In [44]:
```
import warnings
import numpy as np
import pandas as pd
%matplotlib inline
import matplotlib.pyplot as plt
import matplotlib
from IPython.core.pylabtools import figsize

from sklearn.datasets import fetch_openml
from sklearn.linear_model import LogisticRegression, LinearRegression
from sklearn.model_selection import train_test_split, GridSearchCV, cross_val_score, cr
from sklearn.metrics import confusion_matrix, precision_score, recall_score, f1_score,

df = pd.read_csv('gameInfo.csv', sep=",")
```

Analyzing the Data

Looking over the data to make sure that it is okay

In [2]:
```
df.head()
```

Out[2]:

	teamA_player1	teamA_player2	teamA_player3	teamA_player4	teamA_player5	teamB_player1	teamB
0	201	102	131	121	157	89	
1	120	13	202	75	350	99	
2	102	122	222	110	111	39	
3	18	99	245	17	62	21	
4	102	82	131	89	22	114	

In [3]:
```
print("Dimension of the data: ", df.shape)

no_of_rows = df.shape[0]
no_of_columns = df.shape[1]

print("No. of Rows: %d" % no_of_rows)
print("No. of Columns: %d" % no_of_columns)
```

```
Dimension of the data:  (1074, 11)
No. of Rows: 1074
No. of Columns: 11
```

In [4]:
```
df.describe()
```

Out[4]:

	teamA_player1	teamA_player2	teamA_player3	teamA_player4	teamA_player5	teamB_player1	t
count	1074.000000	1074.000000	1074.000000	1074.000000	1074.000000	1074.000000	
mean	146.498138	163.103352	159.216015	166.610801	164.632216	148.362197	
std	170.340771	180.729421	168.398486	193.529900	177.393723	163.582892	
min	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	
25%	45.000000	50.000000	54.000000	50.000000	53.000000	43.000000	

	teamA_player1	teamA_player2	teamA_player3	teamA_player4	teamA_player5	teamB_player1	t
50%	86.000000	103.000000	101.000000	99.000000	99.000000	89.000000	
75%	163.000000	203.000000	203.000000	203.000000	222.000000	164.000000	
max	876.000000	876.000000	876.000000	876.000000	876.000000	876.000000	

In [6]:
```
X = df.drop(labels='win', axis=1)
y = df['win']

print("Dimension of the Data Matrix X: ", X.shape)
print("No. of Rows: %d" % X.shape[0])
print("No. of Columns: %d" % X.shape[1])

print("Dimension of the 1D Vector y: ", y.shape)
print("No. of Rows: %d" % y.shape[0])
print("No. of Columns: %d" % 1)
```

```
Dimension of the Data Matrix X:  (1074, 10)
No. of Rows: 1074
No. of Columns: 10
Dimension of the 1D Vector y:  (1074,)
No. of Rows: 1074
No. of Columns: 1
```

Training the Model

Splitting the data into a training and test set

In [53]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0
```

In [54]:
```
# Create linear regression object
logisticRegresssion_clf = LogisticRegression()

# Train the model using the traing data and label
logisticRegresssion_clf.fit(X_train, y_train)
```

Out[54]:
```
LogisticRegression()
```

Calculating the ROC Curve

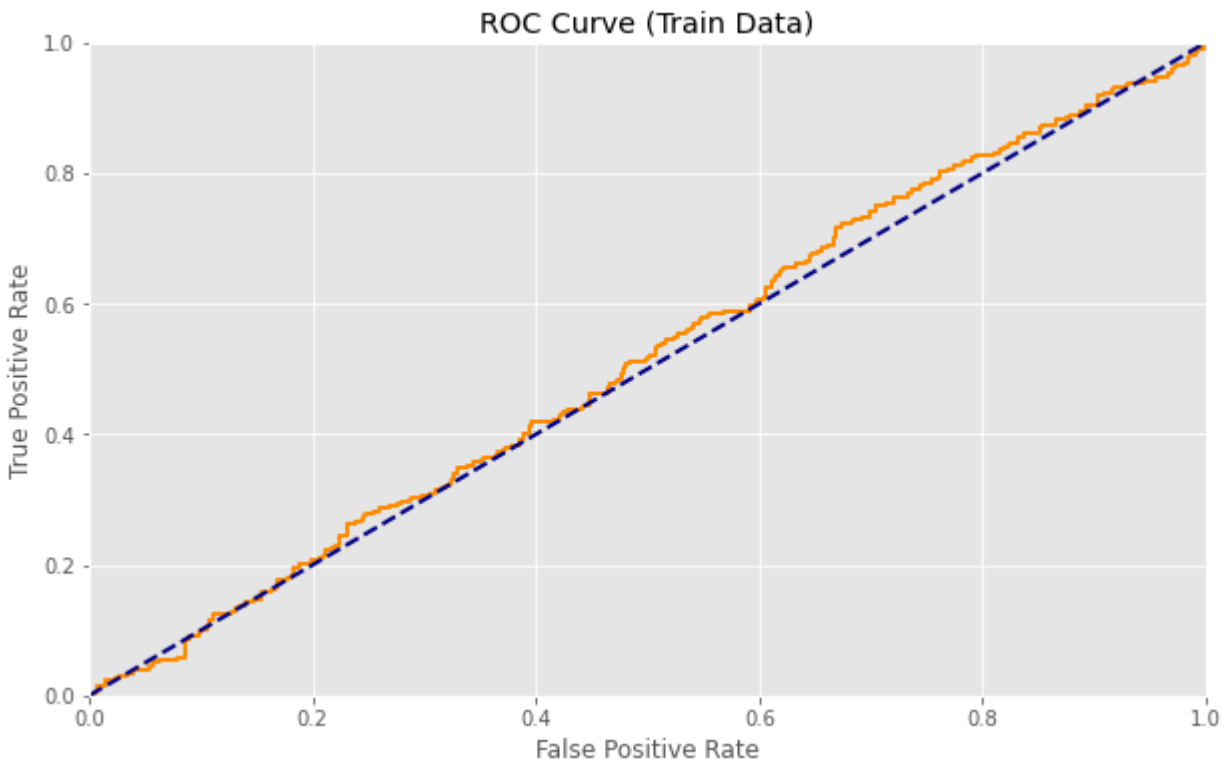
In [55]:
```
y_scores = cross_val_predict(logisticRegresssion_clf, X_train, y_train, method="predict

fpr, tpr, thresholds = roc_curve(y_train, y_scores)
```

In [56]:
```
plt.style.use('ggplot')

fig = plt.figure(figsize=(10, 6))
def plot_roc_curve(fpr, tpr, label=None):
    plt.plot(fpr, tpr, color='darkorange', linewidth=2, label=label)
    plt.plot([0, 1], [0, 1], color='navy', lw=2, linestyle='--')
    plt.axis([0, 1, 0, 1])
    plt.title('ROC Curve (Train Data)')
    plt.xlabel('False Positive Rate')
    plt.ylabel('True Positive Rate')
```

```
plot_roc_curve(fpr, tpr)
plt.show()
```



In [63]:
```
y_scores = cross_val_predict(logisticRegresssion_clf, X_train, y_train, method="predict

fpr, tpr, thresholds = roc_curve(y_train, y_scores)
```

In [65]:
```
precisions, recalls, thresholds = precision_recall_curve(y_train, y_scores)

threshold_optimal = -1
for i in range(len(precisions)):
    if(precisions[i] == recalls[i]):
        threshold_optimal = thresholds[i]

print("Optimal Threshold: ", threshold_optimal)
```

```
Optimal Threshold:  0.7597609156519374
```

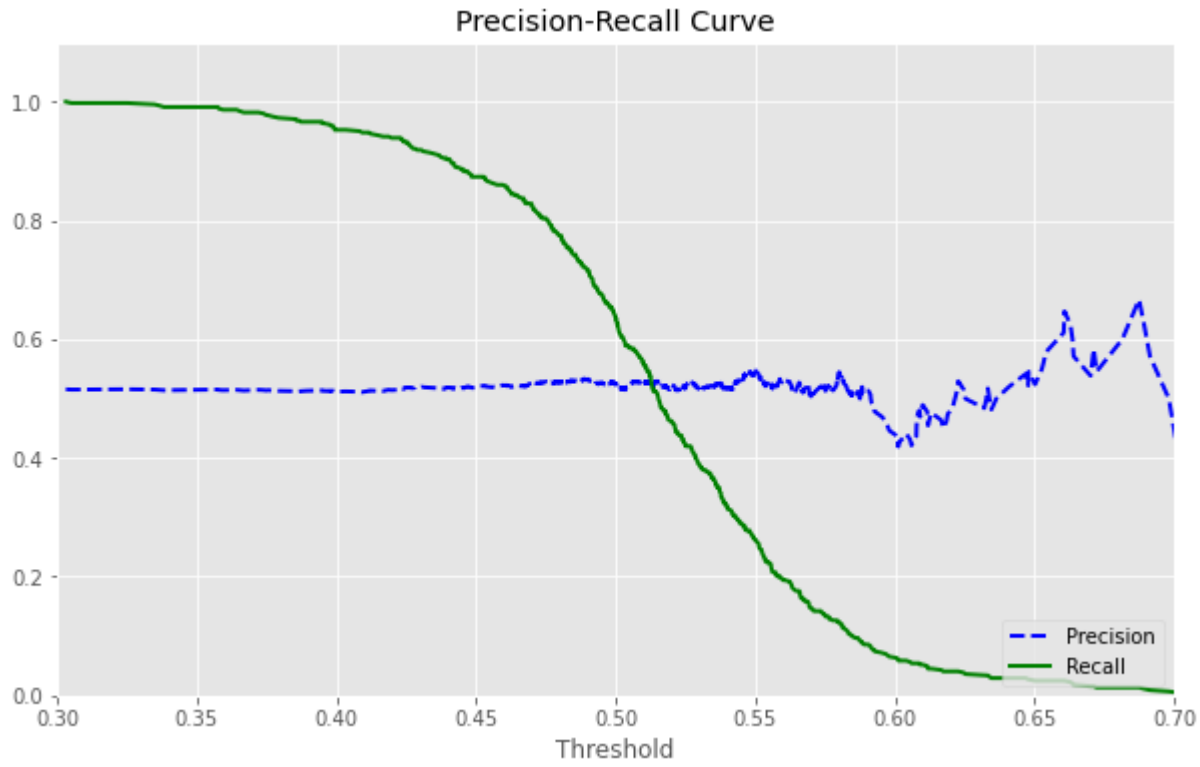
In [13]:
```
roc_auc_score(y_train,y_scores)
```

Out[13]:
```
0.5126595329050182
```

Plotting Precision-Recall Curve

In [67]:
```
fig = plt.figure(figsize=(10, 6))
def plot_precision_recall_vs_threshold(precisions, recalls, thresholds):
    plt.plot(thresholds, precisions[:-1], "b--",  linewidth=2, label="Precision")
    plt.plot(thresholds, recalls[:-1], "g-",  linewidth=2, label="Recall")
    plt.xlabel("Threshold")
    plt.legend(loc="lower right")
    plt.title('Precision-Recall Curve')
    plt.xlim([0.3, 0.7])
    plt.ylim([0, 1.1])
```

```
plot_precision_recall_vs_threshold(precisions, recalls, thresholds)
plt.show()
```



Results

In [57]:
```
# Make predictions using the test data
y_predicted = logisticRegresssion_clf.predict(X_test)

accuracy_score_test = np.mean(y_predicted == y_test)
print("\nAccuracy: ", accuracy_score_test)

print("\nTest Confusion Matrix:")
print(confusion_matrix(y_test, y_predicted))

precision_test = precision_score(y_test, y_predicted, average='micro')
print("\nTest Precision = %f" % precision_test)

recall_test = recall_score(y_test, y_predicted, average='micro')
print("\nTest Recall = %f" % recall_test)


f1_test = f1_score(y_test, y_predicted, average='micro')
print("\nTest F1 Score = %f" % f1_test)


print("\nClassification Report:")
print(classification_report(y_test, y_predicted))
```

```
Accuracy:  0.5348837209302325

Test Confusion Matrix:
[[43 66]
 [34 72]]
```

```
Test Precision = 0.534884

Test Recall = 0.534884

Test F1 Score = 0.534884

Classification Report:
              precision    recall  f1-score   support

           0       0.56      0.39      0.46       109
           1       0.52      0.68      0.59       106

    accuracy                           0.53       215
   macro avg       0.54      0.54      0.53       215
weighted avg       0.54      0.53      0.53       215
```

In [ ]: