Mid-Diploma Project (FIFA 19 complete players dataset) From Kaggle

November 10, 2021

0.1 TASK

1. Choose a problem that have predefined dataset from any source: your own data, or from Kaggle or from scraping and the data can be in any format SQL, CSV, XLSX.

2. Make a notebook and fulfill all the below technical requirements

   - Notebook must have section demonstrate the business problem you try to analyze.
   - Notebook must have section demonstrate the dataset description.
   - Notebook must have section demonstrate the analysis process including numbers & graphs & comments for every thing you can analyze in the data.
   - Upload the Notebook on classroom

0.2 Problem:-

- **We have large dataset of players info from fifa 19 Does Age has an effect on variables?**

0.3 What we want to do

- We want to know if Age has an affect on variables like stamina, Overall
- Who have the highest Overall
- We want how the distribution of Age looks like

Description

0.4 Context

Football analytics

Describtion - Detailed attributes for every player registered in the latest edition of FIFA 19 database.

```
[1]: # !pip install opendatasets
```

```
[2]: # import opendatasets as od
```

```
[3]: # od.download("https://www.kaggle.com/karangadiya/fifa19")
```

```
[4]: # import zipfile
```

```
[5]:  # A = r"C:\Users\peter\Epsilon AI lecture 14 practical"
      # with zipfile.ZipFile("fifa19.zip","r") as zip_ref:
      #     zip_ref.extractall(A)
```

```
[6]:  import pandas as pd
      import numpy as np
      import matplotlib.pyplot as plt
      import seaborn as sns
```

```
[7]:  df = pd.read_csv(r"C:\Users\peter\Epsilon AI lecture 14 practical\fifa19\data.
       ⌐csv")
```

```
[8]:  df.shape
```

```
[8]:  (18207, 89)
```

We can't do analysis for 18k row for now so to speed up the process we can take only 8k row

```
[9]:  df.isnull().sum()
```

```
[9]:  Unnamed: 0            0
      ID                   0
      Name                 0
      Age                  0
      Photo                0
                          ...
      GKHandling          48
      GKKicking           48
      GKPositioning       48
      GKReflexes          48
      Release Clause    1564
      Length: 89, dtype: int64
```

There's a lot of null values so we will also droping that

```
[10]:  df.columns
```

```
[10]:  Index(['Unnamed: 0', 'ID', 'Name', 'Age', 'Photo', 'Nationality', 'Flag',
             'Overall', 'Potential', 'Club', 'Club Logo', 'Value', 'Wage', 'Special',
             'Preferred Foot', 'International Reputation', 'Weak Foot',
             'Skill Moves', 'Work Rate', 'Body Type', 'Real Face', 'Position',
             'Jersey Number', 'Joined', 'Loaned From', 'Contract Valid Until',
             'Height', 'Weight', 'LS', 'ST', 'RS', 'LW', 'LF', 'CF', 'RF', 'RW',
             'LAM', 'CAM', 'RAM', 'LM', 'LCM', 'CM', 'RCM', 'RM', 'LWB', 'LDM',
             'CDM', 'RDM', 'RWB', 'LB', 'LCB', 'CB', 'RCB', 'RB', 'Crossing',
             'Finishing', 'HeadingAccuracy', 'ShortPassing', 'Volleys', 'Dribbling',
             'Curve', 'FKAccuracy', 'LongPassing', 'BallControl', 'Acceleration',
             'SprintSpeed', 'Agility', 'Reactions', 'Balance', 'ShotPower',
```

```
            'Jumping', 'Stamina', 'Strength', 'LongShots', 'Aggression',
            'Interceptions', 'Positioning', 'Vision', 'Penalties', 'Composure',
            'Marking', 'StandingTackle', 'SlidingTackle', 'GKDiving', 'GKHandling',
            'GKKicking', 'GKPositioning', 'GKReflexes', 'Release Clause'],
          dtype='object')
```

From row names:-

- We will be dropping some rows like ['Unnamed: 0', 'Photo', 'Flag', 'Club Logo',…]
- I can see Y/N and (left or right) and nationalities values we will convert them
  - why i am converting nationalities? because i want to see if there any relation between if the player from specific country has overall more than another players
- Is there a relationship between reputition and overall
- we may need to see different relation between Age and other values like overall
- we also may group by age and describe the data / getting info
- currently we don't need ID, Name, Club

```
[11]:  df.head()
```

```
[11]:    Unnamed: 0      ID                Name  Age  \
       0           0  158023           L. Messi   31
       1           1   20801  Cristiano Ronaldo   33
       2           2  190871          Neymar Jr   26
       3           3  193080             De Gea   27
       4           4  192985       K. De Bruyne   27


                                            Photo Nationality  \
       0  https://cdn.sofifa.org/players/4/19/158023.png    Argentina
       1   https://cdn.sofifa.org/players/4/19/20801.png     Portugal
       2  https://cdn.sofifa.org/players/4/19/190871.png       Brazil
       3  https://cdn.sofifa.org/players/4/19/193080.png        Spain
       4  https://cdn.sofifa.org/players/4/19/192985.png      Belgium


                                    Flag  Overall  Potential  \
       0  https://cdn.sofifa.org/flags/52.png       94         94
       1  https://cdn.sofifa.org/flags/38.png       94         94
       2  https://cdn.sofifa.org/flags/54.png       92         93
       3  https://cdn.sofifa.org/flags/45.png       91         93
       4   https://cdn.sofifa.org/flags/7.png       91         92


                         Club  … Composure Marking StandingTackle  SlidingTackle  \
       0         FC Barcelona  …      96.0    33.0           28.0           26.0
       1             Juventus  …      95.0    28.0           31.0           23.0
       2  Paris Saint-Germain  …      94.0    27.0           24.0           33.0
       3    Manchester United  …      68.0    15.0           21.0           13.0
       4      Manchester City  …      88.0    68.0           58.0           51.0


          GKDiving  GKHandling  GKKicking  GKPositioning GKReflexes Release Clause
```

3

```
0      6.0     11.0     15.0          14.0          8.0          €226.5M
1      7.0     11.0     15.0          14.0         11.0          €127.1M
2      9.0      9.0     15.0          15.0         11.0          €228.1M
3     90.0     85.0     87.0          88.0         94.0          €138.6M
4     15.0     13.0      5.0          10.0         13.0          €196.4M

[5 rows x 89 columns]
```

[12]:
```python
df.drop(df.index[5000:], inplace = True)
# df.dropna(inplace=True)
```

[13]:
```python
df.shape
```

[13]: (5000, 89)

[14]:
```python
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 5000 entries, 0 to 4999
Data columns (total 89 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   Unnamed: 0              5000 non-null   int64
 1   ID                      5000 non-null   int64
 2   Name                    5000 non-null   object
 3   Age                     5000 non-null   int64
 4   Photo                   5000 non-null   object
 5   Nationality             5000 non-null   object
 6   Flag                    5000 non-null   object
 7   Overall                 5000 non-null   int64
 8   Potential               5000 non-null   int64
 9   Club                    4929 non-null   object
 10  Club Logo               5000 non-null   object
 11  Value                   5000 non-null   object
 12  Wage                    5000 non-null   object
 13  Special                 5000 non-null   int64
 14  Preferred Foot          5000 non-null   object
 15  International Reputation 5000 non-null  float64
 16  Weak Foot               5000 non-null   float64
 17  Skill Moves             5000 non-null   float64
 18  Work Rate               5000 non-null   object
 19  Body Type               5000 non-null   object
 20  Real Face               5000 non-null   object
 21  Position                5000 non-null   object
 22  Jersey Number           5000 non-null   float64
 23  Joined                  4554 non-null   object
 24  Loaned From             375 non-null    object
 25  Contract Valid Until    4929 non-null   object
```

4

```
26   Height                    5000 non-null    object
27   Weight                    5000 non-null    object
28   LS                        4545 non-null    object
29   ST                        4545 non-null    object
30   RS                        4545 non-null    object
31   LW                        4545 non-null    object
32   LF                        4545 non-null    object
33   CF                        4545 non-null    object
34   RF                        4545 non-null    object
35   RW                        4545 non-null    object
36   LAM                       4545 non-null    object
37   CAM                       4545 non-null    object
38   RAM                       4545 non-null    object
39   LM                        4545 non-null    object
40   LCM                       4545 non-null    object
41   CM                        4545 non-null    object
42   RCM                       4545 non-null    object
43   RM                        4545 non-null    object
44   LWB                       4545 non-null    object
45   LDM                       4545 non-null    object
46   CDM                       4545 non-null    object
47   RDM                       4545 non-null    object
48   RWB                       4545 non-null    object
49   LB                        4545 non-null    object
50   LCB                       4545 non-null    object
51   CB                        4545 non-null    object
52   RCB                       4545 non-null    object
53   RB                        4545 non-null    object
54   Crossing                  5000 non-null    float64
55   Finishing                 5000 non-null    float64
56   HeadingAccuracy           5000 non-null    float64
57   ShortPassing              5000 non-null    float64
58   Volleys                   5000 non-null    float64
59   Dribbling                 5000 non-null    float64
60   Curve                     5000 non-null    float64
61   FKAccuracy                5000 non-null    float64
62   LongPassing               5000 non-null    float64
63   BallControl               5000 non-null    float64
64   Acceleration              5000 non-null    float64
65   SprintSpeed               5000 non-null    float64
66   Agility                   5000 non-null    float64
67   Reactions                 5000 non-null    float64
68   Balance                   5000 non-null    float64
69   ShotPower                 5000 non-null    float64
70   Jumping                   5000 non-null    float64
71   Stamina                   5000 non-null    float64
72   Strength                  5000 non-null    float64
73   LongShots                 5000 non-null    float64
```

```
74  Aggression              5000 non-null   float64
75  Interceptions           5000 non-null   float64
76  Positioning             5000 non-null   float64
77  Vision                  5000 non-null   float64
78  Penalties               5000 non-null   float64
79  Composure               5000 non-null   float64
80  Marking                 5000 non-null   float64
81  StandingTackle          5000 non-null   float64
82  SlidingTackle           5000 non-null   float64
83  GKDiving                5000 non-null   float64
84  GKHandling              5000 non-null   float64
85  GKKicking               5000 non-null   float64
86  GKPositioning           5000 non-null   float64
87  GKReflexes              5000 non-null   float64
88  Release Clause          4551 non-null   object
dtypes: float64(38), int64(6), object(45)
memory usage: 3.4+ MB
```

[15]:
```python
sns.jointplot(data = df, x = "Age", y = "Overall", palette = "rocket")
```

[15]: `<seaborn.axisgrid.JointGrid at 0xc9e7730>`
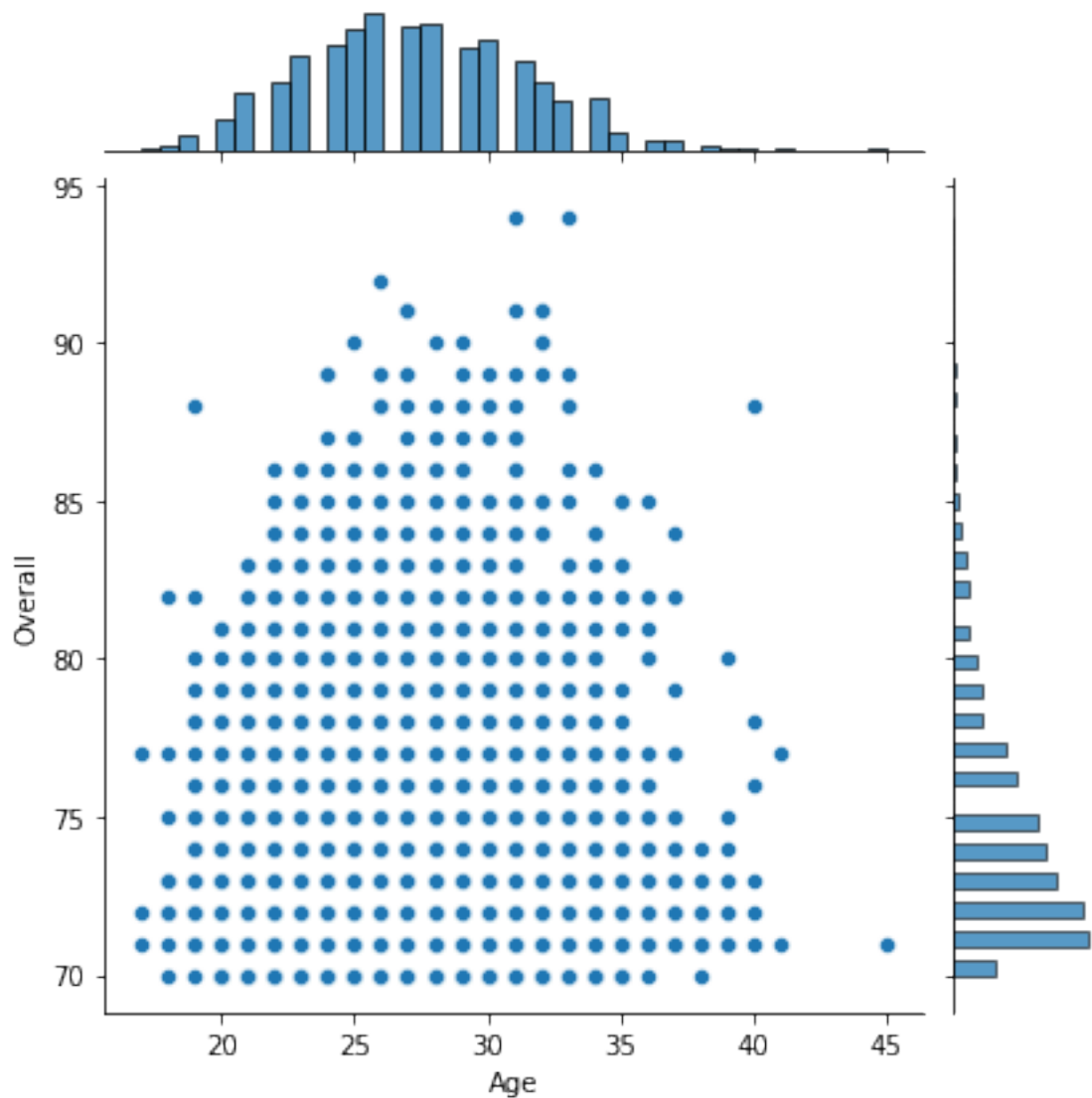
from Visualization we can see that top performers are between 30 years old and 35 years old

```
[16]: df.drop(columns=['Unnamed: 0','Photo','Flag','Real Face','Jersey Number', 'Club␣
      ↪Logo'], axis = 1, inplace=True)
```

Is there specific nationality that we can find most of players are performing better than others?

```
[17]: cat_columns = df.select_dtypes("object").columns
      for col in cat_columns:
          print("----{col}------")
          print(df[col].unique())
```

----{col}------

```
['L. Messi' 'Cristiano Ronaldo' 'Neymar Jr' … 'A. Weber' 'F. Haugen'
 'T. Bruns']
----{col}------
['Argentina' 'Portugal' 'Brazil' 'Spain' 'Belgium' 'Croatia' 'Uruguay'
 'Slovenia' 'Poland' 'Germany' 'France' 'England' 'Italy' 'Egypt'
 'Colombia' 'Denmark' 'Gabon' 'Wales' 'Senegal' 'Costa Rica' 'Slovakia'
 'Netherlands' 'Bosnia Herzegovina' 'Morocco' 'Serbia' 'Algeria' 'Austria'
 'Greece' 'Chile' 'Sweden' 'Korea Republic' 'Finland' 'Guinea'
 'Montenegro' 'Armenia' 'Switzerland' 'Norway' 'Czech Republic' 'Scotland'
 'Ghana' 'Central African Rep.' 'DR Congo' 'Ivory Coast' 'Russia'
 'Ukraine' 'Iceland' 'Mexico' 'Jamaica' 'Albania' 'Venezuela' 'Japan'
 'Turkey' 'Ecuador' 'Paraguay' 'Mali' 'Nigeria' 'Cameroon'
 'Dominican Republic' 'Israel' 'Kenya' 'Hungary' 'Republic of Ireland'
 'Romania' 'United States' 'Cape Verde' 'Australia' 'Peru' 'Togo' 'Syria'
 'Zimbabwe' 'Angola' 'Burkina Faso' 'Iran' 'Estonia' 'Tunisia'
 'Equatorial Guinea' 'New Zealand' 'FYR Macedonia' 'United Arab Emirates'
 'China PR' 'Guinea Bissau' 'Bulgaria' 'Kosovo' 'South Africa'
 'Madagascar' 'Georgia' 'Tanzania' 'Gambia' 'Cuba' 'Belarus' 'Uzbekistan'
 'Benin' 'Congo' 'Mozambique' 'Honduras' 'Canada' 'Northern Ireland'
 'Cyprus' 'Saudi Arabia' 'Curacao' 'Moldova' 'Bolivia' 'Trinidad & Tobago'
 'Sierra Leone' 'Zambia' 'Chad' 'Philippines' 'Haiti' 'Comoros' 'Libya'
 'Panama' 'São Tomé & Príncipe' 'Eritrea' 'Oman' 'Iraq' 'Burundi' 'Fiji'
 'New Caledonia' 'Lithuania' 'Luxembourg' 'Korea DPR' 'Liechtenstein'
 'St Kitts Nevis' 'Latvia' 'Suriname' 'Uganda']
----{col}------
['FC Barcelona' 'Juventus' 'Paris Saint-Germain' 'Manchester United'
 'Manchester City' 'Chelsea' 'Real Madrid' 'Atlético Madrid'
 'FC Bayern München' 'Tottenham Hotspur' 'Liverpool' 'Napoli' 'Arsenal'
 'Milan' 'Inter' 'Lazio' 'Borussia Dortmund' 'Vissel Kobe'
 'Olympique Lyonnais' 'Roma' 'Valencia CF'
 'Guangzhou Evergrande Taobao FC' 'FC Porto' 'FC Schalke 04' 'Beşiktaş JK'
 'LA Galaxy' 'Sporting CP' 'Real Betis' 'Olympique de Marseille'
 'RC Celta' 'Bayer 04 Leverkusen' 'Real Sociedad' 'Villarreal CF'
 'Sevilla FC' 'SL Benfica' 'AS Saint-Étienne' 'AS Monaco' 'Leicester City'
 'Atalanta' 'Grêmio' 'Atlético Mineiro' 'RB Leipzig' 'Ajax'
 'Dalian YiFang FC' 'Everton' 'West Ham United' '1. FC Köln'
 'TSG 1899 Hoffenheim' 'Shanghai SIPG FC' 'OGC Nice' 'Al Nassr'
 'Wolverhampton Wanderers' 'Borussia Mönchengladbach' 'Hertha BSC'
 'SV Werder Bremen' 'Cruzeiro' 'Athletic Club de Bilbao' 'Torino'
 'Medipol Başakşehir FK' 'Beijing Sinobo Guoan FC' 'Crystal Palace'
 'PFC CSKA Moscow' 'VfL Wolfsburg' 'Shakhtar Donetsk' 'Toronto FC'
 'Lokomotiv Moscow' 'Sassuolo' 'New York City FC' 'Fluminense' 'PSV'
 'Levante UD' 'Fulham' 'Watford' 'Atlanta United' 'Montpellier HSC'
 'Galatasaray SK' 'Fenerbahçe SK' 'SD Eibar' 'Los Angeles FC' 'Sampdoria'
 'Al Hilal' 'VfB Stuttgart' 'SC Braga' 'River Plate' 'Deportivo Alavés'
 nan 'Eintracht Frankfurt' 'Girona FC' 'Guangzhou R&F; FC' 'Burnley'
 'Stoke City' 'Southampton' 'Tianjin Quanjian FC' 'Getafe CF'
 'Beijing Renhe FC' 'Montreal Impact' 'Chievo Verona' 'Genoa'
```

'Portland Timbers' 'Tigres U.A.N.L.' 'RCD Espanyol'
'Hebei China Fortune FC' 'Cagliari' 'Chicago Fire' 'DC United'
'Sagan Tosu' 'Dynamo Kyiv' 'Santos' 'Internacional'
'América FC (Minas Gerais)' 'Independiente' 'Boca Juniors' 'Cruz Azul'
'1. FSV Mainz 05' 'Bournemouth' 'Spartak Moscow' 'Racing Club'
'FC Augsburg' 'Fiorentina' 'FC Nantes' 'Feyenoord' 'Club Brugge KV'
'Brighton & Hove Albion' 'Al Ahli' 'Jiangsu Suning FC' 'SC Freiburg'
'PAOK' 'Stade Rennais FC' 'Trabzonspor' 'SPAL' 'Portimonense SC'
'Olympiacos CFP' 'Club Atlético Huracán' 'Kasimpaşa SK'
'Newcastle United' 'Frosinone' 'Querétaro' 'KRC Genk' 'Hannover 96'
'Stade Malherbe Caen' 'Godoy Cruz' 'Toulouse Football Club'
'RSC Anderlecht' 'Huddersfield Town' 'CD Tondela' 'Seattle Sounders FC'
'Hamburger SV' 'FC Red Bull Salzburg' 'Rio Ave FC'
'FC Girondins de Bordeaux' 'Melbourne Victory' 'Parma' 'FC Basel 1893'
'Al Wehda' 'BSC Young Boys' 'KAA Gent' 'Al Ittihad' 'Standard de Liège'
'Shanghai Greenland Shenhua FC' 'Colo-Colo' 'Junior FC'
'West Bromwich Albion' 'RC Strasbourg Alsace' 'Göztepe SK'
'Deportivo Cali' 'Deportivo Toluca' 'Bologna' 'Nagoya Grampus'
'Amiens SC' 'Changchun Yatai FC' 'Club Atlético Lanús' 'Botafogo'
'Club América' 'Udinese' 'Real Valladolid CF' 'CD Leganés'
'Club Atlético Banfield' 'Celtic' 'Vitória Guimarães' 'FC København'
'UD Las Palmas' 'Deportivo de La Coruña' 'Universidad Católica'
'San Lorenzo de Almagro' 'Rayo Vallecano' 'Monterrey' 'Columbus Crew SC'
'MKE Ankaragücü' 'Guizhou Hengfeng FC' 'Swansea City' 'Tianjin TEDA FC'
'Chongqing Dangdai Lifan FC SWM Team' 'AEK Athens' 'Al Taawoun'
'Melbourne City FC' 'En Avant de Guingamp' 'Akhisar Belediyespor'
'Foggia' 'LOSC Lille' '1. FC Nürnberg' 'Clube Sport Marítimo'
'Real Sporting de Gijón' 'BB Erzurumspor' 'Shandong Luneng TaiShan FC'
'Club Atlético Colón' 'Bahia' 'Once Caldas' 'FC Groningen' 'Angers SCO'
'Paraná' 'Antalyaspor' 'Minnesota United FC' 'Club León' 'Empoli'
'VVV-Venlo' 'Leeds United' 'Viktoria Plzeň' 'Alanyaspor'
'Atlético Paranaense' 'Derby County' 'Kawasaki Frontale' 'Cardiff City'
'Aston Villa' 'Guadalajara' 'Dijon FCO' 'Santos Laguna' 'Málaga CF'
'Vitória' 'Çaykur Rizespor' 'U.N.A.M.' 'Nottingham Forest'
'Royal Antwerp FC' 'Club Tijuana' 'Sport Club do Recife' 'Real Salt Lake'
'AZ Alkmaar' 'SK Slavia Praha' 'Willem II' 'Middlesbrough'
'Dinamo Zagreb' 'Club Atlas' 'Granada CF' 'Sydney FC'
'Sporting Kansas City' 'SV Zulte-Waregem' 'Philadelphia Union'
'Real Oviedo' 'Pachuca' 'Boavista FC' 'Atiker Konyaspor' 'Kaizer Chiefs'
'GD Chaves' 'Palermo' 'Atlético Nacional' 'Puebla FC' 'Perth Glory'
'Panathinaikos FC' 'FC Sion' 'Vitória de Setúbal' 'New York Red Bulls'
'Al Shabab' 'Monarcas Morelia' 'Albacete BP' 'Rangers FC' 'Sparta Praha'
'Legia Warszawa' 'Urawa Red Diamonds' 'Rosario Central' 'Stade de Reims'
'ADO Den Haag' 'Chapecoense' 'FC Midtjylland' 'San Jose Earthquakes'
'Belgrano de Córdoba' 'Brescia' 'Kashima Antlers'
'CD Everton de Viña del Mar' 'Fortuna Düsseldorf' 'SD Huesca'
'Preston North End' 'Club Atlético Talleres' 'Benevento' 'Vitesse'
'Gimnasia y Esgrima La Plata' 'Houston Dynamo' 'Club Necaxa'

```
'Norwich City' 'Holstein Kiel' 'Ettifaq FC' 'Kayserispor'
'1. FC Heidenheim 1846' 'Brentford' 'Yeni Malatyaspor' 'Lobos BUAP'
'Bursaspor' 'Ceará Sporting Club' 'Sheffield United' 'FC Ingolstadt 04'
'Estudiantes de La Plata' 'AIK' 'Queens Park Rangers'
'Suwon Samsung Bluewings' 'Heart of Midlothian' 'Reading' 'FC Dallas'
'Heracles Almelo' 'Venezia FC' 'CD Lugo' 'Henan Jianye FC'
'Orlando City SC' 'CA Osasuna' 'NAC Breda' 'Livorno'
'Universidad de Chile' 'Brøndby IF' 'Aberdeen' 'Defensa y Justicia'
'Atlético Tucumán' 'Blackburn Rovers' 'SV Darmstadt 98' 'Moreirense FC'
'Sanfrecce Hiroshima' 'CD Numancia' 'KV Oostende' 'FC Utrecht'
'Vancouver Whitecaps FC' 'Odense Boldklub' 'SC Heerenveen'
'Racing Club de Lens' 'Independiente Santa Fe' 'Sporting de Charleroi'
'Millonarios FC' 'Sheffield Wednesday' 'Perugia' 'Daegu FC'
'Vélez Sarsfield' 'Grasshopper Club Zürich' 'Sivasspor' 'Nîmes Olympique'
'Rosenborg BK' 'SK Sturm Graz' 'FC Metz' 'CD Universidad de Concepción'
'Hellas Verona' 'Brisbane Roar' 'CD Feirense' 'Hull City'
'Waasland-Beveren' 'Neuchâtel Xamax' 'Real Zaragoza' 'CD Aves' 'Millwall'
'Unión de Santa Fe' 'KAS Eupen' 'Cádiz CF' 'FC Tokyo' 'CD Tenerife'
'1. FC Union Berlin' 'Al Fayha' 'AJ Auxerre' 'Patriotas Boyacá FC'
'Molde FK' 'Bristol City' 'CD Nacional' 'Sporting Lokeren' 'FC St. Pauli'
'Deportes Iquique' 'Al Qadisiyah' 'Atlético Bucaramanga'
'Club Atlético Tigre' 'FK Austria Wien' 'Patronato' 'Malmö FF'
'Kashiwa Reysol' 'US Cremonese' 'VfL Bochum 1848' 'SK Rapid Wien'
'KSV Cercle Brugge' 'Rionegro Águilas' 'Gimnàstic de Tarragona' 'Lecce'
'Santa Clara' 'BK Häcken' 'New England Revolution' 'Orlando Pirates'
'Atlético Huila' 'Western Sydney Wanderers' 'Kalmar FF'
'Independiente Medellín' 'Fortuna Sittard' 'Lech Poznań' 'Djurgårdens IF'
'CF Reus Deportiu' 'SK Brann' 'Ulsan Hyundai FC' 'Sint-Truidense VV'
'Carpi' 'Al Fateh' 'Royal Excel Mouscron' 'AC Ajaccio' 'PEC Zwolle'
'Sunderland' 'Club Atlético Aldosivi' 'US Salernitana 1919' 'FC Lorient'
'Argentinos Juniors' 'AD Alcorcón' 'Crotone' 'Excelsior' 'KV Kortrijk'
'IFK Norrköping' 'Adelaide United' 'FC St. Gallen'
'Tiburones Rojos de Veracruz' 'CD Palestino' 'Jeju United FC'
'Deportes Tolima' 'Jeonbuk Hyundai Motors' 'Birmingham City'
'América de Cali' 'La Equidad' 'Spezia' 'Aalborg BK' 'Le Havre AC'
'Górnik Zabrze' 'Central Coast Mariners' 'Wigan Athletic'
'Jagiellonia Białystok' 'Cittadella' 'Hibernian' 'FC Lugano'
'San Martín de San Juan' 'Strømsgodset IF' 'Júbilo Iwata'
"Newell's Old Boys" 'Al Faisaly' 'Colorado Rapids' 'IF Elfsborg'
'SV Sandhausen' 'Al Batin' 'Stade Brestois 29' 'UD Almería'
'Gyeongnam FC' 'Yokohama F. Marinos' 'Kilmarnock' 'Pescara'
'Newcastle Jets' 'Córdoba CF' 'RCD Mallorca' 'Hammarby IF' 'Cerezo Osaka'
'KFC Uerdingen 05' 'Shimizu S-Pulse' 'MSV Duisburg' 'Os Belenenses'
'DSC Arminia Bielefeld' 'Ipswich Town' 'FC Seoul' 'Lechia Gdańsk'
'Gamba Osaka' 'CF Rayo Majadahonda' 'LASK Linz' 'Bolton Wanderers'
'Al Raed' 'Extremadura UD' 'SC Paderborn 07' 'Wellington Phoenix'
'Unión Española' 'Alianza Petrolera' 'Cracovia' 'Gangwon FC' 'Elche CF'
'ESTAC Troyes' 'AS Béziers' 'La Berrichonne de Châteauroux'
```

'Clermont Foot 63' '1. FC Magdeburg' 'Pohang Steelers' 'Örebro SK'
 'Arka Gdynia' 'SG Dynamo Dresden' 'SpVgg Greuther Fürth' 'CD Huachipato'
 'Wisła Kraków' 'Stabæk Fotball' 'Eintracht Braunschweig'
 'Valenciennes FC' 'FC Thun' 'San Luis de Quillota' ' SSV Jahn Regensburg'
 'Cosenza' 'FC Nordsjælland' 'FC Erzgebirge Aue' 'Jeonnam Dragons'
 'Wolfsberger AC' 'Chamois Niortais Football Club' 'Club Deportes Temuco'
 'AS Nancy Lorraine' 'Red Star FC' 'Al Hazem' 'Pogoń Szczecin'
 'Charlton Athletic' 'Grenoble Foot 38' 'FC Hansa Rostock'
 'San Martin de Tucumán' 'Incheon United FC']
----{col}------
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 'En Avant de Guingamp' 'Genoa' 'SD Eibar' 'Bologna'
 'FC Girondins de Bordeaux' 'PSV' 'Real Betis' 'Toulouse Football Club'
 'Querétaro' 'Levante UD' 'Henan Jianye FC' 'Club Atlas' 'RC Celta'
 'Stoke City' 'Tigres U.A.N.L.' 'Atlético Nacional' 'LOSC Lille'
 'Newcastle United' 'Deportivo de La Coruña' 'Deportivo Cali'
 'Bournemouth' 'UD Las Palmas' 'Athletic Club de Bilbao' 'Watford'
 'Córdoba CF' 'Guadalajara' 'Stade Rennais FC' 'Os Belenenses'
 'Manchester City' 'Brighton & Hove Albion' 'VfL Wolfsburg' 'Pachuca'
 'FC Schalke 04' 'Manchester United' 'Ajax' 'Monterrey' 'Getafe CF'
 'FC Nantes' 'KAA Gent' 'FC Augsburg' 'Empoli' 'AS Saint-Étienne' 'Bahia'
 'Olympique Lyonnais' 'VfB Stuttgart' 'Medipol Başakşehir FK'
 'Real Sporting de Gijón' 'Sunderland' 'Kashiwa Reysol' 'Benevento'
 'FC Metz' 'Junior FC' 'Boca Juniors' 'FC Midtjylland' 'Millwall'
 'Al Hilal' 'Puebla FC' 'Club Atlético Tigre' 'Beşiktaş JK' 'Al Ahli'
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 'Hellas Verona' 'SV Werder Bremen' 'Eintracht Frankfurt'
 'Guizhou Hengfeng FC' 'Racing Club' 'Rosario Central'
 'TSG 1899 Hoffenheim' 'Aston Villa' 'FC Red Bull Salzburg'
 'Montpellier HSC' 'Standard de Liège' 'Club León' 'River Plate'
 'Olympique de Marseille' 'Grasshopper Club Zürich' 'Palermo'
 'Club Atlético Talleres' 'Norwich City' 'Hannover 96' 'Deportivo Toluca'
 'Parma' 'Tiburones Rojos de Veracruz' 'Toronto FC' 'West Ham United'
 'Fulham' 'Fenerbahçe SK' 'Brentford' "Newell's Old Boys"
 'Club Atlético Banfield' 'Independiente' 'SC Braga' 'Club América'
 'Sheffield Wednesday' 'Patriotas Boyacá FC' 'Eintracht Braunschweig'
 'FC Seoul' 'Club Brugge KV' 'FC Ingolstadt 04' 'SPAL' 'Tottenham Hotspur'
 'Universidad de Chile' 'Gimnàstic de Tarragona' 'Chievo Verona'
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 'SV Darmstadt 98' 'Nottingham Forest' 'CD Leganés']
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 'Dec 31, 2018' '2018' nan 'May 31, 2020' 'Jun 30, 2020' 'May 31, 2019'
 'Dec 31, 2019' 'Jan 1, 2019' 'Jun 1, 2019' 'Jan 4, 2019']
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'€47.3M' '€48.3M' '€30.7M' '€20M' '€8.5M' '€32M' '€21.4M' '€24M' '€38.4M'
'€30.5M' '€39.5M' '€35.9M' '€28.3M' '€27.5M' '€33.7M' '€38.1M' '€31.2M'
'€24.9M' '€27.7M' '€28.6M' '€36.5M' '€34.8M' '€19.6M' '€24.2M' '€21.9M'
'€29.6M' '€18.4M' '€22.4M' '€40.2M' '€20.4M' '€27.9M' '€16.5M' '€17.9M'
'€14.7M' '€15.2M' '€23.7M' '€13.5M' '€16.7M' '€17M' '€17.3M' '€11.4M'
'€15.7M' '€11.1M' '€16.2M' '€19.2M' '€9.4M' '€11.3M' '€4.2M' '€9.7M'
'€2.9M' '€8.7M' '€18M' '€10M' '€1.7M' '€41.4M' '€28.8M' '€39.6M' '€22.8M'
'€18.1M' '€6.8M' '€21.8M' '€36M' '€14.8M' '€28M' '€35.3M' '€29.7M'
'€40.3M' '€30.1M' '€24.1M' '€18.2M' '€27.2M' '€34.5M' '€24.4M' '€26.6M'
'€15M' '€16M' '€39.4M' '€23.1M' '€26.1M' '€36.8M' '€13.3M' '€20.7M'
'€32.2M' '€22.2M' '€18.9M' '€22.7M' '€17.8M' '€24.6M' '€22.5M' '€15.4M'
'€14.3M' '€13.7M' '€14.5M' '€17.2M' '€15.8M' '€13M' '€9M' '€6.5M'
'€11.7M' '€7.6M' '€30.4M' '€9.5M' '€27M' '€27.6M' '€19.9M' '€21.7M'
'€19.5M' '€11.2M' '€26.7M' '€25.9M' '€15.1M' '€18.6M' '€28.7M' '€19.7M'
'€23.4M' '€22.3M' '€17.6M' '€23.9M' '€20.8M' '€19.8M' '€7M' '€10.5M'
'€12.8M' '€14M' '€4.5M' '€12.9M' '€5.6M' '€8.1M' '€17.7M' '€9.8M' '€8.6M'
'€8M' '€11.8M' '€6.1M' '€1.1M' '€17.4M' '€13.1M' '€9.1M' '€6.3M' '€7.7M'
'€16.3M' '€6.6M' '€5M' '€5.8M' '€28.1M' '€14.4M' '€22M' '€6.7M' '€4.6M'

```
'€19.4M'  '€13.8M'  '€16.9M'  '€10.3M'  '€3.6M'  '€10.8M'  '€13.2M'  '€4M'
'€21.6M'  '€5.4M'  '€15.5M'  '€25.3M'  '€4.4M'  '€22.6M'  '€14.2M'  '€5.1M'
'€7.5M'  '€19.3M'  '€8.3M'  '€20.5M'  '€18.3M'  '€16.1M'  '€10.4M'  '€7.2M'
'€1.9M'  '€840K'  '€8.2M'  '€10.1M'  '€9.2M'  '€5.3M'  '€3.1M'  '€2.1M'  '€9.9M'
'€16.6M'  '€15.6M'  '€12.5M'  '€4.8M'  '€9.3M'  '€26.5M'  '€10.9M'  '€5.9M'
'€11.6M'  '€8.8M'  '€14.1M'  '€11.5M'  '€23.6M'  '€8.4M'  '€4.1M'  '€4.9M'
'€13.4M'  '€12.2M'  '€7.3M'  '€7.9M'  '€2.7M'  '€15.9M'  '€6M'  '€1.5M'  '€3.7M'
'€945K'  '€10.7M'  '€3.8M'  '€4.3M'  '€1.3M'  '€1.6M'  '€30.3M'  '€743K'  '€9.6M'
'€675K'  '€1.2M'  '€3.3M'  '€16.4M'  '€7.8M'  '€765K'  '€3.2M'  '€7.1M'  '€3.9M'
'€1.4M'  '€3.4M'  '€5.5M'  '€12.1M'  '€2.8M'  '€10.6M'  '€1.8M'  '€713K'  '€2.4M'
'€2.5M'  '€2.2M'  '€6.4M'  '€18.8M'  '€5.2M'  '€19.1M'  '€6.2M'  '€2.6M'  '€459K'
'€3.5M'  '€14.9M'  '€432K'  '€2.3M'  '€4.7M'  '€825K'  '€392K'  '€12.7M'  '€567K'
'€405K'  '€378K'  '€419K'  '€798K'  '€531K'  '€294K'  '€336K'  '€2M'  '€616K'
'€638K'  '€305K'  '€1M'  '€680K'  '€808K'  '€723K'  '€263K'  '€389K'  '€488K'
'€240K'  '€272K'  '€455K'  '€770K'  '€908K'  '€715K'  '€585K'  '€486K'  '€504K'
'€406K'  '€853K'  '€880K'  '€935K'  '€162K'  '€781K']
```

