FIFA 2019 Player Analysis and Modeling

Anirban Pal
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https://anirbanpaldsc.github.io/

Contents

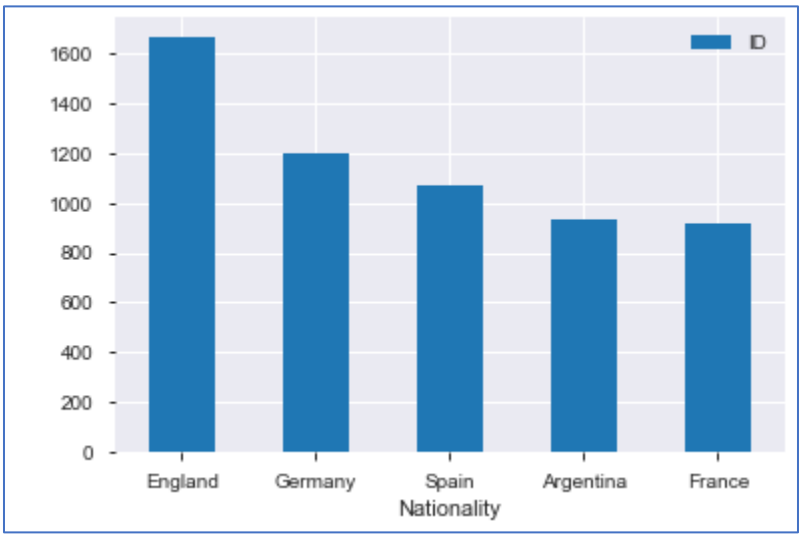
Business Question and Findings

The Fédération Internationale de Football Association or FIFA is a non-profit organization which describes itself as an international governing body of association football, fútsal, beach soccer, and efootball. It is the highest governing body of football. (Wikipedia)

Using the player stats and data, the project intends to answer some business questions and tries to predict some interesting facts.

1. *Which are the major football playing nations?*

   To answer this question, I looked at what countries most of the players are from. I looked at the top 5 countries.



   English Premier League, being one of the biggest football leagues in the world, involve most players from England. Bundeshlega and Spanish La Liga are not far behind. Argentine players are playing all over the world. Therefore, Argentina is also in the list.

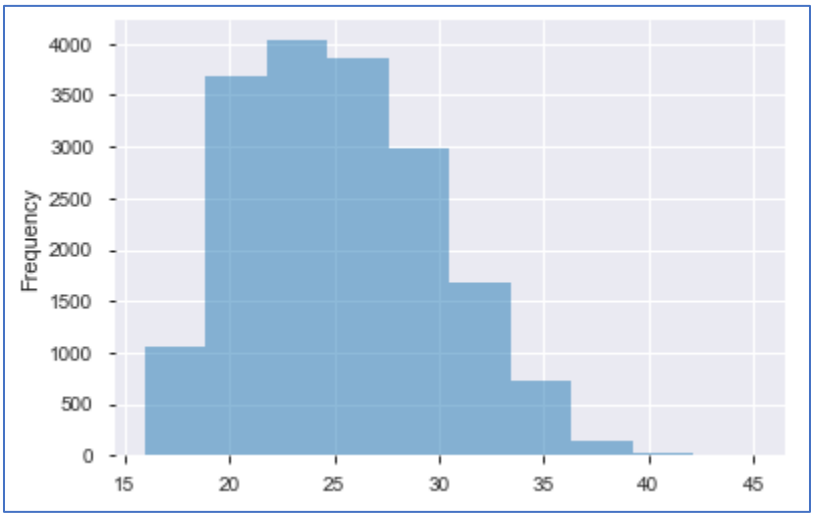
2. *Which are the richest clubs in terms of spending power?*

   It was found that on an average a player gets paid 9.73k Euro. The analysis tries to find out where the big clubs stand in terms of average wages paid.

