In [1]:
```
#Import necessary programs
import os
import sys

import pandas as pd
import numpy as np
import math
import matplotlib.pyplot as plt

import json
import csv

import os,glob

import statsmodels.api as sm
```

The data that is used in this model is from the free data source provided by StatsBomb

In [2]:
```
#Read through all json files in folder and combine them
myList = []
folder_path = r'C:\Users\Yuma\Desktop\Sport Analytics\StatsBomb Data\open-dat
for filename in glob.glob(os.path.join(folder_path,'*.json')):
    with open(filename,'r',encoding='utf-8') as f:
        myList += json.load(f)
print(len(myList))
```

```
1904058
```

In [3]:
```
#Only get shot data from json
shot_data = []
length = len(myList)
for i in range(length):
    if myList[i]["type"]["name"] == "Shot":
        shot_data.append(myList[i])

print(len(shot_data))
```

```
12826
```

In [4]:
```
print(shot_data[162])
```

{'id': '423171d3-ff73-400c-9ff6-669ccf35f2ac', 'index': 2507, 'period': 2,
'timestamp': '00:16:49.931', 'minute': 61, 'second': 49, 'type': {'id': 16,
'name': 'Shot'}, 'possession': 127, 'possession_team': {'id': 217, 'name':
'Barcelona'}, 'play_pattern': {'id': 4, 'name': 'From Throw In'}, 'team':
{'id': 217, 'name': 'Barcelona'}, 'player': {'id': 5246, 'name': 'Luis Albe
rto Suárez Díaz'}, 'position': {'id': 23, 'name': 'Center Forward'}, 'locat
ion': [115.7, 39.3], 'duration': 1.335006, 'related_events': ['28820abd-b16
0-4729-b2f0-cf7bde32b8c0'], 'shot': {'open_goal': True, 'statsbomb_xg': 0.6
45913, 'end_location': [118.8, 39.7], 'first_time': True, 'outcome': {'id':
101, 'name': 'Wayward'}, 'type': {'id': 87, 'name': 'Open Play'}, 'body_par
t': {'id': 37, 'name': 'Head'}, 'technique': {'id': 95, 'name': 'Volley'},
'freeze_frame': [{'location': [105.0, 40.9], 'player': {'id': 6396, 'name':
'Beñat Etxebarria Urkiaga'}, 'position': {'id': 15, 'name': 'Left Center Mi
dfield'}, 'teammate': False}, {'location': [103.6, 36.0], 'player': {'id':
6775, 'name': 'Daniel García Carrillo'}, 'position': {'id': 13, 'name': 'Ri
ght Center Midfield'}, 'teammate': False}, {'location': [110.0, 51.0], 'pla
yer': {'id': 3023, 'name': 'Yuri Berchiche Izeta'}, 'position': {'id': 21,
'name': 'Left Wing'}, 'teammate': False}, {'location': [108.3, 55.1], 'play
er': {'id': 6789, 'name': 'Mikel Balenziaga Oruesagasti'}, 'position': {'i
d': 6, 'name': 'Left Back'}, 'teammate': False}, {'location': [107.0, 26.
0], 'player': {'id': 6390, 'name': 'Markel Susaeta Laskurain'}, 'position':
{'id': 17, 'name': 'Right Wing'}, 'teammate': False}, {'location': [119.6,
36.3], 'player': {'id': 11748, 'name': 'Unai Simón Mendibil'}, 'position':
{'id': 1, 'name': 'Goalkeeper'}, 'teammate': False}, {'location': [114.3, 4
0.1], 'player': {'id': 11744, 'name': 'Peru Nolaskoain Esnal'}, 'position':
{'id': 5, 'name': 'Left Center Back'}, 'teammate': False}, {'location': [11
2.2, 32.1], 'player': {'id': 6877, 'name': 'Yeray Álvarez López'}, 'positio
n': {'id': 3, 'name': 'Right Center Back'}, 'teammate': False}, {'locatio
n': [113.8, 30.8], 'player': {'id': 6649, 'name': 'Óscar de Marcos Arana'},
'position': {'id': 2, 'name': 'Right Back'}, 'teammate': False}, {'locatio
n': [94.7, 32.9], 'player': {'id': 5470, 'name': 'Ivan Rakitić'}, 'positio
n': {'id': 15, 'name': 'Left Center Midfield'}, 'teammate': True}, {'locati
on': [106.6, 34.6], 'player': {'id': 5503, 'name': 'Lionel Andrés Messi Cuc
cittini'}, 'position': {'id': 13, 'name': 'Right Center Midfield'}, 'teamma
te': True}, {'location': [107.4, 60.2], 'player': {'id': 5477, 'name': 'Ous
mane Dembélé'}, 'position': {'id': 17, 'name': 'Right Wing'}, 'teammate': T
rue}, {'location': [115.3, 49.2], 'player': {'id': 6374, 'name': 'Nélson Ca
bral Semedo'}, 'position': {'id': 2, 'name': 'Right Back'}, 'teammate': Tru
e}, {'location': [112.1, 37.3], 'player': {'id': 5213, 'name': 'Gerard Piqu
é Bernabéu'}, 'position': {'id': 3, 'name': 'Right Center Back'}, 'teammat
e': True}, {'location': [115.0, 28.5], 'player': {'id': 3501, 'name': 'Phil
ippe Coutinho Correia'}, 'position': {'id': 21, 'name': 'Left Wing'}, 'team
mate': True}, {'location': [95.4, 20.6], 'player': {'id': 5211, 'name': 'Jo
rdi Alba Ramos'}, 'position': {'id': 6, 'name': 'Left Back'}, 'teammate': T
rue}]}}

