Project 1 - FIFA 2019 - Report and Codes

Dependencies

In [1]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
import pickle
from math import pi
from sklearn.linear_model import LinearRegression
from sklearn import metrics
```

In [2]:
```
import seaborn as sns
```

Reading and cleaning data

In [3]:
```
df = pd.read_csv('data.csv')
#checking missing/null values
df.isnull().values.any()
```

Out[3]: True

In [4]:
```
#adjust format
list_columns_to_adj = ['Value','Wage','Release Clause']
df[list_columns_to_adj] = df[list_columns_to_adj].fillna('€'+'0'+'K')
```

In [5]:
```
def value_columns_adj (list_):
    for i in list_:
        df['i_order'] = ([x[-1] for x in df[i]])
        df['i_order'] = df['i_order'].replace({'M': float(1000000), 'K': float(10
        df[i] = (pd.to_numeric([x[1:-1] for x in df[i]], errors='coerce')) * np.a
        df.drop("i_order", axis=1, inplace=True)
value_columns_adj(list_columns_to_adj)
```

In [6]:
```
#Clustering positions
def filter_(x):
    a = ['GK']
    b = ['LWB','RWB','LB','LCB','CB','RCB','RB']
    c = ['LAM', 'CAM', 'RAM', 'LM', 'LCM', 'CM', 'RCM', 'RM', 'LDM', 'CDM', 'RDM'
    d = ['LS', 'ST', 'RS', 'LW', 'LF', 'CF', 'RF', 'RW']
    if x in a:
        return 'Goalkeeper'
    elif x in b:
        return 'Defenders'
    elif x in c:
        return 'Midfielder'
    elif x in d:
        return 'Attacker'
    else:
        return 'NaN'
df['SimplifiedPosition'] = df['Position'].apply(filter_)
```

In [7]:
```
#Save cleaned df
pickle.dump(df, open("df.pickle", "wb"))
df = pickle.load(open("df.pickle", "rb"))
```

In [8]:
```
df.head()
```

Out[8]:

	Unnamed: 0	ID	Name	Age	Photo	Nationality	
0	0	158023	L. Messi	31	https://cdn.sofifa.org/players/4/19/158023.png	Argentina	https://cc
1	1	20801	Cristiano Ronaldo	33	https://cdn.sofifa.org/players/4/19/20801.png	Portugal	https://cc
2	2	190871	Neymar Jr	26	https://cdn.sofifa.org/players/4/19/190871.png	Brazil	https://cc
3	3	193080	De Gea	27	https://cdn.sofifa.org/players/4/19/193080.png	Spain	https://cc
4	4	192985	K. De Bruyne	27	https://cdn.sofifa.org/players/4/19/192985.png	Belgium	https://c

5 rows × 90 columns

Data Analysis & Visualization

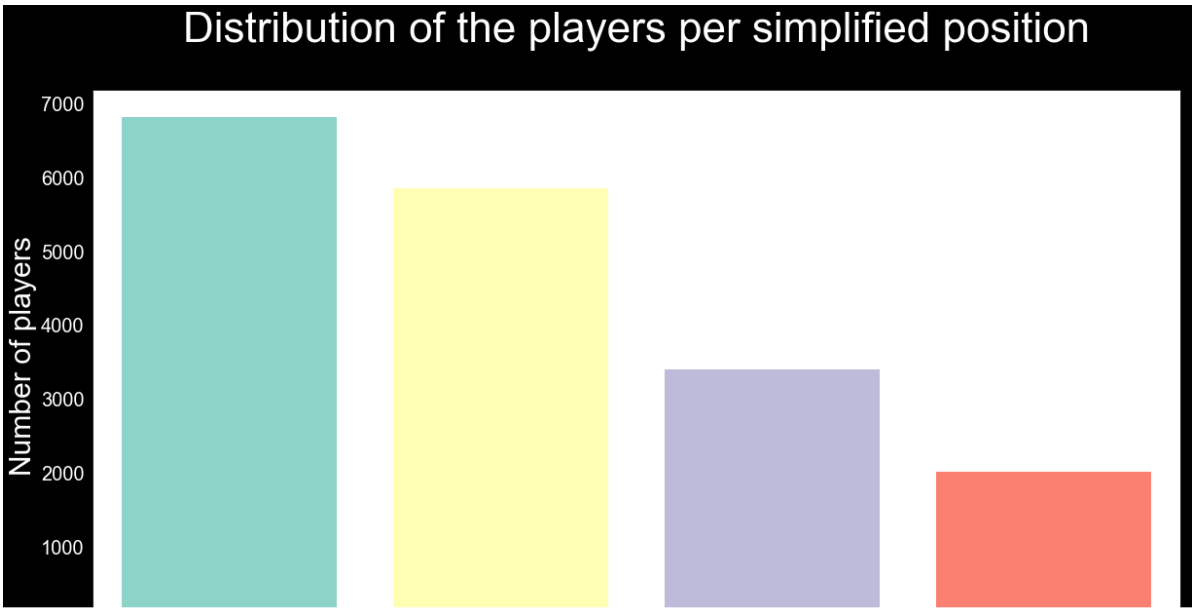
Distribution of the players per simplified position (cluster)

In [9]:
```
bg_color = (0.25, 0.25, 0.25)
sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl

df_temp = df[df['SimplifiedPosition'] != 'NaN']
t= sns.countplot(data=df_temp,
                 x='SimplifiedPosition',
                 palette="Set3",
                 saturation =1,
                 linewidth=2,
                 order=df_temp['SimplifiedPosition'].value_counts().sort_values(a

t.axes.xaxis.label.set_text("Simplified Position")
t.axes.yaxis.label.set_text("Number of players")
t.get_legend()
t.set_title("Distribution of the players per simplified position",fontsize = 44,
```

Out[9]:
```
Text(0.5,1.08,'Distribution of the players per simplified position')
```



Top 10 players by wage

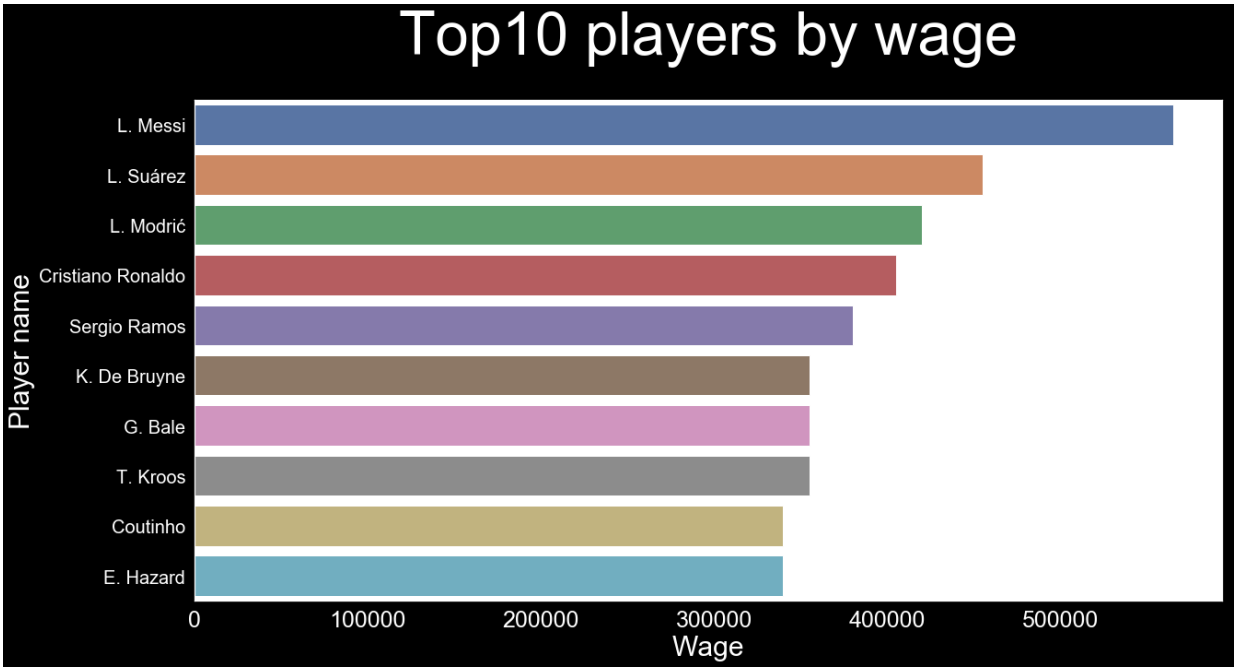
In [10]:
```
df_temp= df[['Wage','Name']].sort_values(by=['Wage'], ascending = False).head(10)

bg_color = (0.25, 0.25, 0.25)
sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl

u= sns.barplot(x= 'Wage',
               y= 'Name',
               data=df_temp)

u.axes.xaxis.label.set_text("Wage")
u.axes.yaxis.label.set_text("Player name")
u.get_legend()
u.set_title("Top10 players by wage",fontsize = 65, color='white',y=1.08)
```

Out[10]:
```
Text(0.5,1.08,'Top10 players by wage')
```



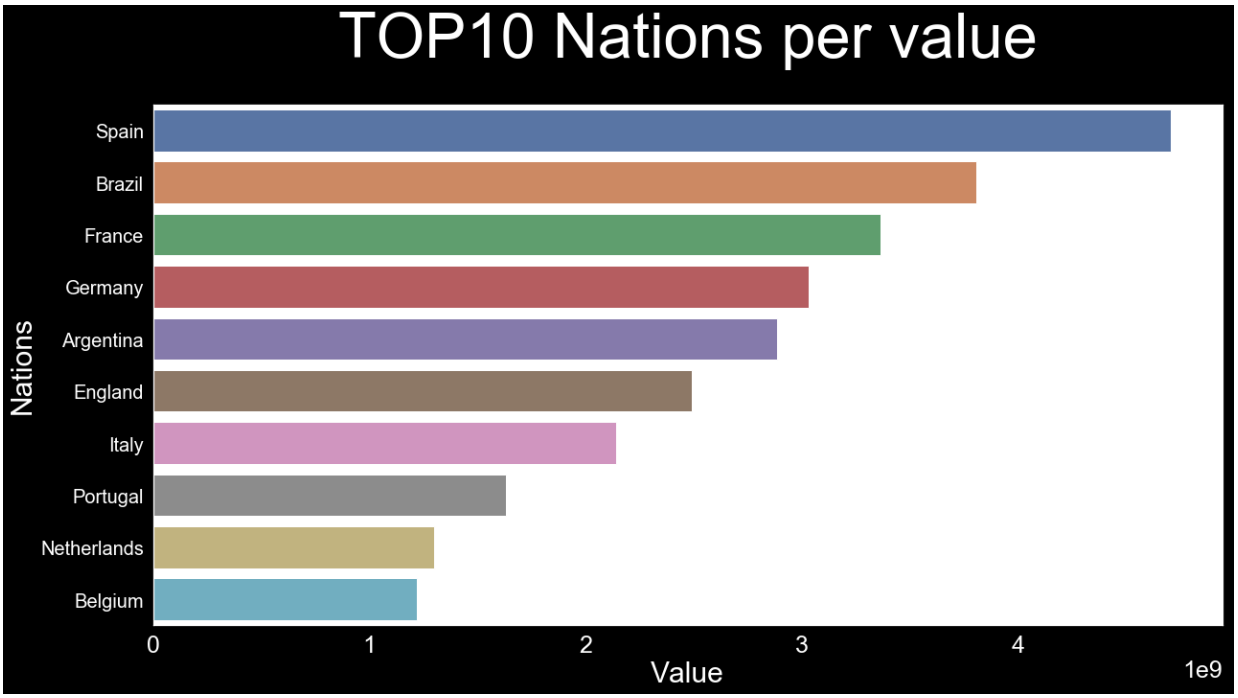
Top10 nations per value

In [11]:
```
top10nations= df.groupby('Nationality').sum().sort_values(by='Value',ascending =F
p = sns.barplot(x= 'Value', y= 'Nationality', data=top10nations)

sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl

p.axes.xaxis.label.set_text("Value")
p.axes.yaxis.label.set_text("Nations")
p.get_legend()
p.set_title("TOP10 Nations per value",fontsize = 65, color='white',y=1.08)
```

Out[11]:
```
Text(0.5,1.08,'TOP10 Nations per value')
```



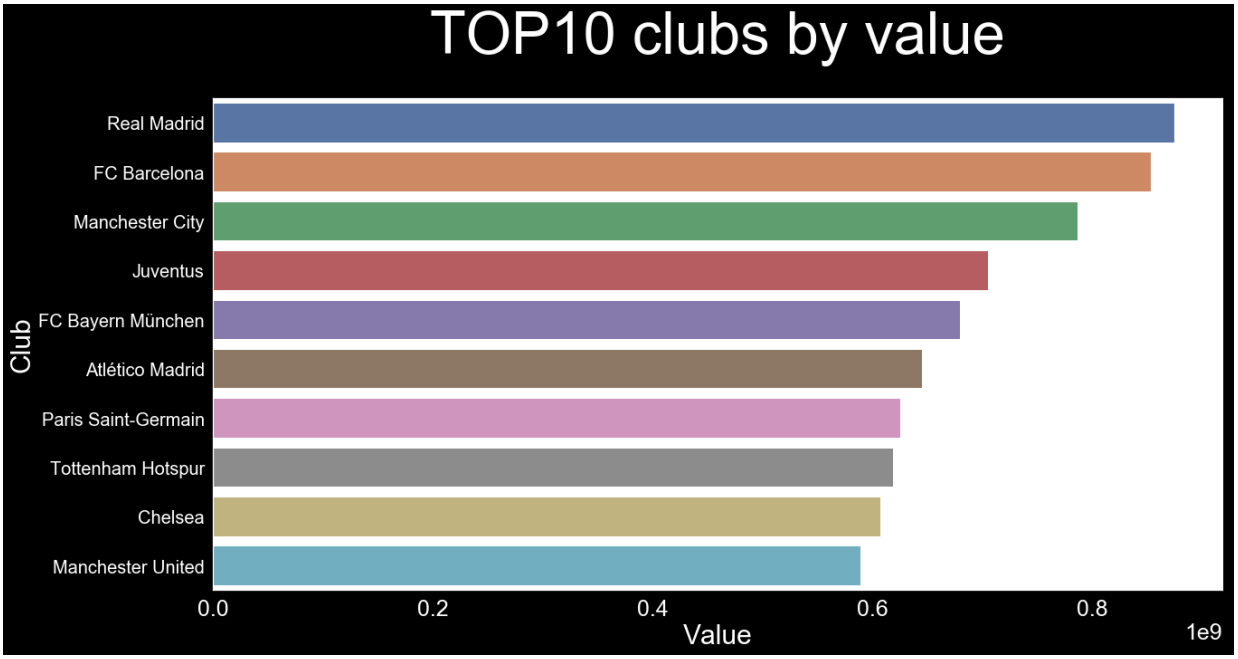
Top10 clubs by value

In [12]:
```
# top10 clubs by value
top10clubs= df.groupby('Club').sum().sort_values(by='Value',ascending =False).hea
p= sns.barplot(x= 'Value', y= 'Club', data=top10clubs)

sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl

p.axes.xaxis.label.set_text("Value")
p.axes.yaxis.label.set_text("Club")
p.get_legend()
p.set_title("TOP10 clubs by value",fontsize = 65, color='white',y=1.08)
```

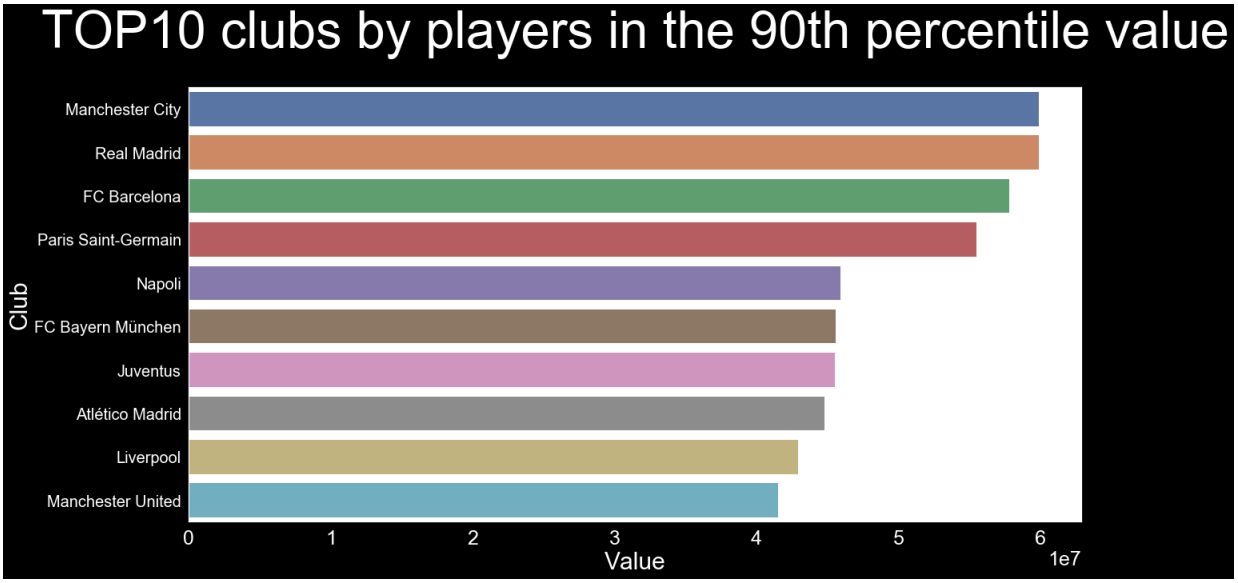
Out[12]:
```
Text(0.5,1.08,'TOP10 clubs by value')
```



Top10 clubs by players in the 90th percentile value

In [13]:
```
topclubs = df.groupby('Club')['Value'].apply(lambda g: g.quantile(.9)).sort_value
p = sns.barplot(x= 'Value', y= 'Club', data=topclubs)
sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl
p.axes.xaxis.label.set_text("Value")
p.axes.yaxis.label.set_text("Club")
p.get_legend()
p.set_title("TOP10 clubs by players in the 90th percentile value",fontsize = 65,
```

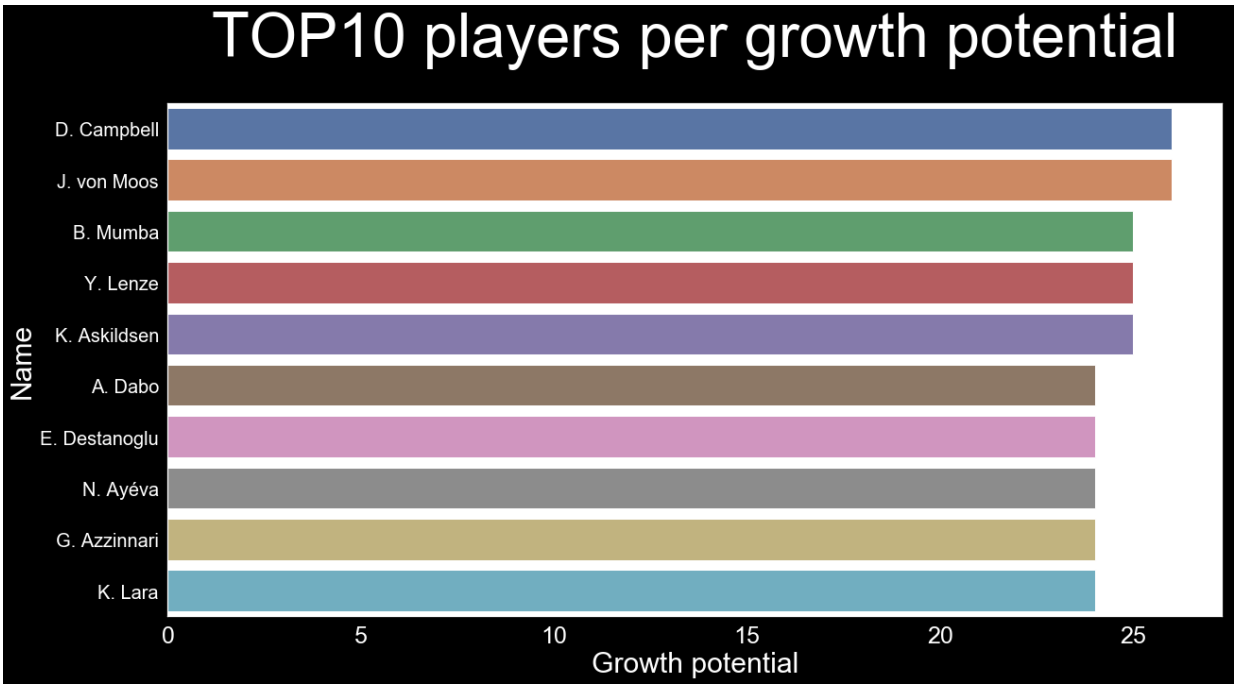
Out[13]:
```
Text(0.5,1.08,'TOP10 clubs by players in the 90th percentile value')
```



Top10 players per growth potential

In [14]:
```
df['Growth Potential'] = abs(df['Potential']-df['Overall'])
toppot = df[['Name','Growth Potential']].sort_values(by='Growth Potential', ascen
