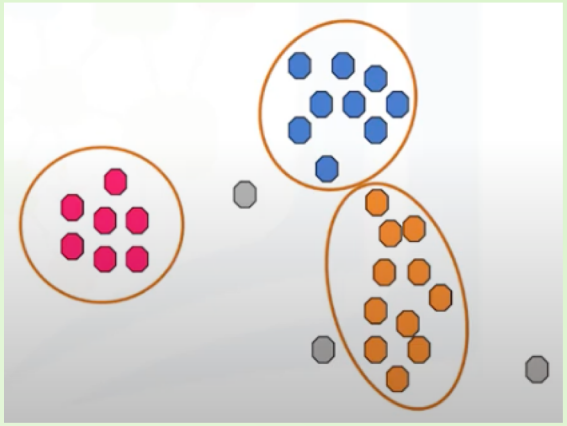
Clustering techniques

❖K-Means Clustering



https://aws.amazon.com/blogs/machine-learning/k-means-clustering-with-amazon-sagemaker/

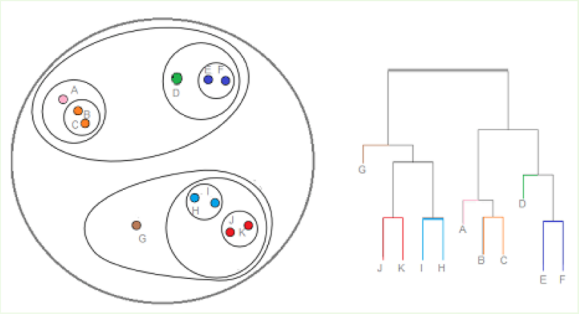
- DBSCAN Clustering (Density-Based Spatial Clustering of Application with Noise)



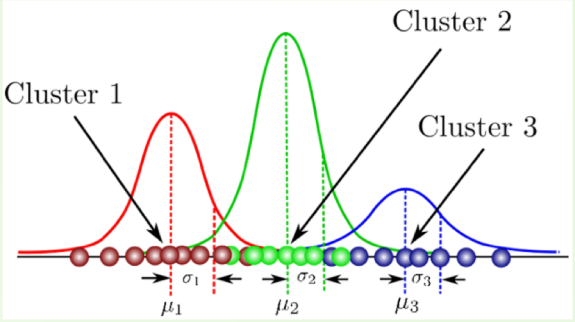
https://www.youtube.com/watch?v=6jl9KkmgDIw

- Gaussian Mixture Models

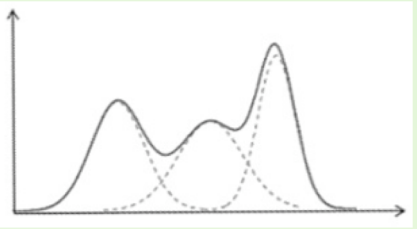
❖Hierarchical Clustering



https://www.statisticshowto.com/hierarchical-clustering/



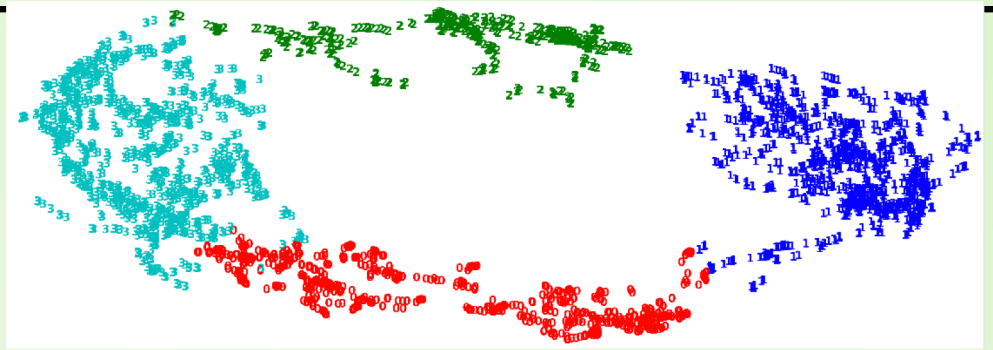
https://towardsdatascience.com/gaussian-mixture-models-explained-6986aaf5a95



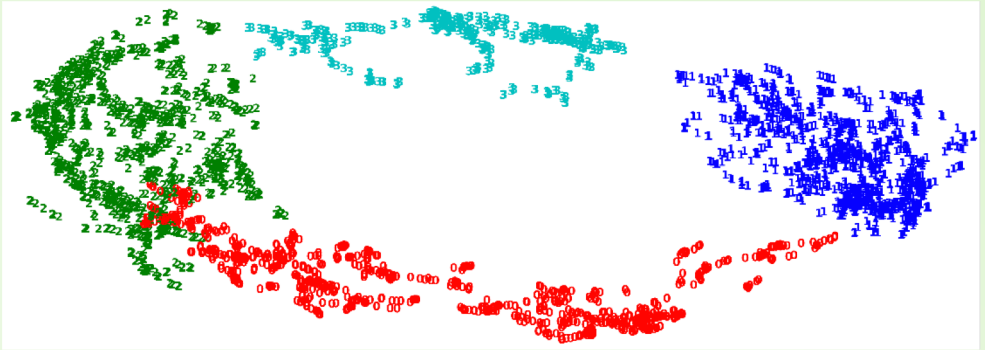
https://www.slideshare.net/dulalsaurab/sample-project-38012289