In [5]:
```
#Display elements of shot data
for i in range(len(shot_data)):
    print(shot_data[i]['shot']['statsbomb_xg'])
```

```
0.35517353
0.2932451
0.074154906
0.05818526
0.017370177
0.092796184
0.645913
0.043115344
0.025119951
0.062046476

0.12498811
0.044921484
0.032342415
0.110647604
0.09387077
0.03721017
0.020380031
0.46143624
0.41998687
```

In [6]:
```
new_shot_data = []
for i in range(len(shot_data)):
    #Get rid of PK shots because we already know PKs have a 0.76 xG
    if 'statsbomb_xg' in shot_data[i]['shot']:
        if not (shot_data[i]['shot'].get('statsbomb_xg') == 0.76):
            Dict = dict({'id': shot_data[i]['id'], 'play_pattern': shot_data[
                     shot_data[i]['location'], 'statsbomb_xg': shot_data[i]['
                     shot_data[i]['shot']['end_location'], 'body_part': shot_
                     'technique': shot_data[i]['shot']['technique']['name'],
                     shot_data[i]['shot']['outcome']['name'], 'under_pressure
            if 'under_pressure' in shot_data[i].keys():
                Dict.update(under_pressure = shot_data[i]['under_pressure'])
            if 'first_time' in shot_data[i]['shot'].keys():
                Dict.update(first_time = shot_data[i]['shot']['first_time'])
            new_shot_data.append(Dict)

print(len(new_shot_data))
```

```
12610
```

In [7]:
```
print(new_shot_data[174])
```

```
{'id': 'ceec9e87-df47-4b25-a784-3b4b41606599', 'play_pattern': 'From Corne
r', 'location': [119.1, 42.6], 'statsbomb_xg': 0.90241957, 'end_location':
[120.0, 42.9, 0.1], 'body_part': 'Right Foot', 'technique': 'Normal', 'outc
ome': 'Goal', 'under_pressure': False, 'first_time': True}
```

In [8]:
```
for i in range(len(new_shot_data)):
    print(new_shot_data[i]['location'])
#print(new_shot_data[130]['location'])
```

```
[111.7, 51.7]
[114.0, 27.0]
[92.0, 34.5]
[109.1, 38.7]
[107.0, 25.0]
[108.1, 27.4]
[112.0, 43.7]
[97.0, 54.0]
[112.3, 41.4]
[102.5, 29.2]
[109.3, 29.7]
[106.5, 33.5]
[116.9, 31.2]
[106.0, 23.0]
[111.1, 24.1]
[94.4, 24.5]
[107.4, 25.9]
[100.1, 58.1]
[100.2, 27.7]
```

In [9]:
```
print(new_shot_data[0]['location'])
```

```
[111.7, 51.7]
```

In [10]:
```
#Calculate 'distance' data from 'location' data
distance = []
goal = [120,40]
for i in range(len(new_shot_data)):
    point = new_shot_data[i]['location']
    calculation = math.sqrt(((point[0]-goal[0])**2) + ((point[1]-goal[1])**2)
    distance.append(calculation)

print(distance[10000])
```

```
11.36353818139403
```

In [11]:

```
#Calculate 'angle' data from 'location' data
angle = []
pen_vect_pt = [12,0]
for i in range(len(new_shot_data)):
    shot_vector = [120-new_shot_data[i]['location'][0],abs(40-new_shot_data[i
    unit_vector_1 = pen_vect_pt / np.linalg.norm(pen_vect_pt)
    unit_vector_2 = shot_vector / np.linalg.norm(shot_vector)
    dot_product = np.dot(unit_vector_1, unit_vector_2)
    current_angle = math.degrees(np.arccos(dot_product))
    angle.append(current_angle)

print(angle)
```

```
[54.64804531609818, 65.22485943116808, 11.113040535948294, 6.80131482398
1564, 49.08561677997488, 46.63657704161671, 24.820541335489118, 31.32869
2867804165, 10.304846468766009, 31.680513712958646, 43.9087837747374, 2
5.709953780811272, 70.59402924599885, 50.527540151656176, 60.76214776397
254, 31.193595102442714, 48.21548399174822, 42.28801653255506, 31.849051
31905529, 12.045632385265794, 27.057552910841316, 5.111893990013171, 42.
247514599731296, 44.56263613247929, 53.44036527550666, 30.8505239136548
1, 23.694216382171234, 34.01934998982646, 86.47854662307778, 50.16224027
094536, 19.430335187247493, 22.048829574925662, 14.406685156436867, 50.8
5601358542897, 29.97289058597137, 49.236394799058836, 4.43266846868991,
51.556946498163384, 57.79587107933758, 49.67416371113079, 23.67863263321
3386, 9.090276920822351, 25.324181401947186, 41.84515713520801, 24.11101
950255092, 36.86989764584398, 41.05481377096251, 50.84892164592895, 14.9
54646765153033, 47.617413363264426, 29.054604099077164, 9.86580694308436
5, 0.9669255716442647, 75.84658741214857, 36.006207601244455, 10.6387666
09506805, 12.587693381648801, 61.76808174133644, 74.19748604606447, 67.5
4306100005792, 39.50767544287257, 34.33021719550333, 58.53049310232291,
7.507346666949624, 75.37912601136831, 12.787972654802287, 45.75716886505
853, 58.33924890336339, 59.52014901853704, 31.60750224624893, 20.7990284
```

In [12]:

```
#Create a different json for the linear regression model
# 0 means false, 1 meeans true
new_shot_data_2 = []
for i in range(len(new_shot_data)):
    Dict_2 = dict({'id': new_shot_data[i]['id'] , 'location': new_shot_data[i
                   'angle': angle[i], 'isFoot': 0, 'isHead': 0, 'isVolley': 0
                   'isCorner': 0, 'isRegularPlay': 0, 'isFreeKick': 0, 'isThr
                   'fromGK': 0, 'first_time': 0, 'under_pressure': 0, 'isGoal
                   'statsbomb_xg': new_shot_data[i]['statsbomb_xg']})

    if new_shot_data[i]['body_part'] == 'Right Foot':
        Dict_2.update(isFoot = 1)
    elif new_shot_data[i]['body_part'] == 'Left Foot':
        Dict_2.update(isFoot = 1)
    else:
        Dict_2.update(isFoot = 0)

    if new_shot_data[i]['body_part'] == 'Head':
        Dict_2.update(isHead = 1)
    else:
        Dict_2.update(isHead = 0)

    if new_shot_data[i]['technique'] == 'Half Volley':
        Dict_2.update(isVolley = 1)
    elif new_shot_data[i]['technique'] == 'Volley':
        Dict_2.update(isVolley = 1)
    else:
        Dict_2.update(isVolley = 0)

    if new_shot_data[i]['technique'] == 'Normal':
        Dict_2.update(isNormalShot = 1)
    else:
        Dict_2.update(isNormalShot = 0)

    if new_shot_data[i]['technique'] == 'Lob':
        Dict_2.update(isLobShot = 1)
    else:
        Dict_2.update(isLobShot = 0)

    if new_shot_data[i]['play_pattern'] == 'From Corner':
        Dict_2.update(isCorner = 1)
    else:
        Dict_2.update(isCorner = 0)

    if new_shot_data[i]['play_pattern'] == 'Regular Play':
        Dict_2.update(isRegularPlay = 1)

    if new_shot_data[i]['play_pattern'] == 'From Free Kick':
        Dict_2.update(isFreeKick = 1)
    else:
        Dict_2.update(isFreeKick = 0)

    if new_shot_data[i]['play_pattern'] == 'From Throw In':
        Dict_2.update(isThrowIn = 1)
    else:
        Dict_2.update(isThrowIn = 0)
```

```
    if new_shot_data[i]['play_pattern'] == 'From Counter':
        Dict_2.update(isCounter = 1)
    else:
        Dict_2.update(isCounter = 0)

    if new_shot_data[i]['play_pattern'] == 'From Keeper':
        Dict_2.update(fromKeeper = 1)
    else:
        Dict_2.update(fromKeeper = 0)

    if new_shot_data[i]['play_pattern'] == 'From Goal Kick':
        Dict_2.update(fromGK = 1)
    else:
        Dict_2.update(fromGK = 0)

    if new_shot_data[i]['under_pressure'] == True:
        Dict_2.update(under_pressure = 1)
    else:
        Dict_2.update(under_pressure = 0)

    if new_shot_data[i]['first_time'] == True:
        Dict_2.update(first_time = 1)
    else:
        Dict_2.update(first_time = 0)

    if new_shot_data[i]['outcome'] == 'Goal':
        Dict_2.update(isGoal = 1)
    else:
        Dict_2.update(isGoal = 0)

    new_shot_data_2.append(Dict_2)


print(new_shot_data_2[10000])
```

```
{'id': 'dbf2d5a1-1817-4fb4-8a79-381e9de3bac0', 'location': [108.7, 38.8],
'distance': 11.36353818139403, 'angle': 6.061788788728689, 'isFoot': 1, 'is
Head': 0, 'isVolley': 0, 'isNormalShot': 1, 'isLobShot': 0, 'isCorner': 0,
'isRegularPlay': 0, 'isFreeKick': 0, 'isThrowIn': 1, 'isCounter': 0, 'fromK
eeper': 0, 'fromGK': 0, 'first_time': 0, 'under_pressure': 1, 'isGoal': 0,
'statsbomb_xg': 0.14499828}
```

In [13]:

```
#Save data as a csv file so we don't have to parse through original data over
headers = ['id', 'location', 'distance', 'angle', 'isFoot', 'isHead', 'isVoll
           'isRegularPlay', 'isFreeKick', 'isThrowIn', 'isCounter', 'fromKeep
          'isGoal', 'statsbomb_xg']

filename = "shot_data.csv"

with open(filename, 'w') as csvfile:
    writer = csv.DictWriter(csvfile, fieldnames = headers)
    writer.writeheader()
    writer.writerows(new_shot_data_2)
```

In [14]:
```
#Read json through pandas dataframe
df = pd.DataFrame(new_shot_data_2, columns=['id','location','distance', 'angl
                                            'isLobShot', 'isCorner','isRegula
                                            'fromKeeper', 'fromGK','first_tim

print(df)
```

```
                                      id       location   distance  \
0      65f16e50-7c5d-4293-b2fc-d20887a772f9  [111.7, 51.7]  14.345034
1      b0f73423-3990-45ae-9dda-3512c2d1aff3  [114.0, 27.0]  14.317821
2      13b1ddab-d22e-43d9-bfe4-12632fea1a27   [92.0, 34.5]  28.535066
3      391bfb74-07a6-4afe-9568-02a9b23f5bd4  [109.1, 38.7]  10.977249
4      5e55f5a5-954f-4cc4-ba6e-a9cf6d6e249e  [107.0, 25.0]  19.849433
...                                     ...           ...        ...
12605  c0090be3-7f39-4653-b535-dbaa01b5639a  [100.5, 39.8]  19.501026
12606  786c2e5c-7a14-407c-81cb-16bf3e4ec34b   [91.8, 53.6]  31.308146
12607  31b998c0-f889-43ee-a215-0f1e1273c76b  [103.1, 47.2]  18.369812
12608  a586c569-474f-4c70-a7de-0364824de189  [104.8, 51.7]  19.181502
12609  b642d77d-582e-4ebb-849e-44202b65df1a  [106.9, 60.1]  23.992082

           angle  isFoot  isHead  isVolley  isNormalShot  isLobShot  isCorn
er  \
0      54.648045       1       0         1             0          0
0
1      65.224859       1       0         1             0          0
0
2      11.113041       1       0         0             1          0
0
3       6.801315       0       1         0             1          0
0
4      49.085617       1       0         0             1          0
1
...          ...     ...     ...       ...           ...        ...
...
12605   0.587628       1       0         1             0          0
1
12606  25.746596       1       0         0             1          0
1
12607  23.075726       1       0         0             1          0
0
12608  37.586804       1       0         0             1          0
0
12609  56.906052       1       0         1             0          0
0

       isRegularPlay  isFreeKick  isThrowIn  isCounter  fromKeeper  fromGK
\
0                  1           0          0          0           0       0
1                  1           0          0          0           0       0
2                  0           0          0          0           1       0
3                  1           0          0          0           0       0
4                  0           0          0          0           0       0
...              ...         ...        ...        ...         ...     ...
12605              0           0          0          0           0       0
12606              0           0          0          0           0       0
12607              1           0          0          0           0       0
```

```
12608              1           0          0          0          0       0
12609              0           1          0          0          0       0

       first_time  under_pressure  isGoal  statsbomb_xg
0               1               0       0      0.095480
1               1               0       0      0.047924
2               0               0       0      0.018477
3               0               1       0      0.137954
4               0               0       0      0.036229
...           ...             ...     ...           ...
12605           1               0       0      0.038873
12606           0               1       0      0.017531
12607           1               0       0      0.079473
12608           0               0       0      0.145874
12609           0               0       0      0.020496

[12610 rows x 20 columns]
```

In [15]:
```
#Eliminate duplicate data
df.drop_duplicates(subset = 'id', keep = False, inplace = True)
print(len(df))
```

```
12610
```

In [16]:
```
print(df[['isFoot', 'isVolley']])
```

```
       isFoot  isVolley
0           1         1
1           1         1
2           1         0
3           0         0
4           1         0
...       ...       ...
12605       1         1
12606       1         0
12607       1         0
12608       1         0
12609       1         1

[12610 rows x 2 columns]
```

In [17]:
```
#Logistic Regression Calculation
#Got rid of 'isNormalShot', 'isCounter', 'fromKeeper', 'fromGK' because the p
x = df[['distance', 'angle', 'isHead', 'isVolley', 'isLobShot', 'isNormalShot
        'under_pressure', 'first_time']]
y = df['isGoal']

model = sm.Logit(y,x).fit()
predictions = model.predict(x)
print(model.summary2())
```

```
Optimization terminated successfully.
         Current function value: 0.310837
         Iterations 7
                          Results: Logit
=================================================================
Model:              Logit            Pseudo R-squared: 0.163
Dependent Variable: isGoal           AIC:              7859.3028
Date:               2020-09-02 12:13 BIC:              7933.7252
No. Observations:   12610            Log-Likelihood:   -3919.7
Df Model:           9                LL-Null:          -4682.0
Df Residuals:       12600            LLR p-value:      0.0000
Converged:          1.0000           Scale:            1.0000
No. Iterations:     7.0000
-----------------------------------------------------------------
                Coef.  Std.Err.    z     P>|z|   [0.025  0.975]
-----------------------------------------------------------------
distance        -0.1640   0.0052 -31.4653 0.0000 -0.1742 -0.1538
angle           -0.0129   0.0015  -8.7771 0.0000 -0.0158 -0.0100
isHead          -1.3571   0.1068 -12.7052 0.0000 -1.5665 -1.1478
```

The next two sets of code are taken from Peter McKeever's Expected Goals Model program. It can be found here: http://petermckeever.com/2019/01/building-an-expected-goals-model-in-python/ (http://petermckeever.com/2019/01/building-an-expected-goals-model-in-python/)

In [18]:
```
#Split and randomise our data into training and testing sets and see how accu
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split

log_r = LogisticRegression()

x_train, x_test, y_train, y_test = train_test_split(x,y, test_size = 0.3, ran

log_r.fit(x_train, y_train)
print("Log Regression test set accuracy {:.3f}".format(log_r.score(x_test,y_t
```

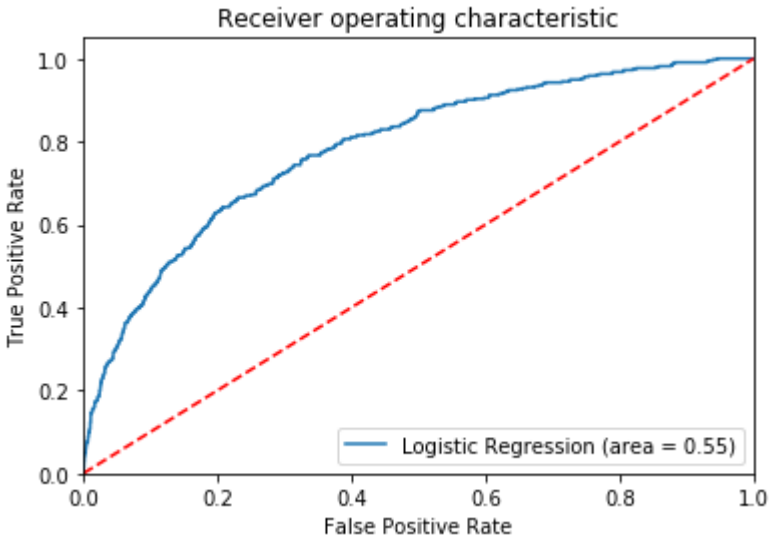
```
Log Regression test set accuracy 0.889

C:\Users\Yuma\Anaconda3\lib\site-packages\sklearn\linear_model\logistic.py:
432: FutureWarning: Default solver will be changed to 'lbfgs' in 0.22. Spec
ify a solver to silence this warning.
  FutureWarning)
```

In [19]:
```
prediction = log_r.predict(x_test)

from sklearn.metrics import confusion_matrix
confusion_matrix = confusion_matrix(y_test, prediction)
print(confusion_matrix)
```

```
[[3319   31]
 [ 390   43]]
```

The below program comes from Susan Li's article on "Building A Logistic Regression in Python, Step by Step" and can be found here: [https://towardsdatascience.com/building-a-logistic-regression-in-python-step-by-step-becd4d56c9c8 (https://towardsdatascience.com/building-a-logistic-regression-in-python-step-by-step-becd4d56c9c8)](https://towardsdatascience.com/building-a-logistic-regression-in-python-step-by-step-becd4d56c9c8)

In [20]:
```
#Draw a ROC curve to better understand our logistic regression model
from sklearn.metrics import roc_auc_score
from sklearn.metrics import roc_curve

logit_roc_auc = roc_auc_score(y_test, log_r.predict(x_test))
fpr, tpr, thresholds = roc_curve(y_test, log_r.predict_proba(x_test)[:,1])
plt.figure()
plt.plot(fpr, tpr, label='Logistic Regression (area = %0.2f)' % logit_roc_auc
plt.plot([0, 1], [0, 1],'r--')
plt.xlim([0.0, 1.0])
plt.ylim([0.0, 1.05])
plt.xlabel('False Positive Rate')
plt.ylabel('True Positive Rate')
plt.title('Receiver operating characteristic')
plt.legend(loc="lower right")
plt.savefig('Log_ROC')
plt.show()
```



In [21]:
```
#Output of xG values
xg_model = log_r.predict_proba(x)
for i in range(len(xg_model)):
    print(xg_model[i][1])
```

```
0.06085157840353018
0.06444000103209123
0.29530300648422597
0.10972257129266423
0.06916560895578812
0.07243000286101878
0.13604853657170463
0.0914299495383149
0.10804098400383186
0.22455177696200465
0.0725760143905931
0.42687777680821876
0.051747318758124536
0.1934598829008563
0.14548176145360356
0.07391687562182615
0.15426284319756012
0.32053178334575116
0.014773122559248454
0.03488243689810308
```

Below is where you can apply the expected goals model to new datasets.

In [22]:
```
#Import dataset and calculate distance and angle
test_df = pd.read_csv(r'C:\Users\Yuma\Desktop\Sport Analytics\xG_Model_Data.c
distance = []
goal = [120,40]
for i in range(len(test_df)):
    point_x = test_df.loc[i]['x_location']
    point_y = test_df.loc[i]['y_location']
    calculation = math.sqrt((point_x-goal[0])**2) + ((point_y-goal[1])**2)
    distance.append(calculation)

angle = []
pen_vect_pt = [12,0]
for i in range(len(test_df)):
    shot_vector = [120-test_df.loc[i]['x_location'],abs(40-test_df.loc[i]['y_
    unit_vector_1 = pen_vect_pt / np.linalg.norm(pen_vect_pt)
    unit_vector_2 = shot_vector / np.linalg.norm(shot_vector)
    dot_product = np.dot(unit_vector_1, unit_vector_2)
    current_angle = math.degrees(np.arccos(dot_product))
    angle.append(current_angle)

test_df['distance'] = distance
test_df['angle'] = angle
print(test_df)
```

```
   x_location  y_location  isHead  isVolley  isLobShot  isNormalShot  \
0       114.0        40.0       0         1          0             0

   isFreeKick  isCorner  under_pressure  first_time  distance  angle
0           0         0               0           0       6.0    0.0
```

In [23]:
```
test_x = test_df[['distance', 'angle', 'isHead', 'isVolley', 'isLobShot', 'is
        'under_pressure', 'first_time']]
test_xG = log_r.predict_proba(test_x)
print("The probability that the shot is a goal is: ")
print(test_xG[0][1])
```

```
The probability that the shot is a goal is:
0.4285524750325052
```