p= sns.barplot(x= 'Growth Potential', y= 'Name', data=toppot)
sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl
p.axes.xaxis.label.set_text("Growth potential")
p.axes.yaxis.label.set_text("Name")
p.get_legend()
p.set_title("TOP10 players per growth potential",fontsize = 65, color='white',y=1
```

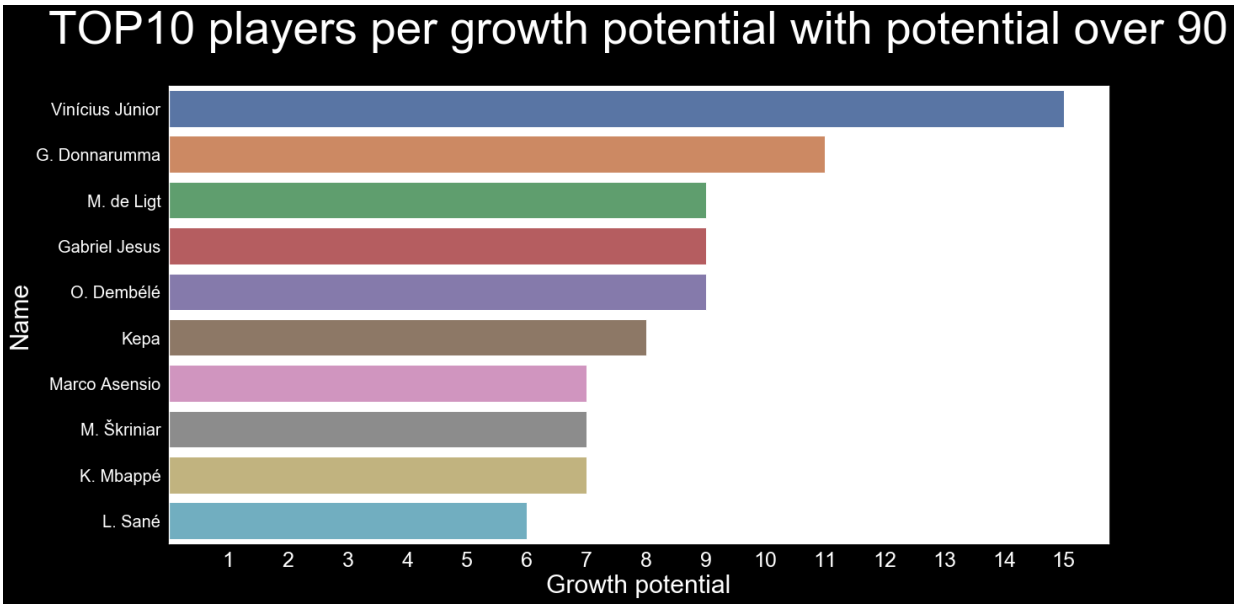
Out[14]:
```
Text(0.5,1.08,'TOP10 players per growth potential')
```



Top10 players per growth potential with potential over 90

In [15]:
```
toppot_2 = df[df['Potential']>90]
toppot_2 = toppot_2[['Name','Growth Potential']].sort_values(by='Growth Potential
p = sns.barplot(x= 'Growth Potential', y= 'Name', data=toppot_2)
sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl
p.set_xticks(np.arange(1,toppot_2['Growth Potential'].max()+1,1))
p.axes.xaxis.label.set_text("Growth potential")
p.axes.yaxis.label.set_text("Name")
p.get_legend()
p.set_title("TOP10 players per growth potential with potential over 90",fontsize
```

Out[15]:
```
Text(0.5,1.08,'TOP10 players per growth potential with potential over 90')
```

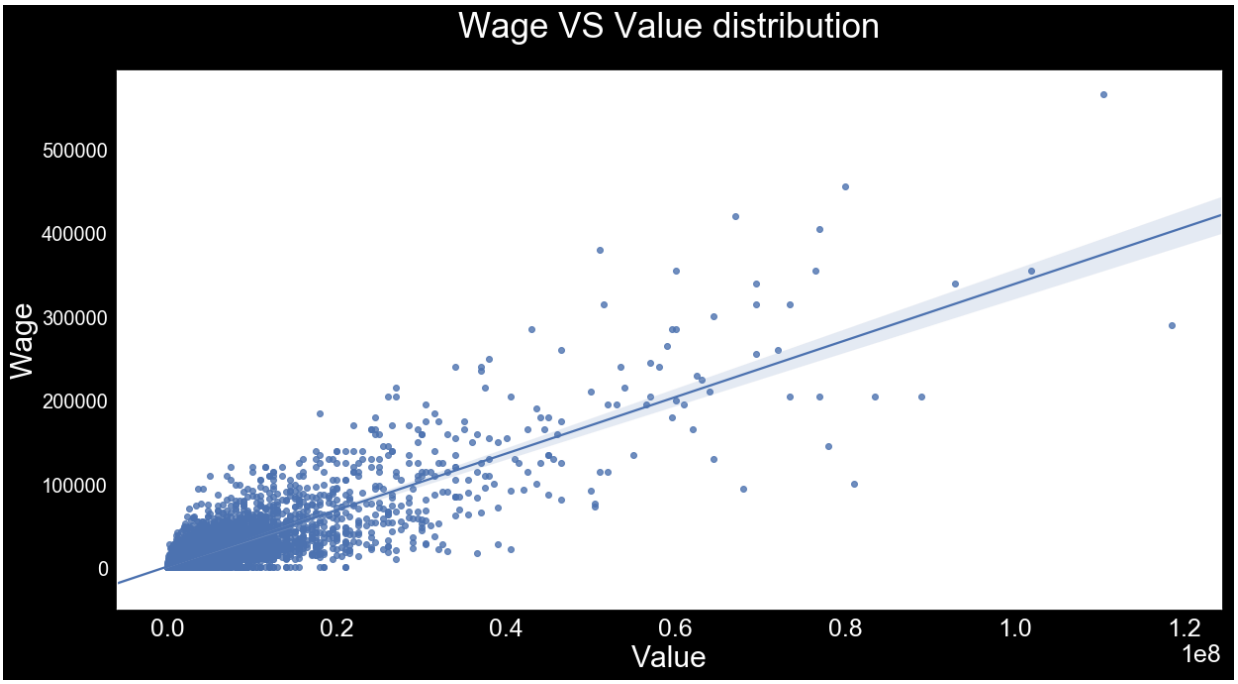


