DecisionTree_splitting_3_into_train_val

November 30, 2017

In [56]:
```
%matplotlib inline
```

In [57]:
```
from pathlib import Path
from pandas.plotting import scatter_matrix
from sklearn.model_selection import train_test_split
from sklearn import tree
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score
import pandas as pd
from sklearn.metrics import confusion_matrix
import matplotlib.pyplot as plt
```

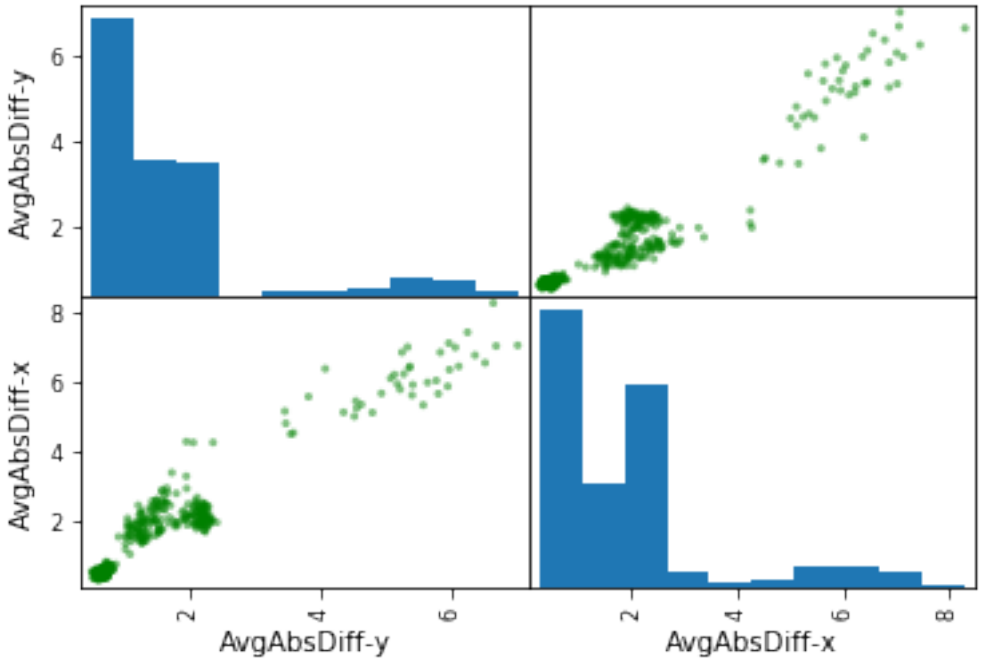
In [58]:
```
#Description of features
#Average[3]: Average acceleration (for each axis)
#Standard Deviation[3]: Standard deviation (for each axis)
#Average Absolute Difference[3]: Average absolute
#difference between the value of each of the 200 readings
#within the ED and the mean value over those 200 values
#(for each axis)
#Average Resultant Acceleration[1]: Average of the square
#roots of the sum of the values of each axis squared
#over the ED
#Time Between Peaks[3]: Time in milliseconds between
#peaks in the sinusoidal waves associated with most
#activities (for each axis)
#Binned Distribution[30]: We determine the range of values
#for each axis (maximum  minimum), divide this range into
#10 equal sized bins, and then record what fraction of the
#200 values fell within each of the bins.
```

In [59]:
```
my_file = Path("/Users/bharu/CS690-PROJECTS/ActivityAnalyzer/activity_analyzer/Decisi
df = pd.read_csv(my_file)
df.head()
df.shape#(no of rows, no of columns)
```

Out[59]:
```
(417, 46)
```

In [60]:
```
df_unique = df.drop_duplicates(subset=['User', 'Timestamp'])
df_unique.head()
df_unique.shape
```

```
Out[60]: (406, 46)

In [61]: X = df_unique.values[:,2:45]

In [62]: Y = df_unique.values[:,45]

In [63]: X_train,X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.3)

In [64]: df_gini = DecisionTreeClassifier(criterion = 'gini')

In [65]: df_gini.fit(X_train, Y_train)

Out[65]: DecisionTreeClassifier(class_weight=None, criterion='gini', max_depth=None,
                    max_features=None, max_leaf_nodes=None,
                    min_impurity_decrease=0.0, min_impurity_split=None,
                    min_samples_leaf=1, min_samples_split=2,
                    min_weight_fraction_leaf=0.0, presort=False, random_state=None,
                    splitter='best')

In [66]: feature_imp = df_gini.feature_importances_

In [67]: main_features = []
         for i in range(0,len(feature_imp)):
             if feature_imp[i] > 0:
                 entry = []
                 entry.append(df.columns.values[i+2])
                 entry.append(feature_imp[i])
                 main_features.append(entry)
         main_features

Out[67]: [['Bin4,x', 0.028256111187644449],
          ['Bin10,x', 0.030419040005312738],
          ['Bin1,y', 0.014088422609356638],
          ['TimeDiffPeaks-z', 0.10412488217179219],
          ['AvgAbsDiff-y', 0.79805934917933619],
          ['AvgAcc-x', 0.010777170613236188],
          ['AvgAcc-y', 0.014275024233321642]]

In [68]: frame = df_unique.loc[:,['AvgAbsDiff-y','AvgAbsDiff-x']]

In [69]: scatter_matrix(frame,color='g')
         plt.savefig('./../Data-Visualization/images/scatter_matrix_AvgAbsDiffxy_dt_train_val_s
```




```
In [70]: #Predicting using test data
         Y_predict_gini = df_gini.predict(X_test)

In [71]: #Calculating accuracy score
         score = accuracy_score(Y_test,Y_predict_gini)
         score

Out[71]: 0.92622950819672134

In [72]: cm = confusion_matrix(Y_test,Y_predict_gini)
         cm

Out[72]: array([[48,  6],
                [ 3, 65]])

In [73]: import numpy as np
         from sklearn import metrics

         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)
```

In [74]:
```
fpr, tpr, thresholds = metrics.roc_curve(labels, predns)
roc_auc = metrics.auc(fpr, tpr)
```

In [75]:
```
import matplotlib.pyplot as plt
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()
```