Club	Average Wage
Real Madrid	152.030303
FC Barcelona	146.575758
Juventus	131.680000
Manchester City	113.363636
Manchester United	102.757576
Chelsea	98.454545
Liverpool	87.939394
Tottenham Hotspur	79.484848
FC Bayern München	78.827586
Arsenal	78.424242

Looking at these numbers, we can conclude that the average wage of these big spenders are significantly above the overall average (9.73k Euro).

3. *What is the age distribution of the players?*
This analysis tries to discover what is the peak age of a player in terms of activity and what is any retirement age range.



As expected, majority of the players are between 19 to 31 years of age. 24 being the most frequent age of players. A noticeable drop at age 34-35 signifies that players usually retire at that age, though there are instances of 40 year old players.

4. *Correlation between Player's Age, Overall potential, Value and Wage.*
To get an overall picture of how players are rated and paid, let us plot correlation between the age of a player, their overall capability and their remunerations.

	Age	Potential	Value_kEuro	Wage_kEuro
Age	1.000000	-0.253312	0.048263	0.141145
Potential	-0.253312	1.000000	0.364553	0.486413
Value_kEuro	0.048263	0.364553	1.000000	0.603883
Wage_kEuro	0.141145	0.486413	0.603883	1.000000

There is a positive correlation of player's potential and their value or wages. But we are not sure at this point why Age and Potential are negatively correlated. Is it because their ability decreases with age? We cannot be sure at this point without further analysis.

Machine Learning model:

Can we predict the Value of a player based on its attributes (like accuracy, shot power, reactions, dribbling etc.)?

Features	Coefs
Reactions	0.290402
Age	0.203213
BallControl	0.164913
StandingTackle	0.053737
GKReflexes	0.023304
GKDiving	0.019340
Special	0.017849
Marking	0.017337
HeadingAccuracy	0.014839
Interceptions	0.014004

Reaction, Age and Ball Control are the three most significant aspects contributing to a player's potential. In real life, young player with quick reaction and good ball control are successful.

Data Source

Data and stats about players enlisted in FIFA is available online on websites like https://www.fifaindex.com/, https://sofifa.com or FIFA itself. The original dataset has been scraped from FIFA website. But specific to this project, the source of the data is Kaggle:

https://www.kaggle.com/karangadiya/fifa19/version/4#

Codebook:

Column Position	Field	Details	Data Type	Example
1	#	row number	numeric	0
2	ID	unique id for every player	numeric	158023

Column Position	Field	Details	Data Type	Example
3	Name	name	string	L. Messi
4	Age	age	numeric	31
5	Photo	url to the player's photo	url	https://cdn.sofifa.org/players/1.png
6	Nationality	nationality	string	Brazil
7	Flag	url to player's country flag	url	https://cdn.sofifa.org/flags/52.png
8	Overall	overall rating	numeric	94
9	Potential	potential rating	numeric	94
10	Club	current club	string	Arsenal
11	Club Logo	url to club logo	url	https://cdn.sofifa.org/teams/1.png
12	Value	current market value	string	€110.5M
13	Wage	current wage	string	€565K
14	Special	special	numeric	2202
15	Preferred Foot	left/right	string	Right
16	International Reputation	rating on scale of 5	numeric	5
17	Weak Foot	rating on scale of 5	numeric	4
18	Skill Move	rating on scale of 5	numeric	4
19	Work Rate	attack work rate/defense work rate	string	Medium/ Medium
20	Body Type	body type of player	string	Normal
21	Real Face	true or false	binary	Yes
22	Position	position on the pitch	string	RF
23	Jersey Number	jersey number	numeric	10
24	Joined	joined date	date	1-Jul-04
25	Loaned From	club name if applicable	string	Al Hilal
26	Contract Valid Until	contract end date	string	2021
27	Height	height of the player	string	5'7
28	Weight	weight of the player	string	159lbs
29	LS	rating on scale of 100	string	88+2
30	ST	rating on scale of 100	string	88+2
31	RS	rating on scale of 100	string	88+2
32	LW	rating on scale of 100	string	92+2
33	LF	rating on scale of 100	string	93+2
34	CF	rating on scale of 100	string	93+2
35	RF	rating on scale of 100	string	93+2
36	RW	rating on scale of 100	string	92+2
37	LAM	rating on scale of 100	string	93+2
38	CAM	rating on scale of 100	string	93+2
39	RAM	rating on scale of 100	string	93+2
40	LM	rating on scale of 100	string	91+2
41	LCM	rating on scale of 100	string	84+2
42	CM	rating on scale of 100	string	84+2
43	RCM	rating on scale of 100	string	84+2
44	RM	rating on scale of 100	string	91+2
45	LWB	rating on scale of 100	string	64+2
46	LDM	rating on scale of 100	string	61+2
47	CDM	rating on scale of 100	string	61+2
48	RDM	rating on scale of 100	string	61+2