In [16]:
```
df = pickle.load(open("df.pickle", "rb"))
```

Player's Wage VS Value

In [17]:
```
v = sns.regplot('Value', 'Wage', data= df)
sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl
v.axes.xaxis.label.set_text("Value")
v.axes.yaxis.label.set_text("Wage")
v.get_legend()
v.set_title("Wage VS Value distribution",fontsize = 35, color='white',y=1.05)
```

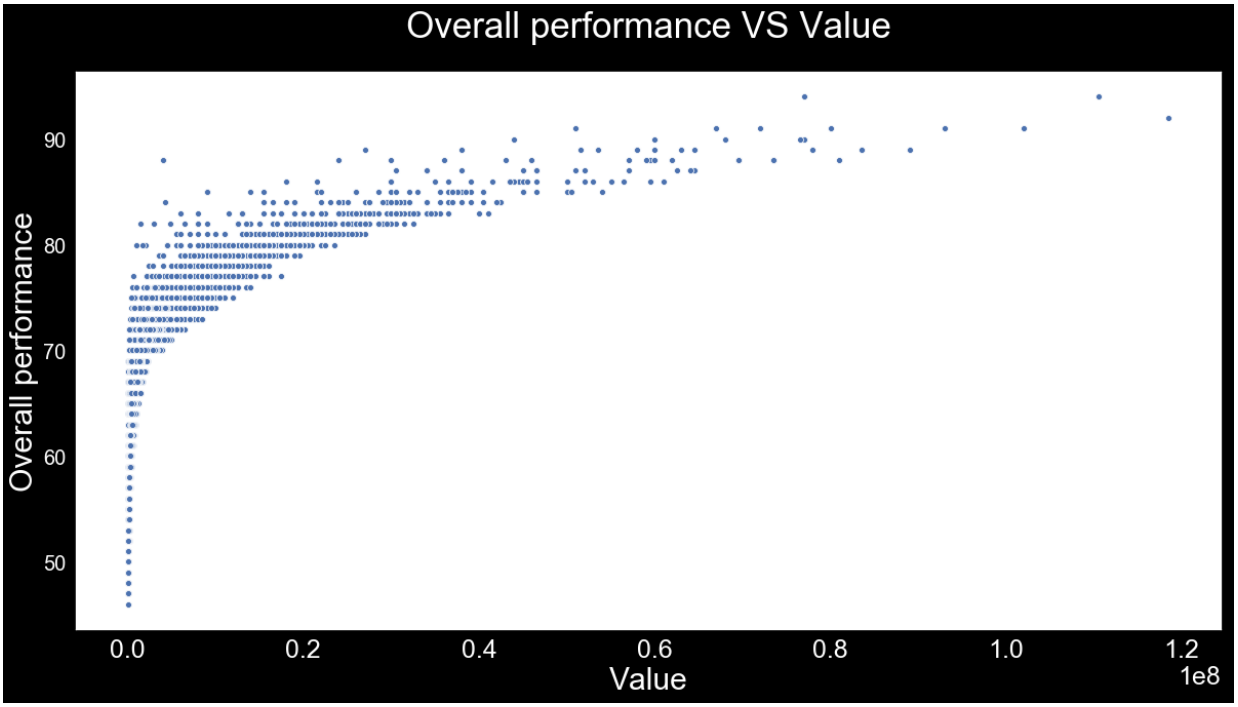
Out[17]:
```
Text(0.5,1.05,'Wage VS Value distribution')
```



Overall performance VS Value

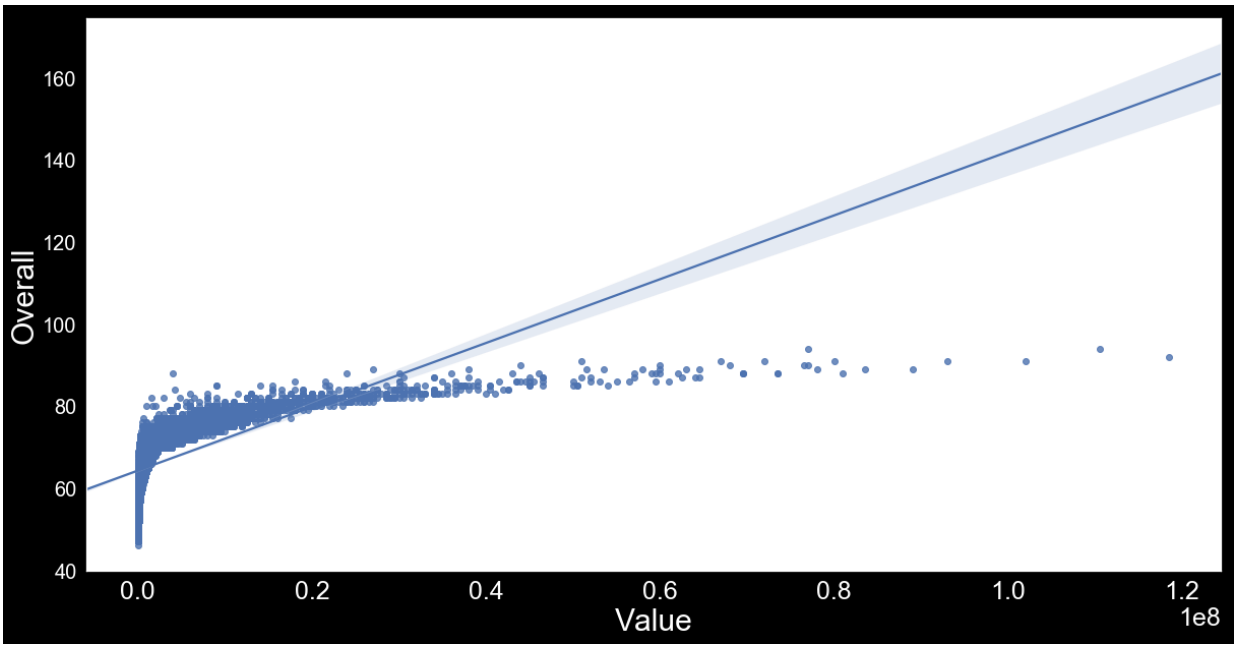
In [18]:
```
x = sns.scatterplot('Value', 'Overall', data= df)
sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl
x.axes.xaxis.label.set_text("Value")
x.axes.yaxis.label.set_text("Overall performance")
x.get_legend()
x.set_title("Overall performance VS Value",fontsize = 35, color='white',y=1.05)
```

Out[18]:
```
Text(0.5,1.05,'Overall performance VS Value')
```



In [19]:
```
sns.regplot('Value', 'Overall', data= df)
```

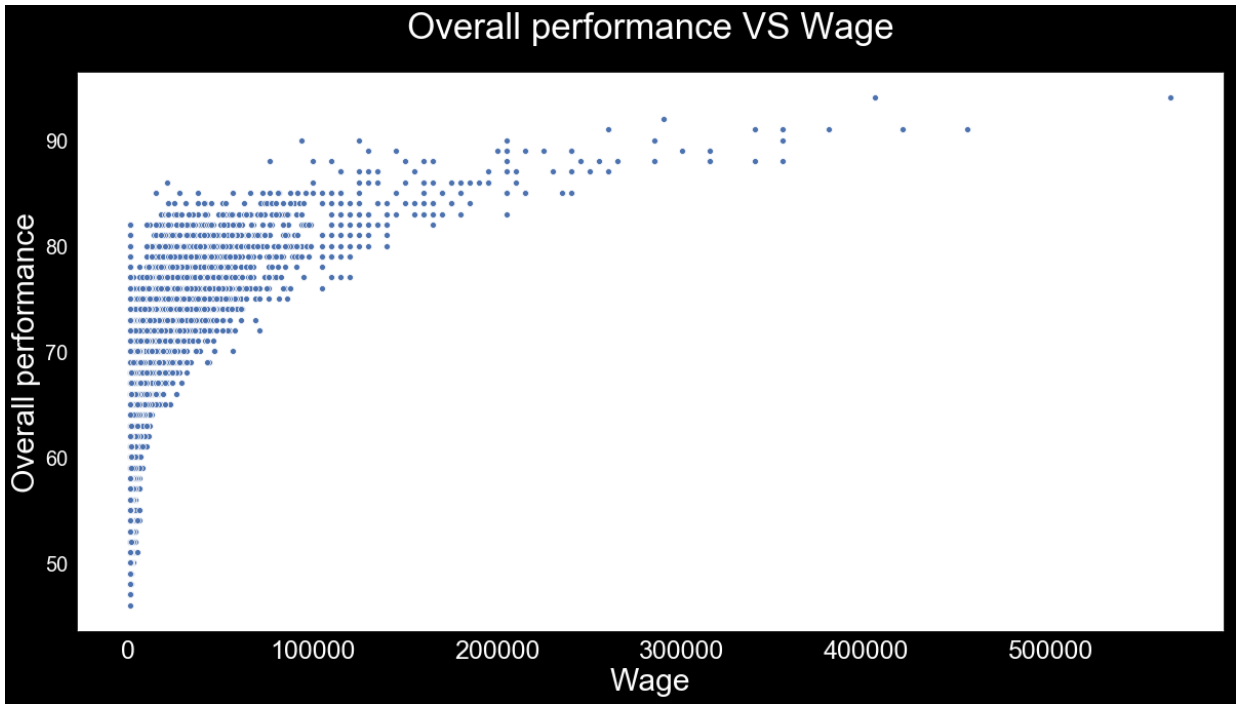
Out[19]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x25c2a2ea278>
```



Overall performance VS Wage

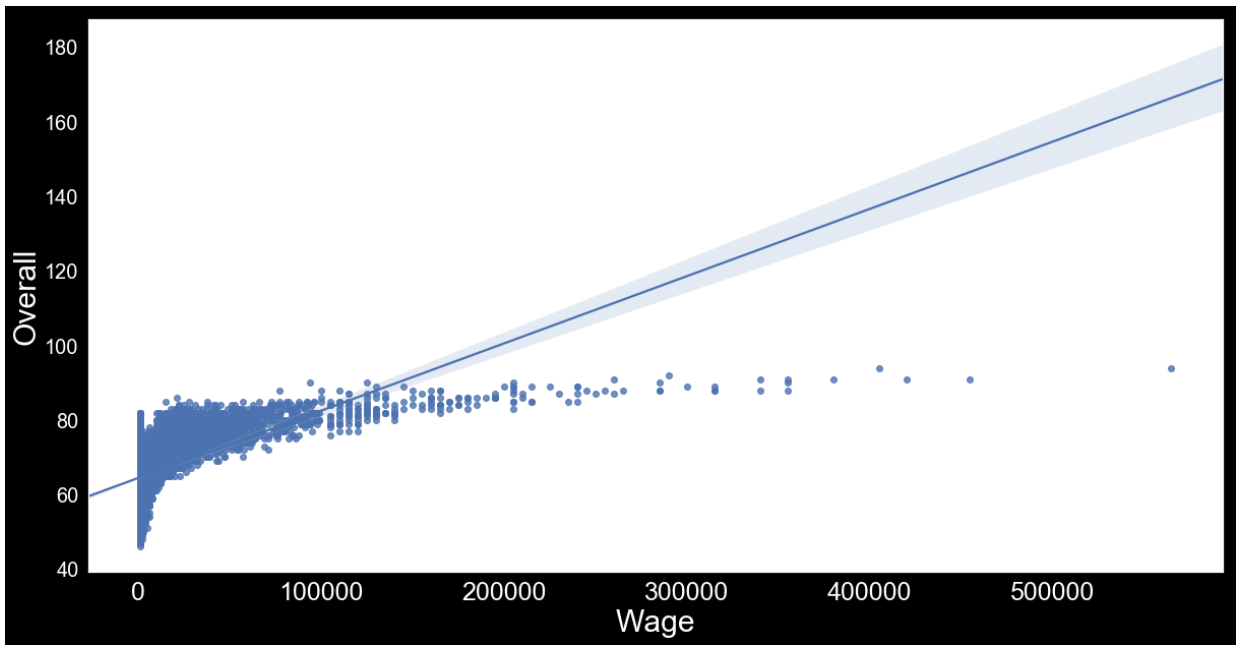
In [20]:
```
z = sns.scatterplot('Wage', 'Overall', data= df)
sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl
z.axes.xaxis.label.set_text("Wage")
z.axes.yaxis.label.set_text("Overall performance")
z.get_legend()
z.set_title("Overall performance VS Wage",fontsize = 35, color='white',y=1.05)
```

Out[20]:
```
Text(0.5,1.05,'Overall performance VS Wage')
```



In [21]:
```
sns.regplot('Wage', 'Overall', data= df)
```

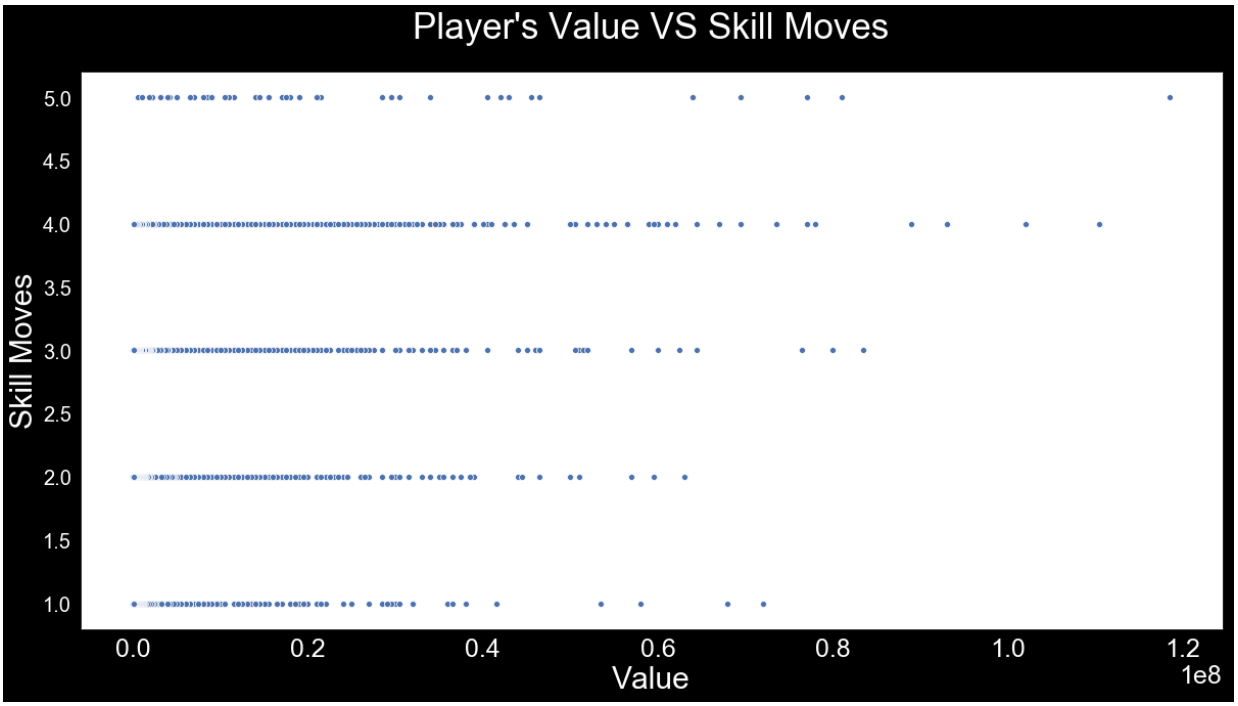
Out[21]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x25c29b02fd0>
```



Player's Value VS Skill Moves

In [22]:
```
a = sns.scatterplot('Value', 'Skill Moves', data= df)
sns.set(rc={"font.style":"normal","axes.facecolor":"white","figure.facecolor":"bl
a.axes.xaxis.label.set_text("Value")
a.axes.yaxis.label.set_text("Skill Moves")
a.get_legend()
a.set_title("Player's Value VS Skill Moves",fontsize = 35, color='white',y=1.05)
```

Out[22]:
```
Text(0.5,1.05,"Player's Value VS Skill Moves")
```



Matrix Correlation

In [23]:
```
data = df[['Value','Wage','Overall','Potential','Skill Moves','Age']]
corr = data.corr()
ax = sns.heatmap(
    corr,
    vmin=-1, vmax=1, center=0,
    cmap=sns.diverging_palette(20, 220, n=200),
    square=True,
    annot=True
)
ax.set_xticklabels(
    ax.get_xticklabels(),
    rotation=45,
    horizontalalignment='right'
);

sns.set(rc={"font.style":"normal",
            "axes.facecolor":"black",
            "figure.facecolor":"black",
            "text.color":"white",
            "xtick.color":"white",
            "ytick.color":"white",
            "axes.labelcolor":"white",
            "axes.grid":True,
            'axes.labelsize':35,
            'figure.figsize':(20.0, 11.0),
            'xtick.labelsize':24,
            'ytick.labelsize':24,
            })

plt.suptitle("Matrix correlation",fontsize = 35, color='white',y=1.05)
```

Out[23]:
```
Text(0.5,1.05,'Matrix correlation')
```

Regression Analysis - Value vs. Overall performance, Wage, Potential, Skill moves, and Age

In [24]:
```
# Regression value(dependent var.), overall performance, wage, potential, skill m
df = df.fillna(0)
x = np.array(df[['Overall','Wage','Potential','Skill Moves', 'Age']])
y = np.array(df['Value'])
model = LinearRegression().fit(x, y)
r_sq = model.score(x, y)
print('coefficient of determination:', r_sq)
print('intercept:', model.intercept_)
print('slope:', model.coef_)
y_pred = model.predict(x)
print('predicted response:', y_pred, sep='\n')
y_pred = model.intercept_ + np.sum(model.coef_ * x, axis=1)
print('predicted response:', y_pred, sep='\n')
print ('median diff Value:',(y_pred-df['Value']).median())
print ('median diff Overall:',(y_pred-df['Overall']).median())
```

```
coefficient of determination: 0.7836334584782609
intercept: -9723019.622792415
slope: [ 2.36218320e+05  1.82036365e+02 -9.50909932e+03  1.01320772e+05
 -1.92860539e+05]
predicted response:
[ 1.08864800e+08  7.94545811e+07  5.94074954e+07 ... -1.95895894e+06
 -2.14231038e+06 -2.18566816e+06]
predicted response:
[ 1.08864800e+08  7.94545811e+07  5.94074954e+07 ... -1.95895894e+06
 -2.14231038e+06 -2.18566816e+06]
median diff Value: 96146.89623352326
median diff Overall: 1179331.1768911183
```