[18]:
```python
sns.displot(df["Age"], bins = 50)
```

[18]: `<seaborn.axisgrid.FacetGrid at 0xc9db820>`
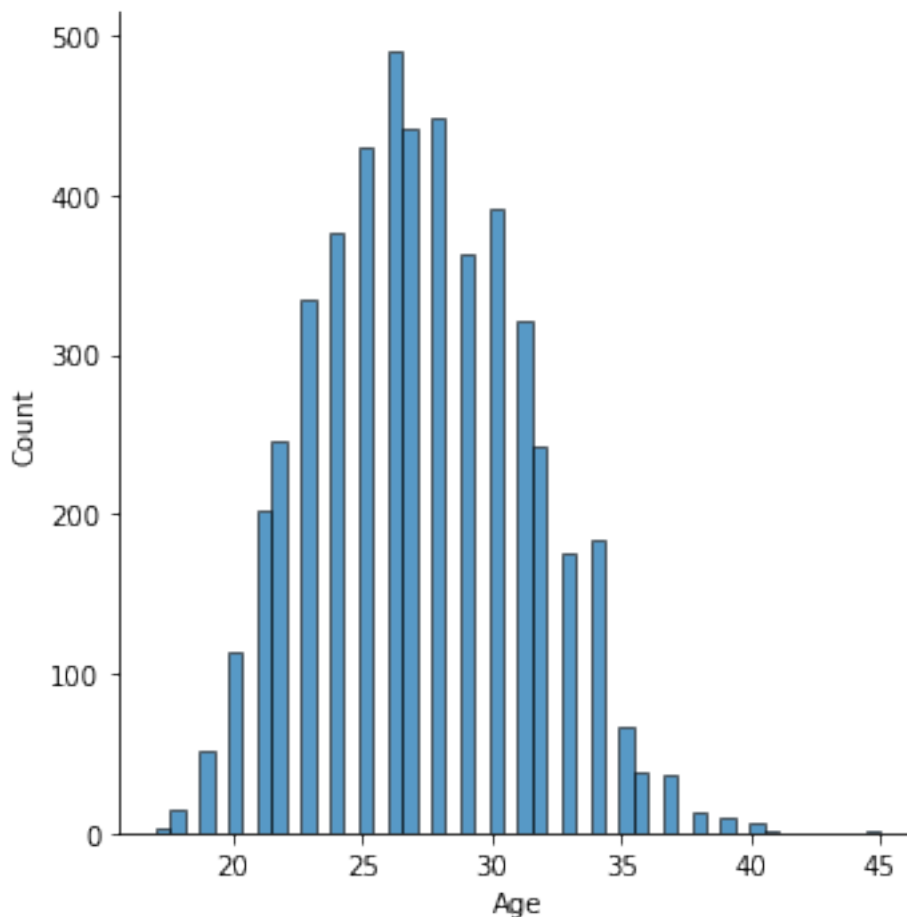
```
[19]: new_age = df[df["Age"] >= 30]
```

```
[20]: new_age.head()
```

```
[20]:         ID              Name  Age Nationality  Overall  Potential  \
      0  158023          L. Messi   31   Argentina       94         94
      1   20801  Cristiano Ronaldo   33    Portugal       94         94
      6  177003         L. Modrić   32     Croatia       91         91
      7  176580         L. Suárez   31     Uruguay       91         91
      8  155862       Sergio Ramos   32       Spain       91         91

               Club    Value   Wage  Special  … Composure  Marking  \
      0  FC Barcelona  €110.5M  €565K     2202  …      96.0     33.0
      1      Juventus     €77M  €405K     2228  …      95.0     28.0
      6   Real Madrid     €67M  €420K     2280  …      84.0     60.0
      7  FC Barcelona     €80M  €455K     2346  …      85.0     62.0
      8   Real Madrid     €51M  €380K     2201  …      82.0     87.0

         StandingTackle  SlidingTackle GKDiving GKHandling GKKicking GKPositioning  \
      0            28.0           26.0      6.0       11.0      15.0          14.0
      1            31.0           23.0      7.0       11.0      15.0          14.0
      6            76.0           73.0     13.0        9.0       7.0          14.0
      7            45.0           38.0     27.0       25.0      31.0          33.0
      8            92.0           91.0     11.0        8.0       9.0           7.0

         GKReflexes Release Clause
      0         8.0        €226.5M
      1        11.0        €127.1M
      6         9.0        €137.4M
      7        37.0          €164M
      8        11.0        €104.6M

      [5 rows x 83 columns]
```

```
[21]: new_age.shape
```

```
[21]: (1486, 83)
```

```
[22]: # sns.pairplot(df, hue = "Nationality", height=1.5)
      print("Numbers of duplicated rows :",df.duplicated().sum())
```

```
Numbers of duplicated rows : 0
```

Styling our describtion table from pandas documentation website

```
[23]: s = df.describe().T.style.bar(subset=['mean'],
                              color='bwr').background_gradient(subset=['std'],
                              cmap='brg').background_gradient(subset=['50%'],
                              cmap='coolwarm').background_gradient(subset=['75%'],
                              cmap='Pastel1').background_gradient(subset=['25%'],
                              cmap='Pastel2').background_gradient(subset=['max'],
                              cmap='crest').background_gradient(subset=['min'],
                              cmap='copper').background_gradient(subset=['count'],
                              cmap='cividis')
```

```
[24]: s
```

```
[24]: <pandas.io.formats.style.Styler at 0xcb87400>
```

From describtion we can see that we have 5000 row

```
[25]: ## €110.5M
      ## we can see also Wage,Value, and Release Clause are integers so we will␣
      ↪convert them to numbers by using .replace function
      df["Wage"] = df["Wage"].astype(str).str.replace("€","")
```

```
[26]: df["Wage"] = df["Wage"].astype(str).str.replace("K", "")
```

```
[27]: df.head(1)
```

```
[27]:        ID       Name  Age Nationality  Overall  Potential         Club  \
      0  158023  L. Messi   31   Argentina       94         94  FC Barcelona

           Value Wage  Special  … Composure  Marking  StandingTackle  \
      0  €110.5M  565     2202  …      96.0     33.0            28.0

         SlidingTackle GKDiving GKHandling GKKicking GKPositioning GKReflexes  \
      0           26.0      6.0       11.0      15.0          14.0        8.0

         Release Clause
      0         €226.5M

      [1 rows x 83 columns]
```

```
[28]: df["Wage"]= df["Wage"].astype(int)
```

```
[29]: df["Wage"] = df["Wage"] * 1000
```

```
[30]: ## we will repeat this for Value
      ## we found a better way on stackoverflow OFC
      df["Value"] = df["Value"].astype(str).str.replace("€","")
      df.Value = (df.Value.replace(r'[KM]+$', '', regex=True).astype(float) * \
                  df.Value.str.extract(r'[\d\.]+([KM]+)', expand=False)
```

```
                      .fillna(0)
                      .replace(['K','M'], [10**3, 10**6]).astype(int))
```

```
[31]: df["Value"].head()
```

```
[31]: 0    110500000.0
      1     77000000.0
      2    118500000.0
      3     72000000.0
      4    102000000.0
      Name: Value, dtype: float64
```

GREAT !!!!!

```
[32]: df["Joined"].head()
```

```
[32]: 0      Jul 1, 2004
      1     Jul 10, 2018
      2      Aug 3, 2017
      3      Jul 1, 2011
      4     Aug 30, 2015
      Name: Joined, dtype: object
```

```
[33]: ## we will convert to datetime
      # import datetime
      # conv=pd.to_datetime.strptime(df["Joined"],"%b %d %Y")
      # time.strftime("%m/%d/%Y",conv)
      df["Joined"] = pd.to_datetime(df["Joined"])
```

```
[34]: df["Joined"].head()
```

```
[34]: 0    2004-07-01
      1    2018-07-10
      2    2017-08-03
      3    2011-07-01
      4    2015-08-30
      Name: Joined, dtype: datetime64[ns]
```

```
[35]: df.columns
```

```
[35]: Index(['ID', 'Name', 'Age', 'Nationality', 'Overall', 'Potential', 'Club',
             'Value', 'Wage', 'Special', 'Preferred Foot',
             'International Reputation', 'Weak Foot', 'Skill Moves', 'Work Rate',
             'Body Type', 'Position', 'Joined', 'Loaned From',
             'Contract Valid Until', 'Height', 'Weight', 'LS', 'ST', 'RS', 'LW',
             'LF', 'CF', 'RF', 'RW', 'LAM', 'CAM', 'RAM', 'LM', 'LCM', 'CM', 'RCM',
             'RM', 'LWB', 'LDM', 'CDM', 'RDM', 'RWB', 'LB', 'LCB', 'CB', 'RCB', 'RB',
```

```
         'Crossing', 'Finishing', 'HeadingAccuracy', 'ShortPassing', 'Volleys',
         'Dribbling', 'Curve', 'FKAccuracy', 'LongPassing', 'BallControl',
         'Acceleration', 'SprintSpeed', 'Agility', 'Reactions', 'Balance',
         'ShotPower', 'Jumping', 'Stamina', 'Strength', 'LongShots',
         'Aggression', 'Interceptions', 'Positioning', 'Vision', 'Penalties',
         'Composure', 'Marking', 'StandingTackle', 'SlidingTackle', 'GKDiving',
         'GKHandling', 'GKKicking', 'GKPositioning', 'GKReflexes',
         'Release Clause'],
        dtype='object')
```

```
[36]: df.loc[df["Wage"] == df["Wage"].max()]
```

```
[36]:       ID      Name  Age Nationality  Overall  Potential          Club  \
      0  158023  L. Messi   31   Argentina       94         94  FC Barcelona

              Value    Wage  Special  … Composure  Marking  StandingTackle  \
      0  110500000.0  565000     2202  …       96.0     33.0            28.0

         SlidingTackle GKDiving GKHandling GKKicking GKPositioning GKReflexes  \
      0          26.0      6.0       11.0      15.0          14.0        8.0

         Release Clause
      0         €226.5M

      [1 rows x 83 columns]
```

```
[37]: df.loc[df["Value"] == df["Value"].max()]
```

```
[37]:       ID      Name  Age Nationality  Overall  Potential  \
      2  190871  Neymar Jr   26      Brazil       92         93

                    Club        Value    Wage  Special  … Composure  Marking  \
      2  Paris Saint-Germain  118500000.0  290000     2143  …      94.0     27.0

         StandingTackle  SlidingTackle GKDiving GKHandling GKKicking GKPositioning  \
      2           24.0           33.0      9.0       9.0      15.0          15.0

         GKReflexes Release Clause
      2       11.0         €228.1M

      [1 rows x 83 columns]
```

```
[38]: df["Release Clause"] = df["Release Clause"].astype(str).str.replace("€","")
      df["Release Clause"] = (df["Release Clause"].replace(r'[KM]+$', '', regex=True).
       ↪astype(float) * \
                  df["Release Clause"].str.extract(r'[\d\.]+([KM]+)', expand=False)
                    .fillna(0)
```

```
                    .replace(['K','M'], [10**3, 10**6]).astype(int))
```

[39]:
```
df.loc[df["Release Clause"] == df["Release Clause"].max()]
```

[39]:
```
       ID       Name  Age Nationality  Overall  Potential  \
2  190871  Neymar Jr   26      Brazil       92         93

                Club        Value    Wage  Special  … Composure  Marking  \
2  Paris Saint-Germain  118500000.0  290000     2143  …      94.0     27.0

   StandingTackle  SlidingTackle GKDiving GKHandling GKKicking GKPositioning  \
2            24.0           33.0      9.0        9.0      15.0          15.0

   GKReflexes Release Clause
2        11.0    228100000.0

[1 rows x 83 columns]
```

[40]:
```
df.loc[df["Release Clause"] == df["Release Clause"].min()]
```

[40]:
```
          ID        Name  Age Nationality  Overall  Potential  \
4820  161807  M. Kelemen   38    Slovakia       70         70

                    Club     Value  Wage  Special  … Composure  Marking  \
4820  Jagiellonia Białystok  120000.0  3000     1000  …      56.0     12.0

      StandingTackle  SlidingTackle GKDiving GKHandling GKKicking  \
4820            18.0           12.0      68.0       68.0      66.0

      GKPositioning GKReflexes Release Clause
4820           69.0       68.0       162000.0

[1 rows x 83 columns]
```

[41]:
```
df["Contract Valid Until"]=pd.to_datetime(df["Contract Valid Until"])
```

[42]:
```
y = df["Nationality"].value_counts().head(10).index
```

[43]:
```
x = df["Nationality"].value_counts().head(10).values
```

[44]:
```
str(df.loc[df['Potential'].idxmax()][1])
```

[44]: 'K. Mbappé'

[45]:
```
str(df.loc[df['Overall'].idxmax()][1])
```

[45]: 'L. Messi'

```
[46]: str(df.loc[df['Potential'].idxmin()][1])
```

```
[46]: 'R. Bianco'
```

```
[47]: str(df.loc[df['Overall'].idxmin()][1])
```

```
[47]: 'J. Botaka'
```

```
[48]: best_players=['Crossing', 'Finishing', 'HeadingAccuracy', 'ShortPassing',␣
      ↪'Volleys',
             'Dribbling', 'Curve', 'FKAccuracy', 'LongPassing', 'BallControl',
             'Acceleration', 'SprintSpeed', 'Agility', 'Reactions', 'Balance',
             'ShotPower', 'Jumping', 'Stamina', 'Strength', 'LongShots',
             'Aggression', 'Interceptions', 'Positioning', 'Vision', 'Penalties',
             'Composure', 'Marking', 'StandingTackle', 'SlidingTackle', 'GKDiving',
             'GKHandling', 'GKKicking', 'GKPositioning', 'GKReflexes']
      print("Best in others aspect :")

      for i in best_players:
          print('Best in {0}:{1} '.format(i,df.loc[df[i].idxmax()][0]))
```

```
Best in others aspect :
Best in Crossing:192985
Best in Finishing:158023
Best in HeadingAccuracy:171919
Best in ShortPassing:177003
Best in Volleys:179813
Best in Dribbling:158023
Best in Curve:20775
Best in FKAccuracy:158023
Best in LongPassing:182521
Best in BallControl:158023
Best in Acceleration:190483
Best in SprintSpeed:231747
Best in Agility:190871
Best in Reactions:20801
Best in Balance:205525
Best in ShotPower:20801
Best in Jumping:20801
Best in Stamina:215914
Best in Strength:232381
Best in LongShots:158023
Best in Aggression:213689
Best in Interceptions:215914
Best in Positioning:20801
Best in Vision:158023
Best in Penalties:186627
Best in Composure:158023
```

```
Best in Marking:137186
Best in StandingTackle:138956
Best in SlidingTackle:155862
Best in GKDiving:193080
Best in GKHandling:200389
Best in GKKicking:167495
Best in GKPositioning:1179
Best in GKReflexes:193080
```

[49]:
```python
plt.figure(figsize=(10,5))
sns.countplot(df["Age"])
plt.title("Players age distribution",fontsize=20)
plt.xlabel("Players age",fontsize=20)
plt.ylabel("Count",fontsize=20)
plt.show()
```

C:\Users\peter\anaconda3\lib\site-packages\seaborn_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version
0.12, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
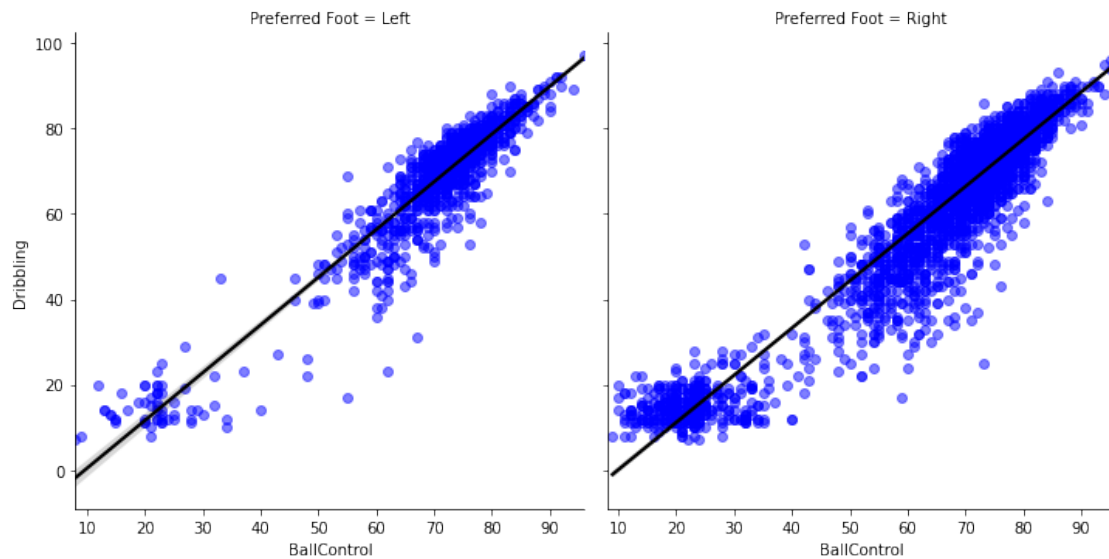misinterpretation.
    warnings.warn(
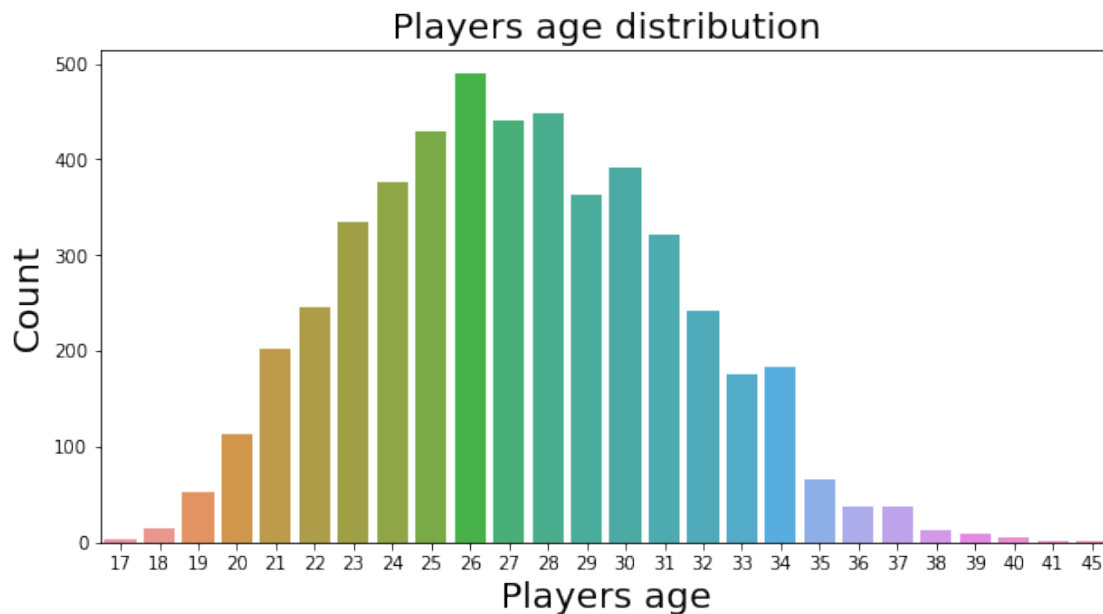
As we can see the highest total count is at 26 yo

