perceptron_15_train_15_test

December 13, 2017

```
In [5]: 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 [6]: perceptron_dup_train = pd.read_csv('../FeaturesCsvFile/featuresfile.csv')
        perceptron_dup_test = pd.read_csv('../FeaturesCsvFile/featuresfile_10.csv')
        df1 = perceptron_dup_test.drop_duplicates(subset=['User', 'Timestamp'])
        df2 = perceptron_dup_train.drop_duplicates(subset=['User', 'Timestamp'])
        frames = [df1, df2]
        df= pd.concat(frames)
        df.shape
```

```
Out[6]: (821, 46)
```

```
In [8]: X = df.values[:, 2:45]
        y = df.values[:, 45] #label : walking/runing
        y_plot = np.where(y == 'walking', -1, 1)
        X_train, X_test, y_train, y_test = train_test_split(X, y_plot, test_size=0.3)
        ppn = Perceptron(max_iter=30, eta0=0.1, random_state=1)
        ppn.fit(X_train, y_train)
        y_pred = ppn.predict(X_test)
        print('Accuracy of Accuracy Score : %.2f' % accuracy_score(y_test,y_pred))
        print('Accuracy of Perceptron Score: %.2f' % ppn.score(X_test,y_test))
```

```
Accuracy of Accuracy Score : 0.96
Accuracy of Perceptron Score: 0.96
```

```
In [32]: print ('Important features (featureName, weigh of important, #column)')
         header = list(perceptron_train.head(1))
         important_feature = []
```

```python
        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]
```

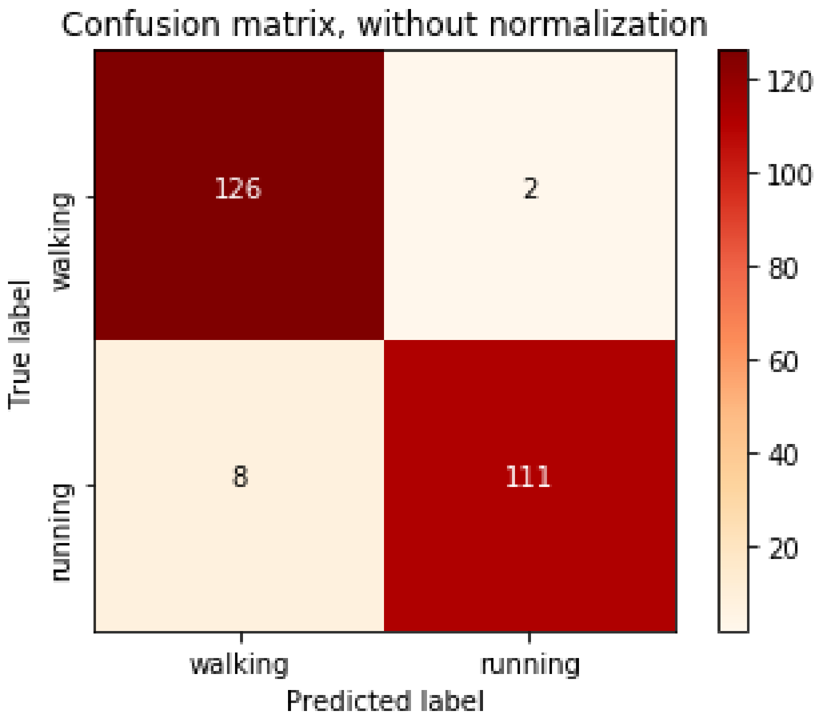
```
Important features (featureName, weigh of important, #column)
('StdDev-z', 185.56889493405149, 43)
('StdDev-x', 161.12133478561577, 41)
('AvgAbsDiff-z', 153.27951262524317, 37)
('AvgAbsDiff-x', 137.07187728764572, 35)
('StdDev-y', 122.48673837800487, 42)
('AvgAbsDiff-y', 103.3940272084579, 36)
('AvgAcc-z', 36.397275816041891, 40)
('TimeDiffPeaks-x', 27.093988187359958, 32)
('Bin9,x', 3.348462884840623, 10)
('Bin3,y', 2.9102979662311594, 14)
('Bin4,y', 2.806936584433942, 15)
('Bin2,y', 2.2745223274530582, 13)
('Bin8,x', 1.7814050239832402, 9)
('Bin10,x', 1.747888333070434, 11)
('Bin3,z', 1.3464187537191366, 24)
('Bin4,x', 1.1402270081585009, 5)
('Bin2,z', 0.96243999131523816, 23)
('Bin1,z', 0.77752172622129445, 22)
('Bin3,x', 0.77710967143979981, 4)
('Bin2,x', 0.76818537528154518, 3)
('Bin1,y', 0.65102736672288364, 12)
('Bin7,z', 0.53394073372101136, 28)
('Bin6,y', 0.40985893992920736, 17)
('Bin1,x', 0.25539929456708249, 2)
('Bin10,z', 0.16029718184240796, 31)
('Bin4,z', 0.067177333233303327, 25)
('Bin5,z', -0.20577150927891691, 26)
('Bin9,z', -0.41511736040235897, 30)
('Bin6,z', -0.42384507436062185, 27)
('Bin7,y', -0.56988161651232472, 18)
('Bin8,z', -0.57194721825808781, 29)
('Bin5,y', -0.82640650469522192, 16)
('Bin8,y', -0.92967877364383611, 19)
('Bin10,y', -1.6151407412936372, 21)
('Bin5,x', -1.9839609799887523, 6)
('Bin9,y', -2.1378126300767399, 20)
('Bin7,x', -2.7485174223217528, 8)
('Bin6,x', -3.4912208937367009, 7)
('AvgAcc-x', -11.595957569237354, 38)
```

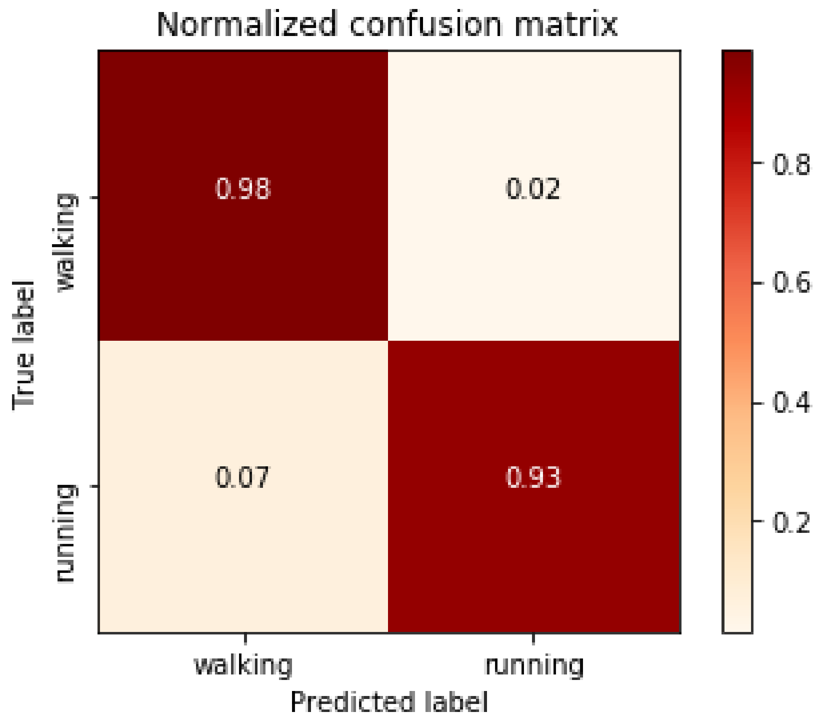
```
('AvgResAcc', -21.530061914756175, 44)
('TimeDiffPeaks-y', -26.653666599639994, 33)
('TimeDiffPeaks-z', -30.413344757570119, 34)
('AvgAcc-y', -32.148856229778566, 39)
```

```
In [9]: 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()
```

```python
class_names = ["walking", "running"]
plot_confusion_matrix(cnf_matrix, classes=["walking", "running"],
                      title='Confusion matrix, without normalization')
plt.figure()
plot_confusion_matrix(cnf_matrix, classes=class_names, normalize=True,
                      title='Normalized confusion matrix')
plt.show()
```

```
Confusion matrix, without normalization
[[126   2]
 [  8 111]]
Normalized confusion matrix
[[ 0.98  0.02]
 [ 0.07  0.93]]
```






```
In [11]: import numpy as np
         from sklearn import metrics
         import matplotlib.pyplot as plt
```

```
In [13]: num_predns = []

         for i in range(0,len(y_pred)):
             if y_pred[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(y_test,y_pred)
         roc_auc = metrics.auc(fpr, tpr)
```

```
plt.title('Area under ROC Curve')
plt.plot(fpr, tpr, 'b', 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()
```