Results

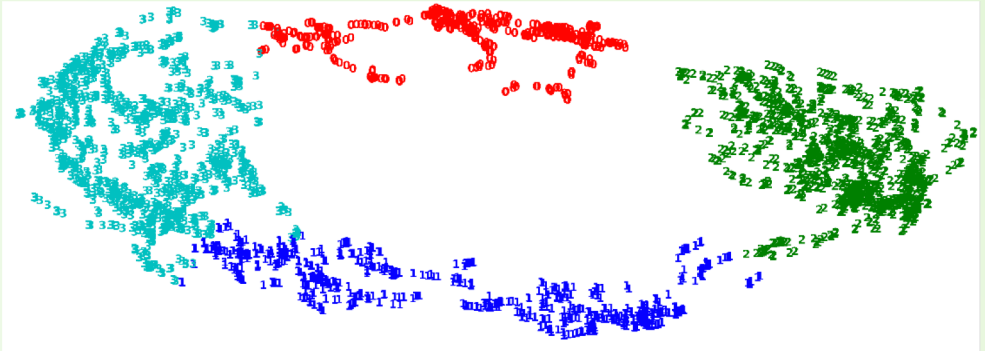
K-Means – 4 clusters



Hierarchical Clustering
Linkage: ward

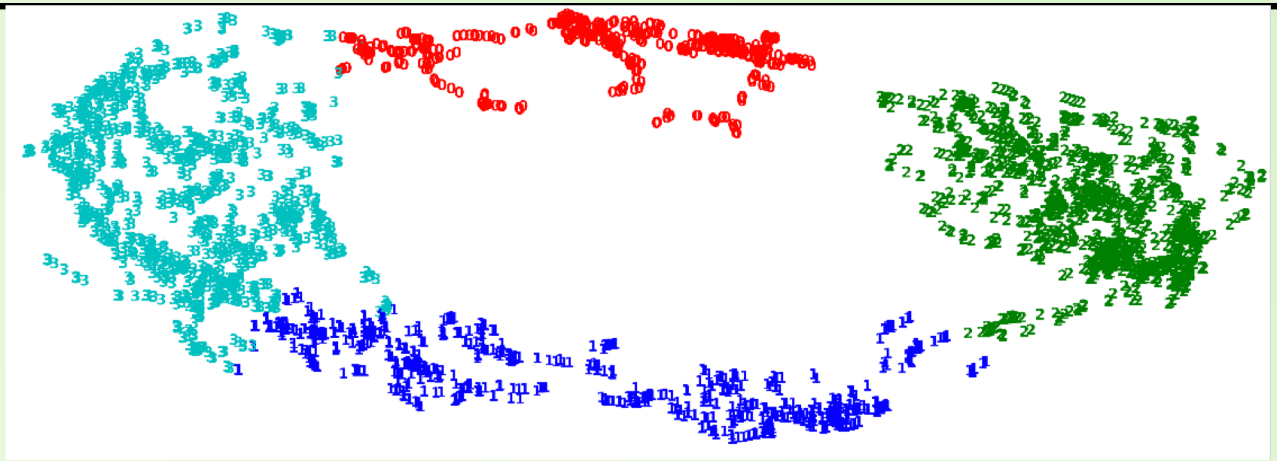


Gaussian Mixture Models
n_components=4,
covariance_type = spherical



Results

K-Means – 4 clusters



Cluster	Player (forward)	Overall Score	Cluster	Player (forward)	Overall Score	Cluster	Player (forward)	Overall Score	Cluster	Player (forward)	Overall Score
0	D. Candeias	74	1	J. Tagueu	72	2	B. Dost	83	3	L. Messi	94
0	R. Quaison	74	1	S. Bahoken	72	2	N. Petersen	79	3	C. Ronaldo	94
0	M. Bolaños	73	1	E. Gallego	71	2	D. Sousa	78	3	Neymar Jr	92
0	Cristiano	73	1	S. Abdullahi	71	2	W. Weghorst	78	3	E. Hazard	91
0	T. Villa	73	1	J. Marriott	71	2	G. Hoarau	77	3	L. Suárez	91

Results

Model	Silhouette Score	Cluster Visualization
K-Means (4 clusters)	0.52 +/- 0.17	Very Good
Hierarchical (Agglomerative): Linkage= complete	0.49 +/- 0.23	Good
Hierarchical (Agglomerative): Linkage= average	0.48 +/- 0.23	Poor
Hierarchical (Agglomerative): Linkage= ward	0.50 +/- 0.23	Good
DBSCAN	0.48 +/- 0.31	Poor
Gaussian Mixture Models (n_components = 3, covariance = full)	0.47 +/- 0.17	Very Poor
Gaussian Mixture Models (n_components = 4, covariance = spherical)	0.52 +/- 0.18	Very Good

Conclusion and The Road Ahead

- UMAP is the best dimensionality reduction technique on **forward** soccer players.
  - reduced 35 features into 6 main components.
- Best clustering techniques are K-Means with 4 clusters and Gaussian Mixture Models with 4 components and spherical covariance.
  - Best silhouette score, consistent standard deviation of silhouette samples and best cluster visualization.
- Best players to pick by clubs and fantasy soccer fans, or to analyze by the opposition teams are those with highest Overall score (L. Messi and C. Ronaldo best 2 **forward** players).

➢ Could exclude goalkeeping features when applying clustering techniques on **forward** players.