[50]: `df["Club"].nunique()`

[50]: 505

```
[51]: sns.lmplot(x = 'BallControl', y = 'Dribbling',
                 data = df,col = 'Preferred Foot',
                 scatter_kws = {'alpha':0.5,'color':'blue'},
                 line_kws={'color':'black'})
```
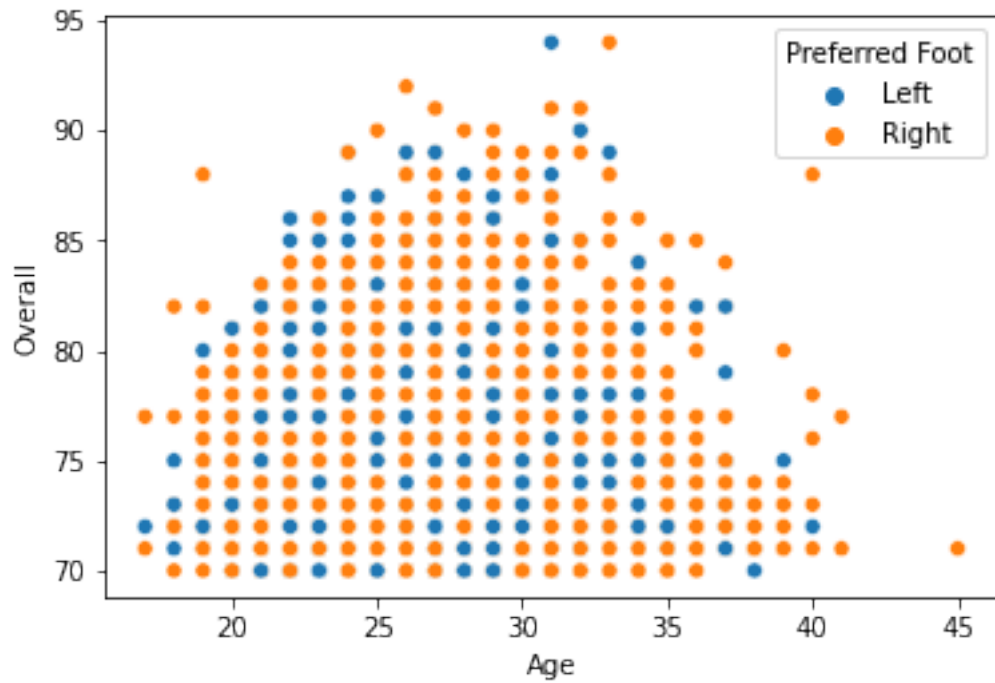
[51]: <seaborn.axisgrid.FacetGrid at 0xd3f63a0>

Most of players prefer right foot

```
[54]: sns.scatterplot(x='Age',y='Overall',hue = 'Preferred Foot',data=df)
```
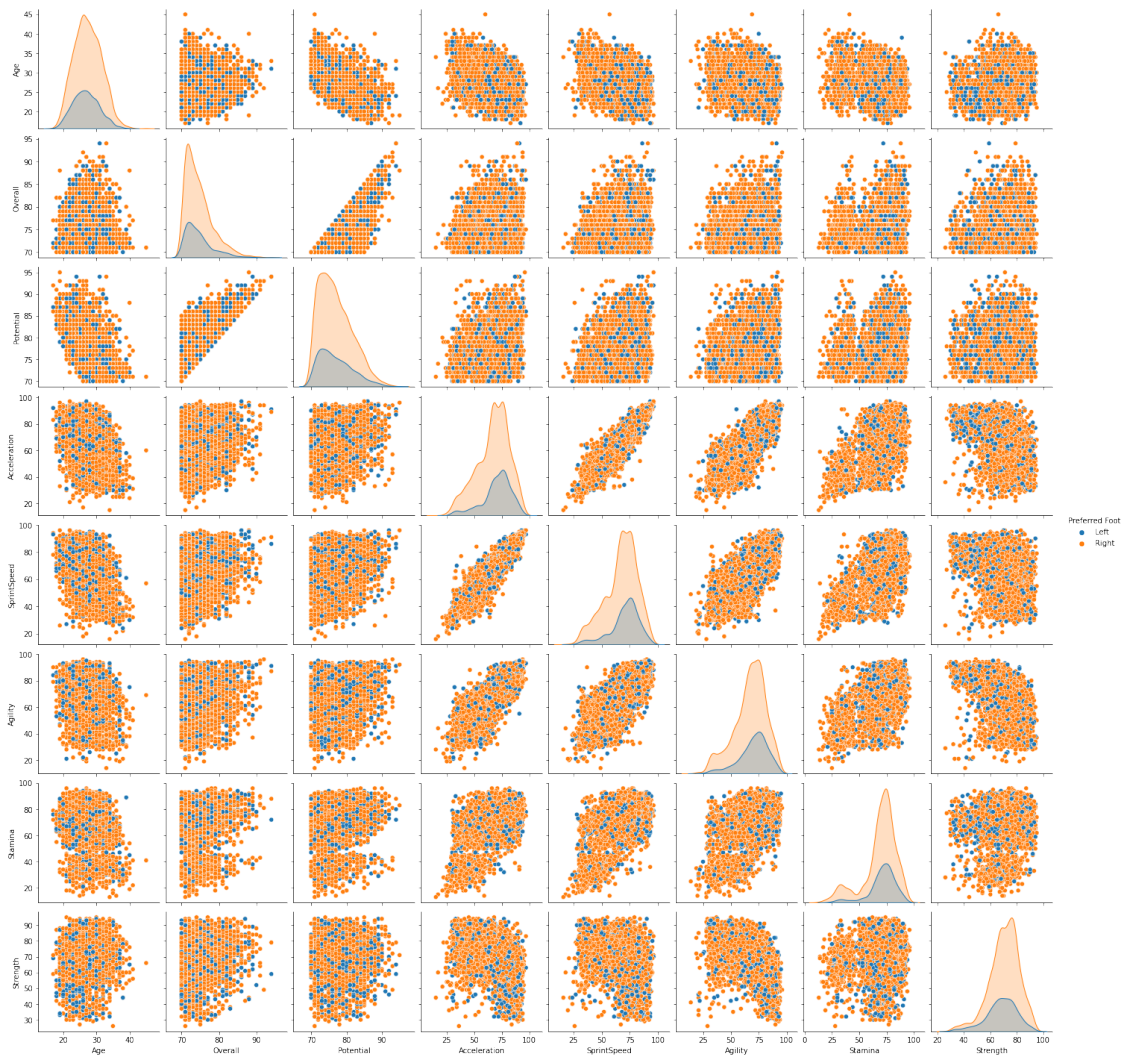
[54]: <AxesSubplot:xlabel='Age', ylabel='Overall'>

```
[56]: cols =␣
      ↪['Age','Overall','Potential','Acceleration','SprintSpeed',"Agility","Stamina",'Strength','P
      ↪Foot']
      df_small = df[cols]
      sns.pairplot(df_small,hue="Preferred Foot")
```

```
[56]: <seaborn.axisgrid.PairGrid at 0xd31f340>
```

- From our plots we can see that most of players are right foot
- We can say that Age isn't a perfect variable to measure another variables on it

[ ]:

[ ]:

[ ]:

[ ]: