LAB5 [BACK PROPAGATION ALGORITHM]:

PROGRAM: Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.

```
import numpy as np
x=np.array(([2,9],[1,5],[3,6]),dtype=float)
y=np.array(([92],[86],[89]),dtype=float)
x=x/np.amax(x,axis=0)
y=y/100
def sigmoid(x):
    return 1/(1+np.exp(-x))
def derivatives_sigmoid(x):
    return x*(1-x)
epoch=7000
lr=0.1
inputlayer_neurons=2
hiddenlayer_neurons=3
output_neurons=1
wh=np.random.uniform(size=(inputlayer_neurons,hiddenlayer_neurons))
bh=np.random.uniform(size=(1,hiddenlayer_neurons))
wout=np.random.uniform(size=(hiddenlayer_neurons,output_neurons))
bout=np.random.uniform(size=(1,output_neurons))
for i in range(epoch):
    hinp1=np.dot(x,wh)
    hinp=hinp1+bh
    hlayer_act=sigmoid(hinp)
    outinp1=np.dot(hlayer_act,wout)
    outinp=outinp1+bout
    output=sigmoid(outinp)
```

```
print("Input:\n"+str(x))
print("Actual output:\n"+str(y))
print("Predicted output:\n",output)
```

OUTPUT:

```
[[0.66666667 1.        ]
 [0.33333333 0.55555556]
 [1.         0.66666667]]
Actual output:
[[0.92]
 [0.86]
 [0.89]]
('Predicted output:\n', array([[0.87550341],
       [0.86351179],
       [0.87336642]]))
```

LAB 6 [NAÏVE BAYESIAN CLASSIFIER]:

PROGRAM: 6. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

```
from sklearn.datasets import load_iris
iris=load_iris()
x=iris.data
y=iris.target
from sklearn.naive_bayes import GaussianNB
from sklearn.model_selection import train_test_split
xtrain,xtest,ytrain,ytest=train_test_split(x,y,test_size=0.4,random_state=2)
print("training data",xtrain)
print("training data",ytrain)
print("testing data",xtest)
print("testing data",ytest)
```

```
gnb=GaussianNB()
gnb.fit(xtrain,ytrain)
y_pred=gnb.predict(xtest)
from sklearn import metrics
print("accuracy is",metrics.accuracy_score(ytest,y_pred)*100)
```

OUTPUT:

('accuracy is', 93.33333333333333)

LAB 8 [K-NEAREST NEIGHBOR ALGORITHM]:

PROGRAM: Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

```
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import classification_report,confusion_matrix
from sklearn import datasets
iris=datasets.load_iris()
iris_data=iris.data
iris_labels=iris.target
print(iris_data)
print(iris_labels)
x_train,x_test,y_train,y_test=train_test_split(iris_data,iris_labels,test_size=0.30)
classifier=KNeighborsClassifier(n_neighbors=5)
classifier.fit(x_train,y_train)
y_pred=classifier.predict(x_test)
print('confusion matrix is as follows')
print(confusion_matrix(y_test,y_pred))
print('Accuracy metrices')
```

```
print(classification_report(y_test,y_pred))
```

OUTPUT:

```
confusion matrix is as follows
[[17  0  0]
 [ 0 14  1]
 [ 0  1 12]]
Accuracy metrices
             precision    recall  f1-score   support

          0       1.00      1.00      1.00        17
          1       0.93      0.93      0.93        15
          2       0.92      0.92      0.92        13

avg / total       0.96      0.96      0.96        45
```

LAB 7 [EM-KMEANS]:

PROGRAM: Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set

for clustering using k-Means algorithm. Compare the results of these two algorithms

and comment on the quality of clustering. You can add Java/Python ML library

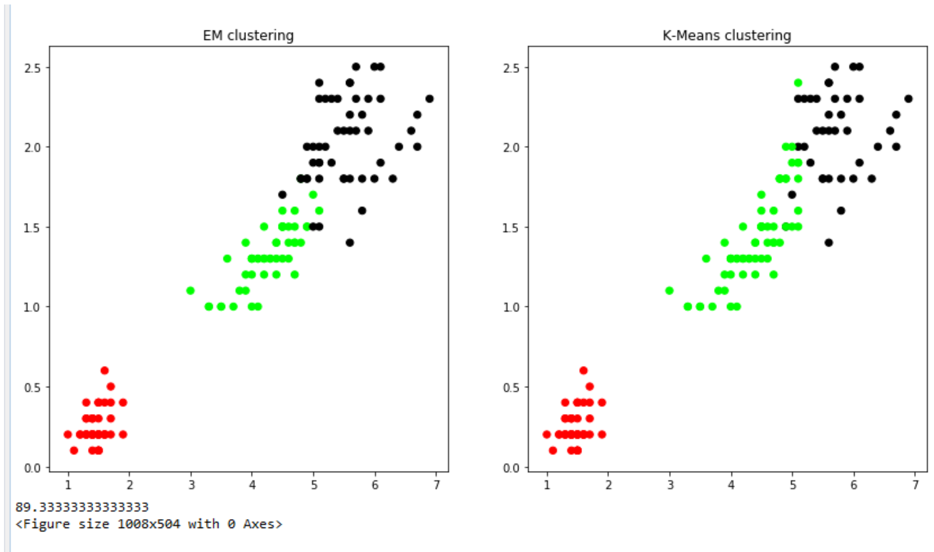
classes/API in the program.

[EM-KMEANS]:

```
import matplotlib.pyplot as plt
from sklearn import datasets
from sklearn.cluster import KMeans
import pandas as pd
import numpy as np
import sklearn.metrics as sm
```

```
iris=datasets.load_iris()
X=pd.DataFrame(iris.data)
X.columns=['Sepal_Length','Sepal_Width','Petal_Length','Petal_Width']
y=pd.DataFrame(iris.target)
y.columns=['Targets']
plt.figure(figsize=(14,7))
model=KMeans(n_clusters=3)
model.fit(X)
model.labels_
plt.figure(figsize=(14,7))
colormap=np.array(['red','lime','black'])
plt.subplot(1,2,1)
plt.scatter(X.Petal_Length,X.Petal_Width,c=colormap[y.Targets],s=40)
plt.title('EM clustering')
plt.subplot(1,2,2)
plt.scatter(X.Petal_Length,X
        .Petal_Width,c=colormap[model.labels_],s=40)
plt.title('K-Means clustering')
acc=sm.accuracy_score(y,model.labels_)
print(acc*100)
```

OUTPUT:



LAB 9 [LOCALLY WEIGHTED REGRESSION ALGORITHM]:

PROGRAM: Implement the non-parametric Locally Weighted Regressionalgorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs

```
import matplotlib.pyplot as plt

import pandas as pd

#import numpy.linalg as np

import numpy as np1

#from scipy.stats.stats import pearsonr


def kernel(point,xmat,k):

    m,n=np1.shape(xmat)

    weights=np1.mat(np1.eye((m)))

    for j in range(m):

        diff=point-x[j]
```

```
        weights[j,j]=np1.exp(diff*diff.T/(-2.0*k**2))
    return weights
def localweight(point,xmat,ymat,k):
    wei=kernel(point,xmat,k)
    w=(x.T*(wei*x)).I*(x.T*(wei*ymat.T))
    return w
def localweightregression(xmat,ymat,k):
    m,n=np1.shape(xmat)
    ypred=np1.zeros(m)
    for i in range(m):
        ypred[i]=xmat[i]*localweight(xmat[i],xmat,ymat,k)
    return ypred
data=pd.read_csv('10data.csv')
bill=np1.array(data.total_bill)
tip=np1.array(data.tip)
mbill=np1.mat(bill)
mtip=np1.mat(tip)
m=np1.shape(mbill)[1]
one=np1.mat(np1.ones(m))
x=np1.hstack((one.T,mbill.T))
ypred=localweightregression(x,mtip,2)
sortindex=x[:,1].argsort(0)
xsort=x[sortindex][:,0]
fig=plt.figure()
ax=fig.add_subplot(1,1,1)
ax.scatter(bill,tip,color='green')
ax.plot(xsort[:,1],ypred[sortindex],color='red',linewidth=3)
plt.xlabel('total bill')
```

plt.ylabel('tip')

OUTPUT: