Perceptron_3_train_10_val

December 13, 2017

In [1]:
```
import pandas as pd
from pandas import DataFrame,Series
from matplotlib.colors import ListedColormap
import numpy as np
from sklearn.linear_model import Perceptron
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score,confusion_matrix,classification_report
import matplotlib.pyplot as plt
from pandas.plotting import scatter_matrix
from random import sample
```

In [2]:
```
perceptron_dup_train = pd.read_csv('../FeaturesCsvFile/featuresfile.csv')
perceptron_dup_test = pd.read_csv('../FeaturesCsvFile/featuresfile_10.csv')
perceptron_train = perceptron_dup_train.drop_duplicates(subset=['User', 'Timestamp'])
perceptron_unique_test = perceptron_dup_test.drop_duplicates(subset=['User', 'Timestamp
perceptron_test = perceptron_unique_test.iloc[sample(range(len(perceptron_unique_test)),

print ('(#row,#column) of train dataset' , perceptron_train.shape)
print ('(#row,#column) of test dataset' , perceptron_test.shape)
```

```
('(#row,#column) of train dataset', (406, 46))
('(#row,#column) of test dataset', (40, 46))
```

In [3]:
```
X_train = perceptron_train.values[:, 2:45]
y_train = perceptron_train.values[:, 45]
X_test = perceptron_test.values[:, 2:45]
y_test = perceptron_test.values[:, 45]
```

In [8]:
```
ppn = Perceptron(max_iter=60, eta0=0.1, random_state=1)
ppn_pred =ppn.fit(X_train, y_train)
y_pred = ppn.predict(X_test)
print (type(y_pred))
print (type(y_test))
```

```
<type 'numpy.ndarray'>
<type 'numpy.ndarray'>
```

```
In [9]: print('Accuracy of Accuracy Score : %.2f' % accuracy_score(y_test,y_pred))
```

```
Accuracy of Accuracy Score : 0.93
```

```
In [10]: print('Accuracy of Perceptron Score: %.2f' % ppn.score(X_test,y_test))
```

```
Accuracy of Perceptron Score: 0.93
```

```
In [28]: print ('Important features (featureName, weigh of important, #column)')
         header = list(perceptron_train.head(1))
         important_feature = []
         for i in range(0,len(ppn.coef_[0])):
             important_feature.append((header[i+2],ppn.coef_[0][i],i+2))
         sorted_list = sorted(important_feature,key=lambda important_feature: important_feature
         for j in range(0,len(sorted_list)):
                 first_imp_fea = sorted_list[0]
                 second_imp_fea = sorted_list[1]
                 print sorted_list[j]
```

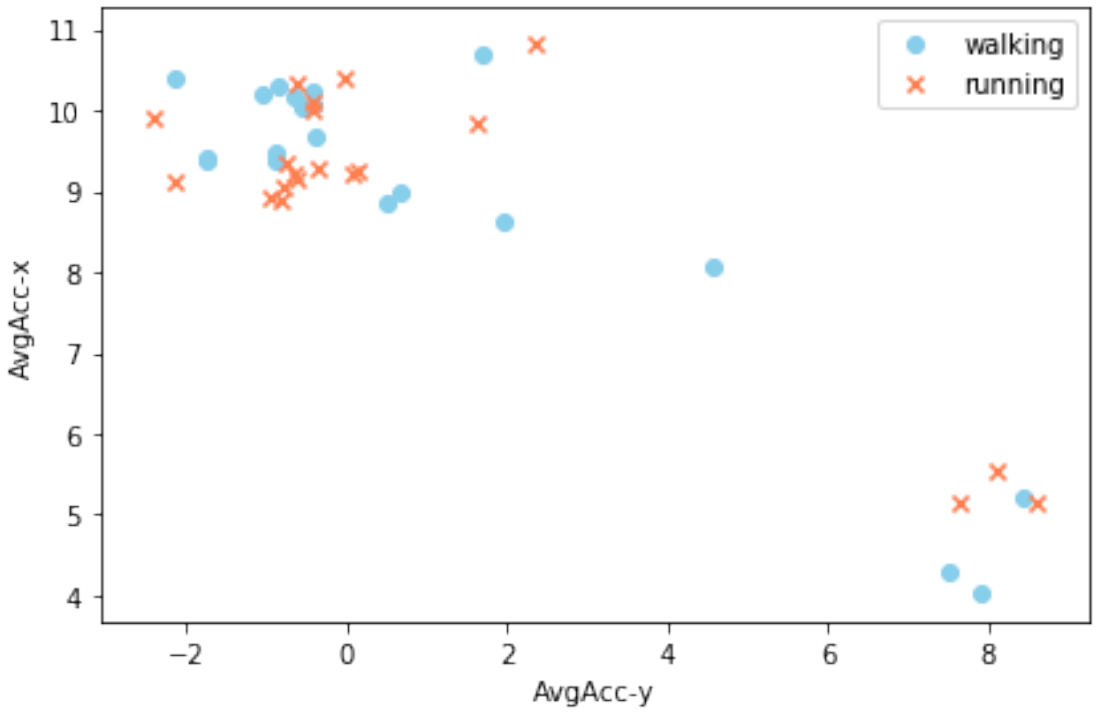
```
Important features (featureName, weigh of important, #column)
('AvgAcc-y', 72.607829669715898, 39)
('AvgAcc-x', 34.823192045965037, 38)
('TimeDiffPeaks-z', 32.926751030100078, 34)
('TimeDiffPeaks-y', 28.884858797770107, 33)
('Bin6,x', 2.8731772765371026, 7)
('Bin9,y', 0.95946801803235127, 20)
('Bin10,y', 0.9033767476038489, 21)
('Bin2,z', 0.7682173690725026, 23)
('Bin5,x', 0.71913563839741812, 6)
('Bin9,z', 0.41001768948117007, 30)
('Bin8,y', 0.3343243323228704, 19)
('Bin7,x', 0.27960158656987844, 8)
('Bin8,z', 0.25165286788151325, 29)
('Bin1,z', -0.098100663388680648, 22)
('Bin10,z', -0.17729868380306502, 31)
('Bin3,z', -0.18874113672481552, 24)
('Bin1,x', -0.3042547350168216, 2)
('Bin1,y', -0.79347645299278513, 12)
('Bin2,x', -1.4051253251879674, 3)
('Bin5,y', -1.4964144362679963, 16)
('Bin4,x', -1.5687985777184215, 5)
('Bin7,y', -1.573166054272868, 18)
('Bin7,z', -2.0465118405176712, 28)
('Bin10,x', -2.1616253822957145, 11)
('Bin4,y', -2.3074327610272931, 15)
('Bin3,x', -2.5023352891105466, 4)
('Bin2,y', -2.9123049765130853, 13)
```

```
('Bin6,y', -3.1933404687042266, 17)
('Bin4,z', -3.2641489616142456, 25)
('Bin3,y', -3.4770995396301032, 14)
('Bin8,x', -3.6866725004136893, 9)
('Bin6,z', -4.1882712825113497, 27)
('Bin5,z', -4.5303751757882385, 26)
('Bin9,x', -4.794178788210667, 10)
('AvgResAcc', -8.7640535005790206, 44)
('TimeDiffPeaks-x', -18.935042977210117, 32)
('AvgAbsDiff-y', -104.07171230816596, 36)
('AvgAbsDiff-z', -113.04002238877527, 37)
('StdDev-y', -125.46160330290986, 42)
('StdDev-z', -140.75387920366106, 43)
('AvgAbsDiff-x', -145.88830491145316, 35)
('AvgAcc-z', -160.4030544462608, 40)
('StdDev-x', -168.65869543238892, 41)
```

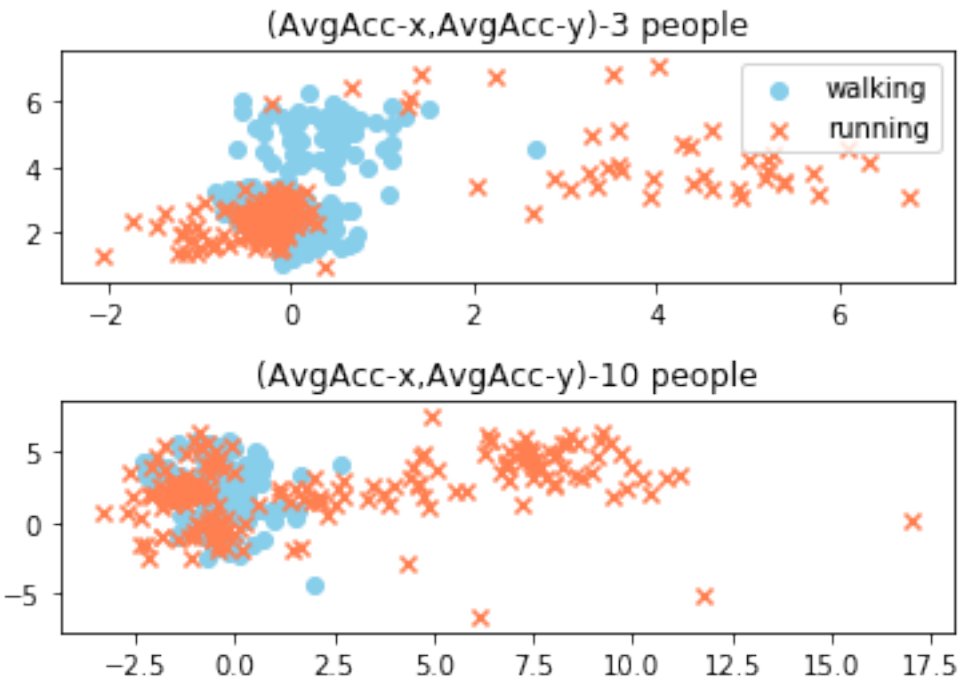
```
In [26]: perceptron_train['color'] = Series([(0 if x == "walking" else 1) for x in perceptron_t
         my_color_map = ListedColormap(['skyblue','coral'],'mycolormap')
         perceptron_test['color'] = Series([(0 if x == "walking" else 1) for x in perceptron_te
```

```
/usr/local/lib/python2.7/site-packages/ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
  """Entry point for launching an IPython kernel.
/usr/local/lib/python2.7/site-packages/ipykernel_launcher.py:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html
  This is separate from the ipykernel package so we can avoid doing imports until
```

```
In [33]: y = perceptron_test.iloc[:, 45].values
         y = np.where(y == 'walking', -1, 1)
         X = perceptron_test.iloc[:, [38, 40]].values
         plt.scatter(X[:len(perceptron_test)/2, 0], X[:len(perceptron_test)/2, 1],
                     color='skyblue', marker='o', label='walking')
         plt.scatter(X[len(perceptron_test)/2:len(perceptron_test), 0], X[len(perceptron_test)/
                      color='coral', marker='x', label='running')
         plt.xlabel('%s'%first_imp_fea[0])
         plt.ylabel('%s'%second_imp_fea[0])
         plt.legend(loc='upper right')
         plt.tight_layout()
         plt.show()
```

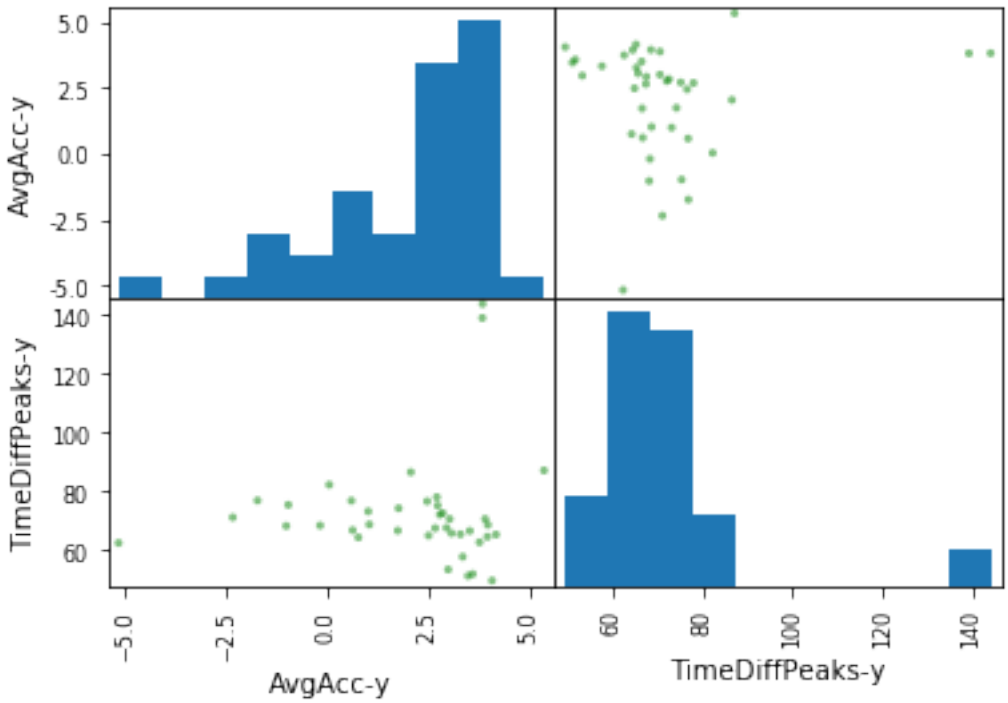


In [34]:
```
#walking and running data points for training set(3 people data)
plt.subplot(2,1,1)
walk_points = perceptron_train.loc[perceptron_train['Label'] == 'walking']
run_points = perceptron_train.loc[perceptron_train['Label'] == 'running']
plt.scatter(walk_points['AvgAcc-x'],walk_points['AvgAcc-y'],color='skyblue'
            ,marker='o',edgecolors=None)
plt.scatter(run_points['AvgAcc-x'],run_points['AvgAcc-y'],color='coral'
            ,marker='x',edgecolors=None)
plt.legend(['walking','running'],loc='upper right')
plt.title("(AvgAcc-x,AvgAcc-y)-3 people")
# plt.xticks(1)

#walking and running data points for test set(10 people data)
plt.subplot(2,1,2)
walk_points_test = perceptron_unique_test.loc[perceptron_unique_test['Label'] == 'wal
run_points_test = perceptron_unique_test.loc[perceptron_unique_test['Label'] == 'runn
plt.scatter(walk_points_test['AvgAcc-x'],walk_points_test['AvgAcc-y'],color='skyblue'
            ,marker='o',edgecolors=None)
plt.scatter(run_points_test['AvgAcc-x'],run_points_test['AvgAcc-y'],color='coral'
            ,marker='x',edgecolors=None)
plt.title("(AvgAcc-x,AvgAcc-y)-10 people")
plt.subplots_adjust(hspace=0.5)
plt.show()
# plt.savefig('./image/scatter_pc_train_3_val_10.png',dpi=1000)
```




```
In [153]: frame = perceptron_test.loc[:,['AvgAcc-y','TimeDiffPeaks-y']]
          test=scatter_matrix(frame,color='g')
          plt.show()
```

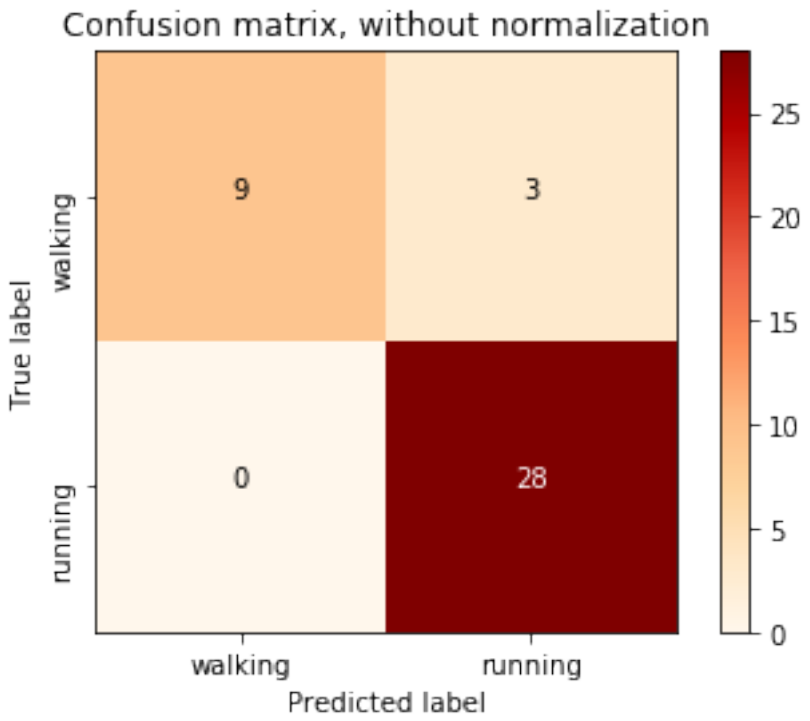
```
<matplotlib.figure.Figure at 0x110b077d0>
```

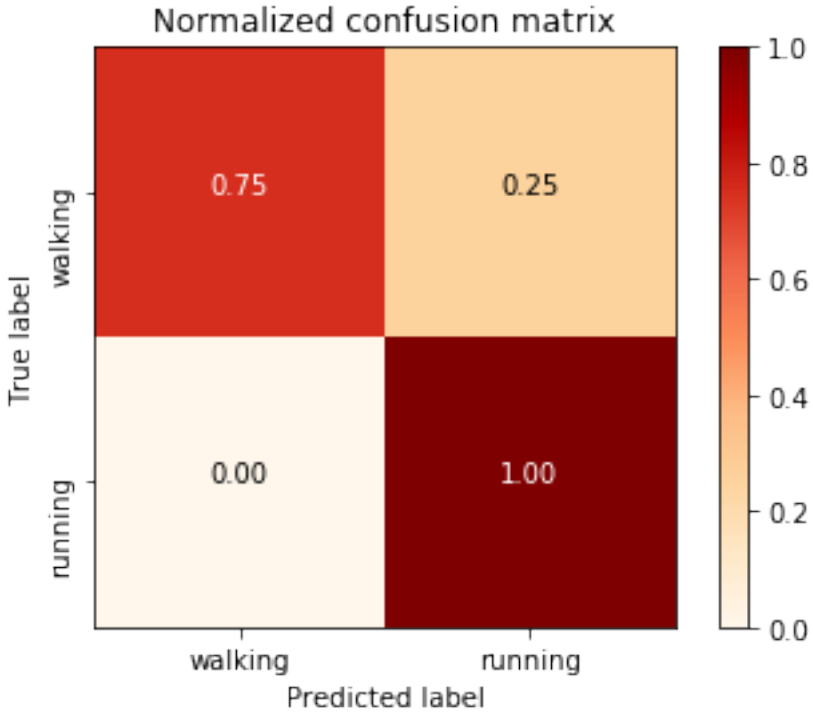


In [163]:
```
import itertools
import numpy as np
import matplotlib.pyplot as plt

def plot_confusion_matrix(cm, classes,
                          normalize=False,
                          title='Confusion matrix',
                          cmap=plt.cm.OrRd):
    """
    This function prints and plots the confusion matrix.
    Normalization can be applied by setting `normalize=True`.
    """
    if normalize:
        cm = cm.astype('float') / cm.sum(axis=1)[:, np.newaxis]
        print("Normalized confusion matrix")
    else:
        print('Confusion matrix, without normalization')

    print(cm)

    plt.imshow(cm, interpolation='nearest', cmap=cmap)
    plt.title(title)
    plt.colorbar()
    tick_marks = np.arange(len(classes))
```

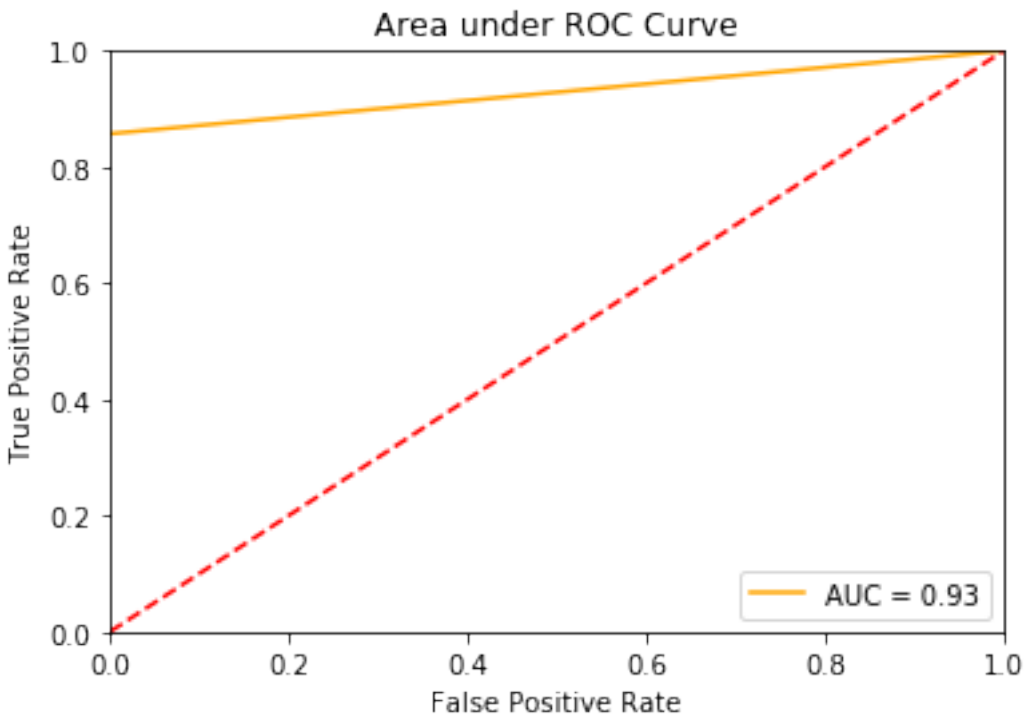
```
            plt.xticks(tick_marks, classes)
            plt.yticks(tick_marks, classes, rotation=90)

            fmt = '.2f' if normalize else 'd'
            thresh = cm.max() / 2.
            for i, j in itertools.product(range(cm.shape[0]), range(cm.shape[1])):
                plt.text(j, i, format(cm[i, j], fmt),
                         horizontalalignment="center",
                         color="white" if cm[i, j] > thresh else "black")

            plt.ylabel('True label')
            plt.xlabel('Predicted label')

        cnf_matrix = confusion_matrix(y_test, y_pred)
        np.set_printoptions(precision=2)

        # Plot non-normalized confusion matrix
        plt.figure()
        class_names = ["walking", "running"]
        plot_confusion_matrix(cnf_matrix, classes=["walking", "running"],
                              title='Confusion matrix, without normalization')
        # plt.savefig('H:/mastersProject/activity_analyzer/LogisticRegression/cm_lr', dpi=10

        # Plot normalized confusion matrix
        plt.figure()
        plot_confusion_matrix(cnf_matrix, classes=class_names, normalize=True,
                              title='Normalized confusion matrix')

        plt.savefig('./image/cm_pc_normalized', dpi=1000)
        plt.show()
```

```
Confusion matrix, without normalization
[[ 9  3]
 [ 0 28]]
Normalized confusion matrix
[[ 0.75  0.25]
 [ 0.    1.  ]]
```


Confusion matrix, without normalization
9
3
0
28
walking
running
True label
walking
running
Predicted label
25
20
15
10
5
0


Normalized confusion matrix
0.75
0.25
0.00
1.00
walking
running
True label
walking
running
Predicted label
1.0
0.8
0.6
0.4
0.2
0.0

In [5]:
```
import numpy as np
from sklearn import metrics
import matplotlib.pyplot as plt

def plot_roc_curve(Y_predict_gini,Y_test,name_graph):
    num_predns = []
    for i in range(0,len(Y_predict_gini)):
        if Y_predict_gini[i] == "walking":
            num_predns.append(0)
        else:
            num_predns.append(1)
    num_labels = []
    for i in range(0,len(Y_test)):
        if Y_test[i] == "walking":
            num_labels.append(0)
        else:
            num_labels.append(1)

    predns = np.array(num_predns)
    labels = np.array(num_labels)
    fpr, tpr, thresholds = metrics.roc_curve(labels, predns)
    roc_auc = metrics.auc(fpr, tpr)
    plt.title('Area under ROC Curve')
    plt.plot(fpr, tpr, 'orange', label = 'AUC = %0.2f' % roc_auc)
    plt.legend(loc = 'lower right')
    plt.plot([0, 1], [0, 1],'r--')
    plt.xlim([0, 1])
    plt.ylim([0, 1])
    plt.ylabel('True Positive Rate')
    plt.xlabel('False Positive Rate')
    plt.show()
#     plt.savefig('./image/Area_under_roc_pc.png', dpi=1000)

plot_roc_curve(y_pred,y_test,"Area_under_roc_pc")
```




```
In [46]: proba = ppn_pred.predict_proba(X_test)
         print (proba)
```

```
---------------------------------------------------------------------------

AttributeError                            Traceback (most recent call last)

<ipython-input-46-b6496f6b0349> in <module>()
      1
----> 2 proba = ppn_pred.predict_proba(X_test)
      3 print (proba)


AttributeError: 'Perceptron' object has no attribute 'predict_proba'
```