Investigate_a_Dataset

January 15, 2021

1 Project: Soccer Data Analysis

1.1 Table of Contents

Introduction
Data Wrangling
Exploratory Data Analysis
Conclusions
Introduction

There is no doubt that soccer is so important and well knowen for all of us. So here in this research We will analyze and invastigate the soccer statistics of the most FIFA leagues. Dataset took from Kaggle.com which includes all Data of Matches, Leagues and players, etc from 2008 to 2016.

1.1.1 This report answerd some questions

1-What teams improved the most over the time period? 2-Which players had the most penalties? 3-What team attributes lead to the most victories? 4-What is the top 50 organized teams?

```
In [2]: #Important libraries
        import pandas as pd
        import numpy as np
        import matplotlib.pyplot as plt
        %matplotlib inline
        from mpl_toolkits.mplot3d import Axes3D
```

Data Wrangling

note: In this section of the report, We will foucs on Loading data, Checking clearliness and prepare it to be analyzed.

1.1.2 General Properties

```
In [3]: # Get the csv datasets to deal with it
        df_country = pd.read_csv('Country.csv')
        df_match = pd.read_csv('Match.csv')
```

```
        df_team = pd.read_csv('Team.csv', encoding='ISO-8859-1')
        df_player = pd.read_csv('Player.csv')
        df_player_attributes = pd.read_csv('Player_Attributes.csv')
        df_team_attributes = pd.read_csv('Team_Attributes.csv')
        df_league = pd.read_csv('League.csv')
```

```
In [4]: # Printing each dataset information for easily understanding it
        df_country.info()
        df_match.info()
        df_team.info()
        df_player.info()
        df_player_attributes.info()
        df_team_attributes.info()
        df_league.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11 entries, 0 to 10
Data columns (total 2 columns):
id      11 non-null int64
name    11 non-null object
dtypes: int64(1), object(1)
memory usage: 256.0+ bytes
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25979 entries, 0 to 25978
Columns: 115 entries, id to BSA
dtypes: float64(96), int64(9), object(10)
memory usage: 22.8+ MB
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 299 entries, 0 to 298
Data columns (total 5 columns):
id                  299 non-null int64
team_api_id         299 non-null int64
team_fifa_api_id    288 non-null float64
team_long_name      299 non-null object
team_short_name     299 non-null object
dtypes: float64(1), int64(2), object(2)
memory usage: 11.8+ KB
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11060 entries, 0 to 11059
Data columns (total 7 columns):
id                   11060 non-null int64
player_api_id        11060 non-null int64
player_name          11060 non-null object
player_fifa_api_id   11060 non-null int64
birthday             11060 non-null object
height               11060 non-null float64
weight               11060 non-null int64
dtypes: float64(1), int64(4), object(2)
```

```
memory usage: 604.9+ KB
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 183978 entries, 0 to 183977
Data columns (total 42 columns):
id                     183978 non-null int64
player_fifa_api_id     183978 non-null int64
player_api_id          183978 non-null int64
date                   183978 non-null object
overall_rating         183142 non-null float64
potential              183142 non-null float64
preferred_foot         183142 non-null object
attacking_work_rate    180748 non-null object
defensive_work_rate    183142 non-null object
crossing               183142 non-null float64
finishing              183142 non-null float64
heading_accuracy       183142 non-null float64
short_passing          183142 non-null float64
volleys                181265 non-null float64
dribbling              183142 non-null float64
curve                  181265 non-null float64
free_kick_accuracy     183142 non-null float64
long_passing           183142 non-null float64
ball_control           183142 non-null float64
acceleration           183142 non-null float64
sprint_speed           183142 non-null float64
agility                181265 non-null float64
reactions              183142 non-null float64
balance                181265 non-null float64
shot_power             183142 non-null float64
jumping                181265 non-null float64
stamina                183142 non-null float64
strength               183142 non-null float64
long_shots             183142 non-null float64
aggression             183142 non-null float64
interceptions          183142 non-null float64
positioning            183142 non-null float64
vision                 181265 non-null float64
penalties              183142 non-null float64
marking                183142 non-null float64
standing_tackle        183142 non-null float64
sliding_tackle         181265 non-null float64
gk_diving              183142 non-null float64
gk_handling            183142 non-null float64
gk_kicking             183142 non-null float64
gk_positioning         183142 non-null float64
gk_reflexes            183142 non-null float64
dtypes: float64(35), int64(3), object(4)
memory usage: 59.0+ MB
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1458 entries, 0 to 1457
Data columns (total 25 columns):
id                                1458 non-null int64
team_fifa_api_id                  1458 non-null int64
team_api_id                       1458 non-null int64
date                              1458 non-null object
buildUpPlaySpeed                  1458 non-null int64
buildUpPlaySpeedClass             1458 non-null object
buildUpPlayDribbling              489 non-null float64
buildUpPlayDribblingClass         1458 non-null object
buildUpPlayPassing                1458 non-null int64
buildUpPlayPassingClass           1458 non-null object
buildUpPlayPositioningClass       1458 non-null object
chanceCreationPassing             1458 non-null int64
chanceCreationPassingClass        1458 non-null object
chanceCreationCrossing            1458 non-null int64
chanceCreationCrossingClass       1458 non-null object
chanceCreationShooting            1458 non-null int64
chanceCreationShootingClass       1458 non-null object
chanceCreationPositioningClass    1458 non-null object
defencePressure                   1458 non-null int64
defencePressureClass              1458 non-null object
defenceAggression                 1458 non-null int64
defenceAggressionClass            1458 non-null object
defenceTeamWidth                  1458 non-null int64
defenceTeamWidthClass             1458 non-null object
defenceDefenderLineClass          1458 non-null object
dtypes: float64(1), int64(11), object(13)
memory usage: 284.8+ KB
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11 entries, 0 to 10
Data columns (total 3 columns):
id            11 non-null int64
country_id    11 non-null int64
name          11 non-null object
dtypes: int64(2), object(1)
memory usage: 344.0+ bytes
```

1.1.3 Data Cleaning

```
In [5]: # Making sure that the datasets are clear from null vaues
        df_country.isna().sum()#check number of null vaules
        df_country.dropna(inplace = True)#drop the null values
        df_country.isna().sum()#check number of null vaules again! and so on for all the next in

        df_league.isna().sum()
```

```
df_league.dropna(inplace = True)
df_league.isna().sum()


df_match.isna().sum()
df_match.dropna(inplace = True)
df_match.notna().sum()

df_team.isna().sum()
df_team.dropna(inplace = True)
df_team.isna().sum()

df_team_attributes.isna().sum()
df_team_attributes.dropna(inplace = True)
df_team_attributes.isna().sum()

df_player.isna().sum()
df_player.dropna(inplace = True)
df_player.isna().sum()

df_player_attributes.isna().sum()
df_player_attributes.dropna(inplace = True)
df_player_attributes.isna().sum()
```

Out[5]:

```
id                    0
player_fifa_api_id    0
player_api_id         0
date                  0
overall_rating        0
potential             0
preferred_foot        0
attacking_work_rate   0
defensive_work_rate   0
crossing              0
finishing             0
heading_accuracy      0
short_passing         0
volleys               0
dribbling             0
curve                 0
free_kick_accuracy    0
long_passing          0
ball_control          0
acceleration          0
sprint_speed          0
agility               0
reactions             0
balance               0
```

```
shot_power             0
jumping                0
stamina                0
strength               0
long_shots             0
aggression             0
interceptions          0
positioning            0
vision                 0
penalties              0
marking                0
standing_tackle        0
sliding_tackle         0
gk_diving              0
gk_handling            0
gk_kicking             0
gk_positioning         0
gk_reflexes            0
dtype: int64
```

Exploratory Data Analysis

Note: once the data is clear now , you're ready to move on to exploration. by Computing statistics and create visualizations with the goal of addressing the research questions

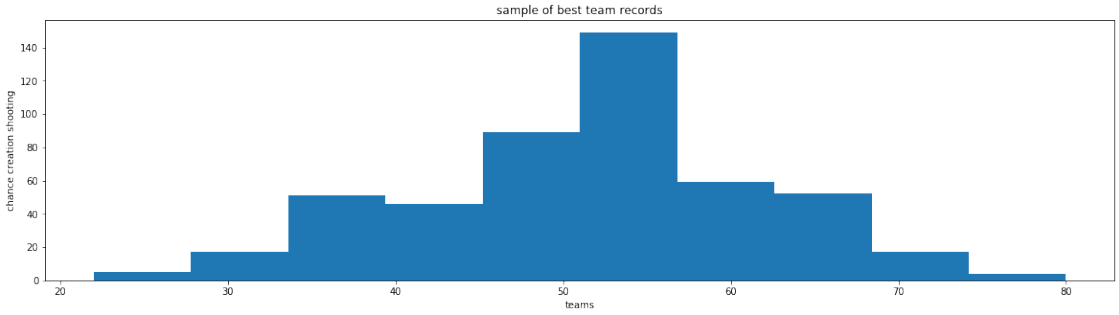
1.1.4 (Q1) What teams improved the most over the time period?

In [6]:
```
#1- What teams improved the most over the time period?
#one of the best ways to know the best team is to compare the result of a mean of higher
Best_team = df_team_attributes[(df_team_attributes['buildUpPlaySpeed'] > df_team_attribu
Best_team = df_team[df_team['team_api_id'] == Best_team['team_api_id']]
Team_name = Best_team['team_long_name']
Team_name # is it Celtic
```

Out[6]:
```
242    Celtic
Name: team_long_name, dtype: object
```

In [7]:
```
df_team_attributes_visualize = df_team_attributes['chanceCreationShooting'].plot(kind =
plt.title("sample of best team records")
plt.xlabel("teams")
plt.ylabel("chance creation shooting")
```

Out[7]:
```
Text(0,0.5,'chance creation shooting')
```



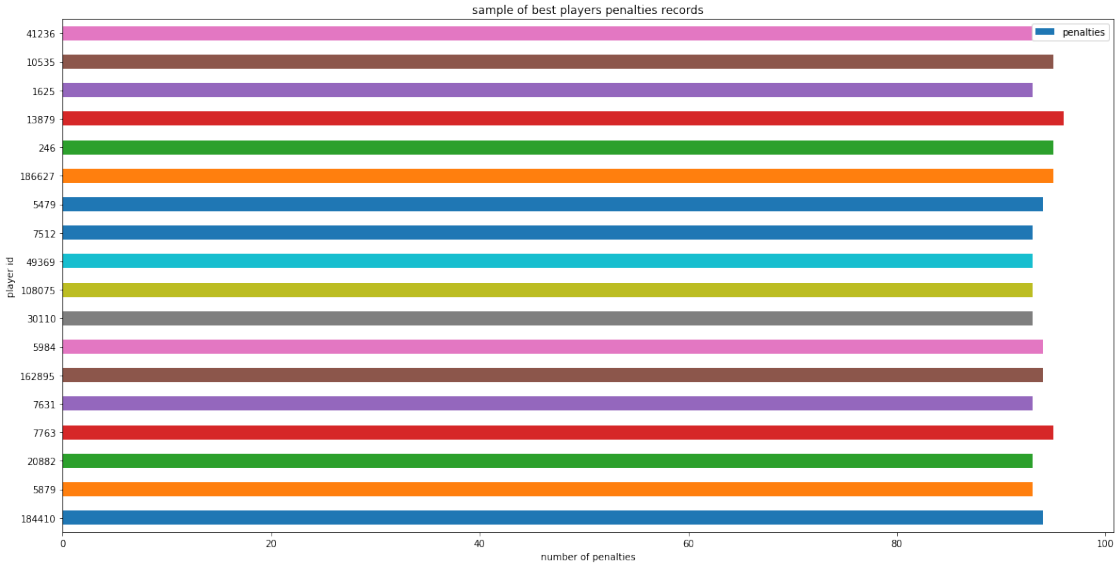
1.1.5 (Q2) Which players had the most penalties?

```
In [8]: Best_player = df_player_attributes[df_player_attributes['penalties'] == df_player_attrib
        Best_player = df_player[df_player['player_fifa_api_id'] == Best_player['player_fifa_api_
        Player_name = Best_player['player_name'] # get his name
        Player_name # Rickie Lambert
```

```
Out[8]: 8967    Rickie Lambert
        Name: player_name, dtype: object
```

```
In [9]: # get a top sample of 1.68*mean of this Data Frame to check it for high speed response
        df_mean_player_penalties = df_player_attributes[df_player_attributes['penalties']>df_pla
        df_mean_player_penalties = df_mean_player_penalties.sort_values('penalties', ascending=F
        df_mean_player_penalties.plot.barh(y='penalties',x='player_fifa_api_id',figsize=(20,10))
        plt.title("sample of best players penalties records")
        plt.xlabel("number of penalties")
        plt.ylabel("player id")
```

```
Out[9]: Text(0,0.5,'player id')
```



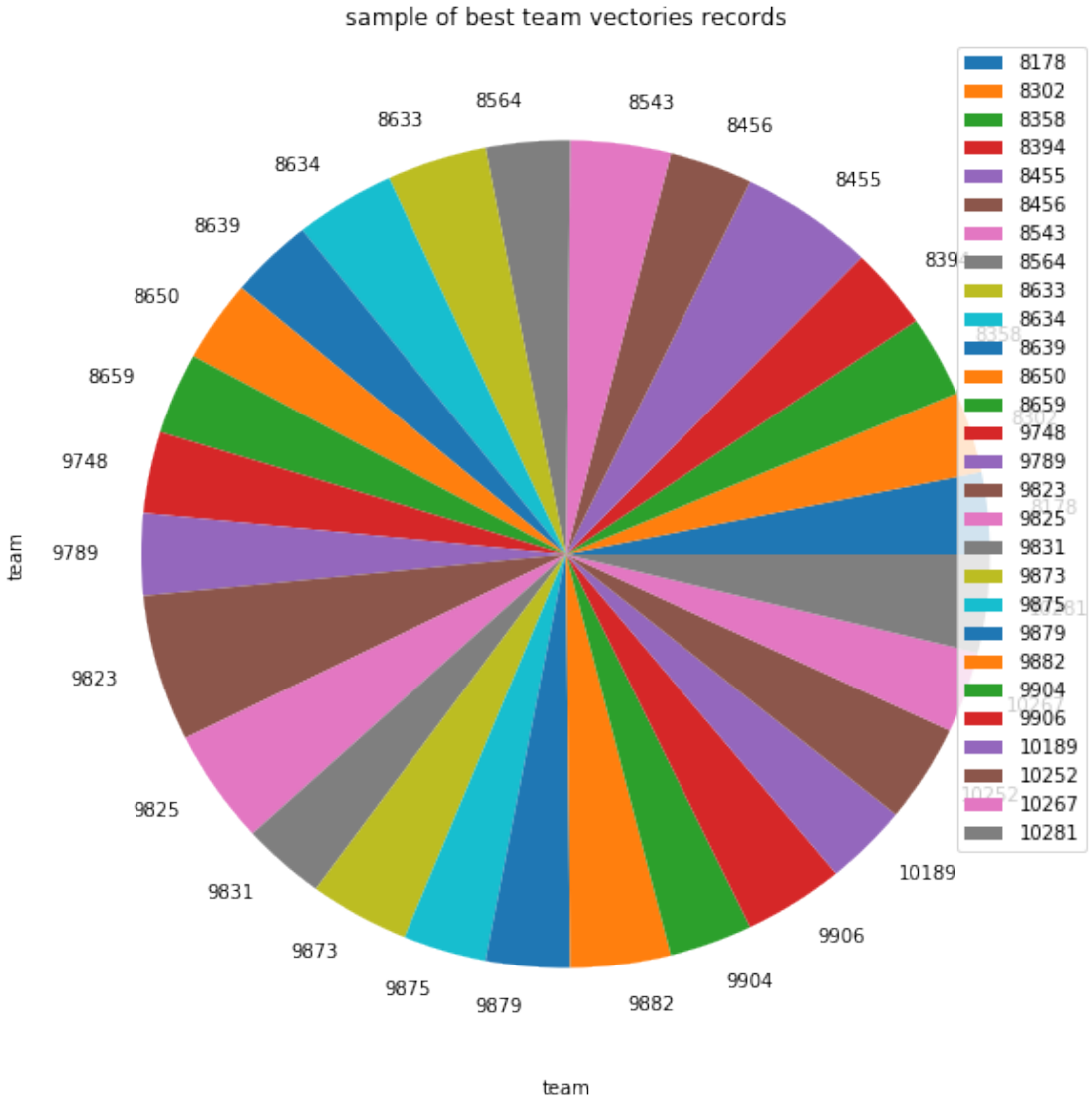
1.1.6 (Q3) What team attributes lead to the most victories?

In [10]:
```
vectory_team = df_match[(df_match['home_team_goal'] == df_match['home_team_goal'].max()
vectory_team = df_team[df_team['team_api_id'] == vectory_team['home_team_api_id'].max()
Team_name = vectory_team['team_long_name']# get the team name
Team_name # FC Bayern Munich
```

Out[10]:
```
94    FC Bayern Munich
Name: team_long_name, dtype: object
```

In [11]:
```
df_mean_team_goals = df_match[df_match['home_team_goal'] > df_match['home_team_goal'].m
df_mean_team_goals = df_mean_team_goals.sort_values('home_team_goal', ascending=False).
df_mean_team_goals.groupby(['home_team_api_id']).sum().plot(kind='pie', y='home_team_go
plt.title("sample of best team vectories records")
plt.xlabel("team")
plt.ylabel("team")
```

Out[11]:
```
Text(0,0.5,'team')
```

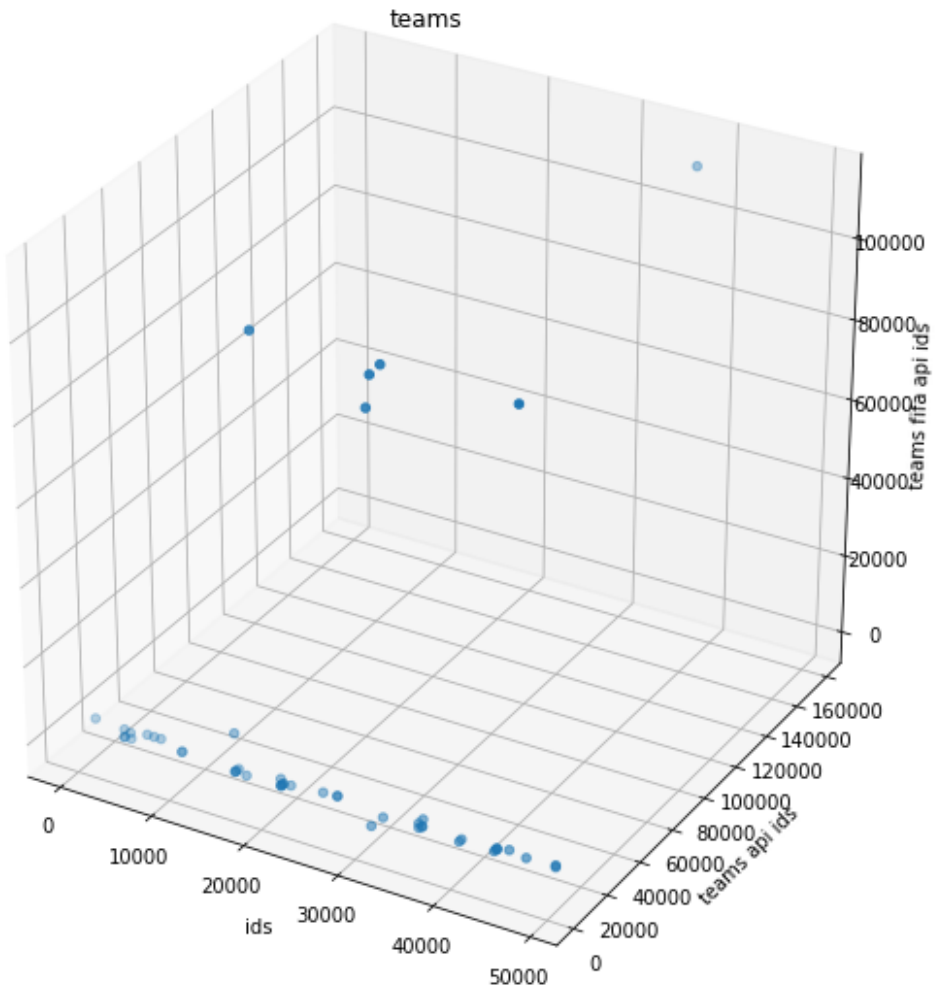


1.1.7 (Q4) What is the top 50 organized teams?

```
In [26]: # here we want to have a 3D visualization of top 50 teams
         df_team_attributes = df_team_attributes.sort_values('team_fifa_api_id', ascending=False
         top_fifty_teams = df_team_attributes[(df_team_attributes['buildUpPlayPositioningClass']
         top_fifty_ids = top_fifty_teams['team_api_id']
         top_fifty_all = df_team[df_team['team_api_id'].isin(top_fifty_ids)] # check and get the
         top_fifty_all
         z = top_fifty_all['team_fifa_api_id'] # z-axis
         y = top_fifty_all['team_api_id'] # y-axis
         x = top_fifty_all['id'] # x-axis
         fig = plt.figure(figsize=(10,10))
         ax = fig.add_subplot(111, projection = "3d") #3D figure
```

```
        ax.scatter(x, y, z)
        ax.set_xlabel("ids")
        ax.set_ylabel("teams api ids")
        ax.set_zlabel("teams fifa api ids")
        ax.set_title("teams")
```

```
Out[26]: Text(0.5,0.92,'teams')
```



Conclusions

Note: Finally, summarize our findings and the results that have been performed. The teams improved the most over the time was Celtic, Which players had the most penalties was Rickie Lambert and team attributes lead to the most victories was FC Bayern Munich in addition to a a list of top 50 organized teams.

Note: There is some limitations here, as we use here a sample of the top high 1.68 in the second question and 2.6 in the third one to make the process more easier and high performance and the fourth question we use 1.1 for the same reason.

```
In [38]: from subprocess import call
         call(['python', '-m', 'nbconvert', 'Investigate_a_Dataset.ipynb'])
```

```
Out[38]: 0
```