Column Position	Field	Details	Data Type	Example
49	RWB	rating on scale of 100	string	64+2
50	LB	rating on scale of 100	string	59+2
51	LCB	rating on scale of 100	string	47+2
52	CB	rating on scale of 100	string	47+2
53	RCB	rating on scale of 100	string	47+2
54	RB	rating on scale of 100	string	59+2
55	Crossing	rating on scale of 100	numeric	84
56	Finishing	rating on scale of 100	numeric	95
57	HeadingAccuracy	rating on scale of 100	numeric	70
58	ShortPassing	rating on scale of 100	numeric	90
59	Volleys	rating on scale of 100	numeric	86
60	Dribbling	rating on scale of 100	numeric	97
61	Curve	rating on scale of 100	numeric	93
62	FKAccuracy	rating on scale of 100	numeric	94
63	LongPassing	rating on scale of 100	numeric	87
64	BallControl	rating on scale of 100	numeric	96
65	Acceleration	rating on scale of 100	numeric	91
66	SprintSpeed	rating on scale of 100	numeric	86
67	Agility	rating on scale of 100	numeric	91
68	Reactions	rating on scale of 100	numeric	95
69	Balance	rating on scale of 100	numeric	95
70	ShotPower	rating on scale of 100	numeric	85
71	Jumping	rating on scale of 100	numeric	68
72	Stamina	rating on scale of 100	numeric	72
73	Strength	rating on scale of 100	numeric	59
74	LongShots	rating on scale of 100	numeric	94
75	Aggression	rating on scale of 100	numeric	48
76	Interceptions	rating on scale of 100	numeric	22
77	Positioning	rating on scale of 100	numeric	94
78	Vision	rating on scale of 100	numeric	94
79	Penalties	rating on scale of 100	numeric	75
80	Composure	rating on scale of 100	numeric	96
81	Marking	rating on scale of 100	numeric	33
82	StandingTackle	rating on scale of 100	numeric	28
83	SlidingTackle	rating on scale of 100	numeric	26
84	GKDiving	rating on scale of 100	numeric	6
85	GKHandling	rating on scale of 100	numeric	11
86	GKKicking	rating on scale of 100	numeric	15
87	GKPositioning	rating on scale of 100	numeric	14
88	GKReflexes	rating on scale of 100	numeric	8
89	Release Clause	release clause value	string	€226.5M

Methods used in the project

For Data Cleaning:

- Conversion to uniform unit of measurement

- Null value handling
- Converting currency to uniform values by removing characters

For Model Building:

Random Forest Regressor

Potential Issues?

At the beginning of the project, following were identified as potential issues or candidates for considerable data scrubbing effort. And it also explains how those issues were handled during the project.

- Since international player and currency data is involved, handling special character in the data is going to be a significant task (Śląsk Wrocław).
  Player names are not used during analysis or model building.
- There are a few players missing significant amount of information e.g. Preferred Foot, Skill Move etc.
  Mean value of those fields is used to replace nulls.
- The currency fields (e.g. Release Clause) are in thousand or million formats. They need to be converted to numbers.
  Everything is converted to thousands of Euro.
- Heights column need to be converted to single unit, e.g. inch and treated as numeric for using in the analysis.
  Heights converted to numeric inch.
- Weight column need to be converted to single unit, e.g. lbs. and treated as numeric for using in the analysis.
  Weights converted to numeric pounds.

Some of the variables like

GitHub Repository

https://github.com/anirbanpalDSC/Fifa2019-Analysis-and-Modelling

Appendix

LS – Left Stricker

ST - Striker

RS – Right Striker

LW – Left Winger

Winger (RW-LW)

This position is similar to the side midfielder but have fewer defensive duties. As a winger you will need great dribbling skills to get around your defenders. You will also need to provide your forwards with quality crosses from wide positions.

LF – Left Forward

RF/LF stands for Right Forward and Left Forward. Forward meaning striker. The wide attacking midfielders are usually the ones to feed the ball to forwards and sit deeper in field

CF - Centre forward

Your main task as center forward is to score goals. It doesn't matter how you do it but without scoring goals your status as center forward will be low.

RF - Right Forward

Refer to LF.

RW – Right Winger

Refer to LW

LAM – Left Attacking midfielder

Attacking midfielder (AM)

Attacking midfielders are also called playmakers and their ball skills (shooting, passing, first touch on the ball) should be of high quality.

CAM - Center Attacking midfielder

Refer to LAM

RAM - Left Attacking midfielder

Refer to LAM

LM – Left Midfielder

Side midfielder (LM-RM)

As a side midfielder you will be placed either left or right (depending on your kicking foot) of the midfield. One of your main tasks is to provide your forwards with quality crosses.

LCM – Left Central Midfielder

CM - Central midfielder

As a (CM) you must be ready to play more than one role on the field, depending on your team's strength and tactics. You will be the link between your defense and offense. You must also help in defense when your opponents have possession of the ball.

RCM - Right Central Midfielder

RM – Right Midfielder

Refer to LM

LWB – Left Wing Back

LDM – Left Defensive Midfielder

CDM - Central Defensive Midfielder

RDM - Right Defensive Midfielder

RWB – Right Wing Back

LB – Left Back

As a full back you will be responsible to prevent your opponents from getting the ball into your own 18 yard box (penalty area). You will also need to make offensive runs on the flank especially in a formation like 4-4-2. A full back (FB) could be Left Back (LB) or Right Back (RB).

LCB – Left Center Back

CB – Center Back

If you are playing as CB (even called center halves or central defenders) your main task will be to mark the opposing team forwards (and even their CM (central midfielders).

RCB – Right Center Back

RB – Right Back

Refer to LB

Reference

1. Tuo Q, Wang L, Huang G, Zhang H and Liu H (2019) Running Performance of Soccer Players During Matches in the 2018 FIFA World Cup: Differences Among Confederations. Front. Psychol. 10:1044. doi: 10.3389/fpsyg.2019.01044
2. *Welcome to FIFA EDA*, Retrieved from https://www.kaggle.com/ritesaluja/fifa19/
3. Wiseman, Marc (2019), *Machine Learning using FIFA 2019*, Retrieved from https://www.linkedin.com/pulse/machine-learning-using-fifa-2019-marc-wiseman/
4. Verma, Akshaj (2018), *Exploratory Analysis of FIFA 18 dataset using R*, Retrieved from https://towardsdatascience.com/exploratory-analysis-of-fifa-18-dataset-using-r-ba09aa4a2d3c
5. Prayag, Devesh (2019), *Insights from FIFA 2019 Player Data Set*, Retrieved from https://medium.com/@deevesh/insights-from-fifa-2019-player-data-set-cdcfc9304bda
6. Lu, Pilin (2019), *Does money affect performance? Analysis of the FIFA 19 data.*, Retrieved from https://medium.com/@u0509421/fifa-19-complete-player-dataset-what-can-we-tell-from-it-f7343fdad020
7. *Positions of Players on a Soccer Field Sheet*, Retrieved from http://www.soccer-training-guide.com/positions-of-players-on-a-soccer-field.html#.XZA4L0ZKjMU