hw1_2

August 29, 2018

0.1 Importing Pakages

```
In [1]: import numpy as np
        import copy
```

0.2 Parameters

```
In [2]: k = 5
        x_test = [1,1]
```

0.3 Loading the Dataset

```
In [3]: x_train = np.transpose(np.genfromtxt('X.csv',delimiter=','))           # Loading trainin
        y_train = (np.genfromtxt('Y.csv',delimiter=',')).reshape((1000,1))     #loading the corr
```

0.4 Finding the Euclidian Distance for all the training samples w.r.t test sample

```
In [4]: dist = []
        for i in range(0,1000):
            dist.append(np.linalg.norm(x_train[i]-x_test))    #Finding the distance
        # print(size(dist))
        dist = np.asarray(dist)
        dist_label = np.append(dist.reshape(1000,1),y_train,axis = 1)   #mapping the distances u
        print(dist_label)
```

```
[[ 2.03030034  1.        ]
 [ 3.71738819 -1.        ]
 [ 2.17987734  1.        ]
 ...
 [ 2.1560412  -1.        ]
 [ 0.52724465  1.        ]
 [ 0.58514677  1.        ]]
```

0.5 Sorting the distances along with the corresonding labels

```
In [5]: dist_sorted = np.append(x_train,dist_label,axis = 1)           #Mapping distances with t
        for i in range(0,1000):
            for j in range(i,0,-1):
```

```
                if dist_sorted[j,2] < dist_sorted[j-1,2]:
                    temp = copy.deepcopy(dist_sorted[j-1])
                    dist_sorted[j-1] = copy.deepcopy(dist_sorted[j])
                    dist_sorted[j] = copy.deepcopy(temp)
```

0.6 Predecting the Labels

```
In [6]: if np.sum(dist_sorted[1:k,3]) > 0:
            print("label = 1")
        else:
            print("label = -1")
```

```
label = 1
```

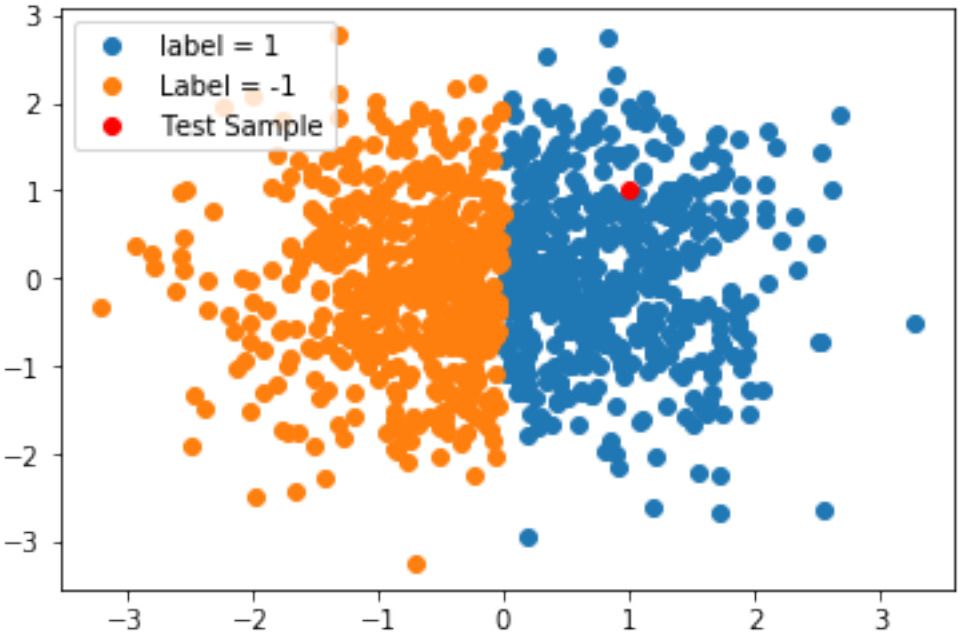
1 Visualisation

```
In [8]: import matplotlib.pyplot as plt

        x_train_1 = []
        x_train_0 = []
        for i in range(0,1000):
            if y_train[i] == 1:
                x_train_1.append(x_train[i])
            else:
                x_train_0.append(x_train[i])
        x_train_1 = np.asarray(x_train_1)
        x_train_0 = np.asarray(x_train_0)
        print(x_train_1.shape)
        print(x_train_0.shape)

        plt.plot(x_train_1[:,0],x_train_1[:,1],'o',label = 'label = 1')
        plt.plot(x_train_0[:,0],x_train_0[:,1],'o', label = 'Label = -1')
        plt.plot(x_test[0],x_test[1],'ro',label = 'Test Sample')
        plt.legend()
        plt.show()
```

```
(493, 2)
(507, 2)
```



2 Observations

- K-Nearest Neighbours classifier has been implemented
- Interpreting the two demensions as coordinates of the cartesian plane, the data has been visualized
- As the data is neat and well distigushable, The is no change in prediction by change in "k".

The predictions on the test data given is as follows: - for [1,-1] the estimated label is "1" - for [1,1] the estimated label is "1" - for [-1,-1] the estimated label is "-1" - for [-1,1] the estimated label is "-1"