20MCA241 DATA SCIENCE LAB

Lab Report Submitted By

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Reg. No.: AJC20MCA-2039

In Partial fulfillment for the Award of the Degree Of

MASTER OF COMPUTER APPLICATIONS (2 Year)
(MCA)
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

AMAL JYOTHI COLLEGE OF ENGINEERING
KANJIRAPPALLY

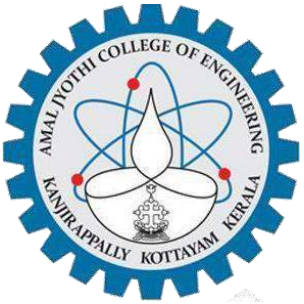
[Affiliated to APJ Abdul Kalam Technological University, Kerala. Approved by AICTE, Accredited by NAAC with 'A' grade. Koovappally, Kanjirappally, Kottayam, Kerala – 686518]

2020-2022

DEPARTMENT OF COMPUTER APPLICATIONS

AMAL JYOTHI COLLEGE OF ENGINEERING

KANJIRAPPALLY



CERTIFICATE

This is to certify that the Lab report, "**20MCA241 DATA SCIENCE LAB"** is the bonafide work of **GOPIKA DAS (Reg.No:AJC20MCA-2039)** in partial fulfillment of the requirements for the award of the Degree of Master of Computer Applications under APJ Abdul Kalam Technological University during the year 2021-22.

Ms. Nimmy Francis

Lab In-Charge

CONTENT

PROGRAM NO : 01 **Date:24/11/2021**

AIM : Perform all matrix operation using python.

PROGRAM CODE

```
import numpy as np import random def
PrintMatrix(matrix_in):     for x in range(0,
matrix_in.shape[0]):        for y in range(0,
matrix_in.shape[1]):
        print("%d \t" % (matrix_in[x][y]), end='')
if (y % 3 > 1):                print("\n") def
FillMatrix(matrix_in):     for x in range(0,
matrix_in.shape[0]):        for y in range(0,
matrix_in.shape[1]):
        matrix_in[x][y] = random.randrange(2, 10) + 2
matrix1 = np.ndarray((3,3)) matrix2 =
np.ndarray((3,3))  FillMatrix(matrix1)
FillMatrix(matrix2)  add_results =
np.add(matrix1,matrix2)
sub_results=np.subtract(matrix1,matrix2)
mult_results=np.multiply(matrix1,matrix
2)
div_results=np.divide(matrix1,matrix2)
dot_results=np.dot(matrix1,matrix2)
sqrt1_results=np.sqrt(matrix1)
sqrt2_results=np.sqrt(matrix2)
trans_results=add_results.T
print("Matrix1:") PrintMatrix(matrix1)
print("Matrix2:") PrintMatrix(matrix2)
print("Adding")
PrintMatrix(add_results)
print("Subtraction")
```

```
PrintMatrix(sub_results)
print("Multiplication")
PrintMatrix(mult_results) print("Dot
Operation") PrintMatrix(dot_results)
print("squareroot Operation")
print("matrix 1")
PrintMatrix(sqrt1_results)
print("matrix 2")
PrintMatrix(sqrt2_results)
print("Transpose")
PrintMatrix(trans_results)
```

OUTPUT

Matrix1:

9 8 7

6 4 6

9 8 7

Matrix2:

8 10 10

11 9 8

8 11 10

Adding

17 18 17

17 13 14

17 19 17

Subtraction

1 -2 -3

-5 -5 -2

1 -3 -3

Multiplication

32 40 110
66 36 48
72 121 50

Dot Operation
164 197 182
140 162 152
233 244 228
Squareroot Operation matrix 1
2 2 3
2 2 2
3 2 3
matrix 2
2 2 3
3 2 3
2 3 3
Transpose
12 17 17
14 13 22
21 14 15
Process finished with exit code 0

Date :01/12/2021

PROGRAM NO : 02

AIM: Program to perform SVD (Singular value Decomposition) using Python.

PROGRAM CODE

```
from scipy. linalg import svd from
numpy import array
A= ([[3,4,[2,4],[3,9]]) print(A)
X, B, T=svd(A)
print("decomposition") print(X)
print("inverse") print(B)
print("transpose") print(T)
```

OUTPUT

```
[[3,4],[2 ,4][3,9]] decomposition
[[-0.68168247 -0.26872313 -0.68051223]
[-0.15885378 -0.85356116 0.49618427]
[-0.71419499 0.44634205  0.53916999]] inverse
[7.87492 2.01650097 1.38540929] transpose
[[-0.21760031 -0.53589686 -0.81576017]
[-0.75849376 0.61885512 -0.20421939]
[ 0.61427789 0.5743108 -0.54113749]]
Process finished with exit code 0
```

Date :01/12/2021

PROGRAM NO : 03

AIM :Program to implement k-NN Classification using any standard dataset available in the public domain and find the accuracy of the algorithm using in build function.

PROGRAM CODE

```
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
from sklearn.datasets import load_iris  from
sklearn.metrics import accuracy_score  iris =
load_iris() x=iris.data  y=iris.target
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=42)
knn=KNeighborsClassifier(n_neighbors=7) knn.fit(x_train,y_train)
print(knn.predict(x_test)) V=knn.predict(x_test) result=accuracy_score (y_test, V)

print ("accuracy:", result)
```

OUTPUT

```
[1 0 2 1 1 0 1 2 2 1 2 0 0 0 0 1 2 1 1 2 0 2 0 2 2 2 2 2 0 0] accuracy:
0.9666666666666667
Process finished with exit code 0
```

Date :01/12/2021

PROGRAM NO : 04

AIM : Program to implement k-NN Classification using any random dataset without using inbuild functions.

PROGRAM CODE

```
from math import sqrt def
euclidean_distance(row1, row2):
distance = 0.0     for i in
range(len(row1) - 1):          distance +=
(row1[i] - row2[i]) ** 2
return sqrt(distance)
# Locate the most similar neighbors def
get_neighbors(train, test_row, num_neighbors):
distances = list()     for
train_row in train:
      dist = euclidean_distance(test_row, train_row)

distances.append((train_row, dist))
distances.sort(key=lambda tup: tup[1])     neighbors =
list()     for i in range(num_neighbors):
neighbors.append(distances[i][0])
return neighbors
# Make a classification prediction with neighbors def predict_classification(train,
test_row, num_neighbors):
neighbors = get_neighbors(train, test_row, num_neighbors)
output_values = [row[-1] for row in neighbors]     prediction =
max(set(output_values), key=output_values.count)     return prediction

# Test distance function dataset
= [[2.781, 2.550,0],
[1.465, 2.326,3],
```

```
        [3.398, 4.429,5],

        [1.388, 1.857,11],
         [3.064, 3.393,3],
    [7.624, 2.235,4],              [5.338, 2.775,8]]
prediction = predict_classification(dataset, dataset[0], 3)

print('Expected %d, Got %d.' % (dataset[0][-1], prediction))
```

OUTPUT

```
Expected 2, Got 3.
Process finished with exit code 0
```

PROGRAM NO : 05 **Date :08/12/2021**

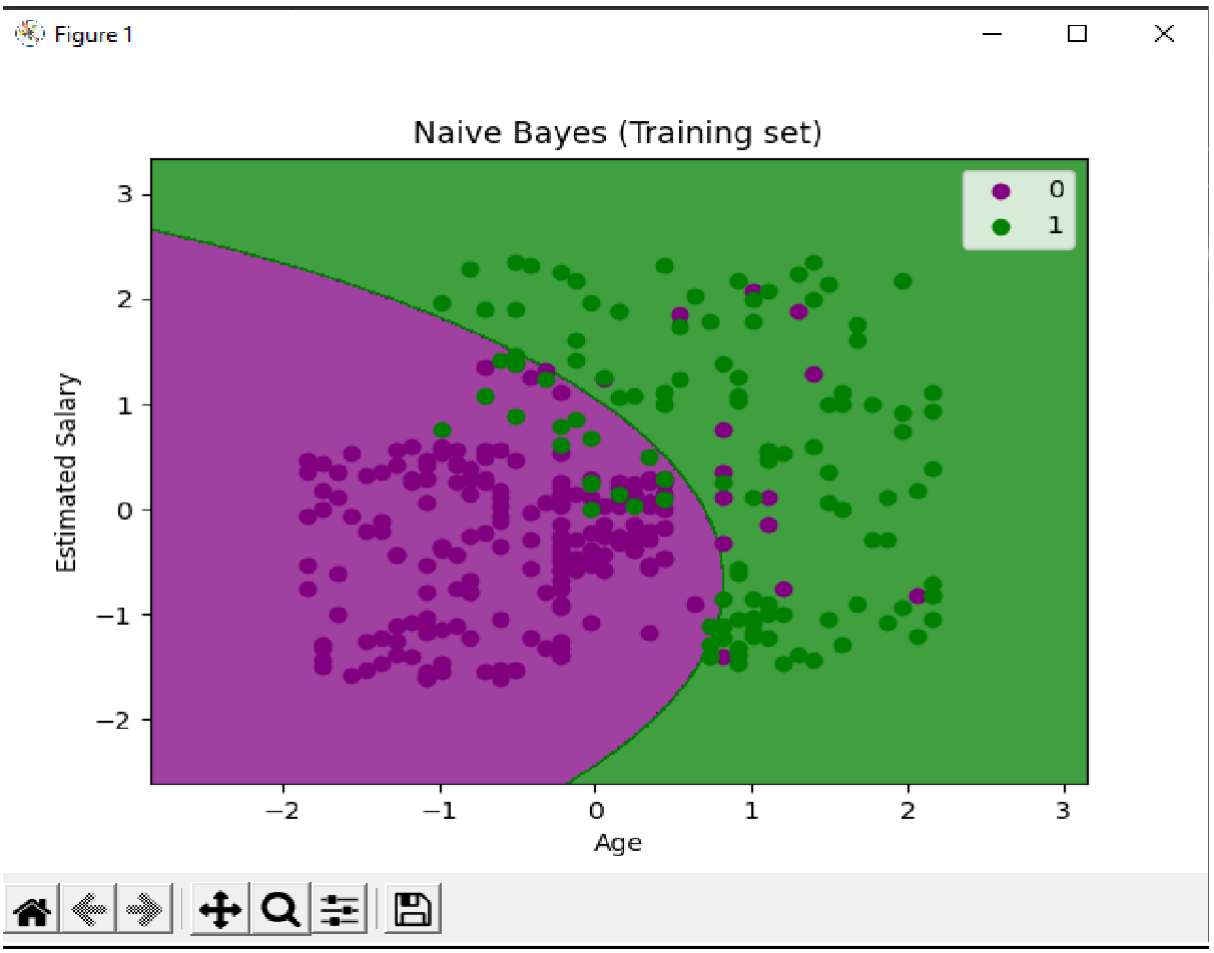
AIM : Program to implement Naïve Bayes Algorithm using any standard dataset available in the public domain and find the accuracy of the algorithm.

PROGRAM CODE

```
import pandas as pd  dataset = pd.read_csv('Social_Network_Ads.csv')  x =
dataset.iloc[:, [2,3]].values  y = dataset.iloc[:,-1].values  from
sklearn.model_selection import train_test_split  x_train, x_test, y_train, y_test =
train_test_split(x, y, test_size=0.2,random_state=10)
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()  x_train = sc.fit_transform(x_train)  x_test
= sc.transform(x_test)  from sklearn.naive_bayes import
GaussianNB  gnb = GaussianNB()  gnb.fit(x_train, y_train)
y_pred = gnb.predict(x_test)  print(y_pred)  from sklearn import
metrics  print("Accuracy", metrics.accuracy_score(y_test,
y_pred) * 100)  import numpy as nm  import matplotlib.pyplot
as mtp  from matplotlib.colors import ListedColormap  x_set,
y_set = x_train, y_train
X1, X2 = nm.meshgrid(nm.arange(start = x_set[:, 0].min() - 1, stop = x_set[:, 0].max() + 1, step =
0.01),   nm.arange(start = x_set[:, 1].min() - 1, stop = x_set[:, 1].max() + 1, step = 0.01))
mtp.contourf(X1, X2, gnb.predict(nm.array([X1.ravel(), X2.ravel()]).T).reshape(X1.shape),
alpha = 0.75, cmap = ListedColormap(('purple', 'green'))) mtp.xlim(X1.min(), X1.max())
mtp.ylim(X2.min(), X2.max())  for i, j in enumerate(nm.unique(y_set)):
 mtp.scatter(x_set[y_set == j, 0], x_set[y_set == j, 1],   c =
ListedColormap(('purple', 'green'))(i), label = j)
mtp.title('Naive Bayes (Training set)') mtp.xlabel('Age')
mtp.ylabel('Estimated Salary')
mtp.legend() mtp.show()  x_set,
y_set = x_test, y_test
X1, X2 = nm.meshgrid(nm.arange(start = x_set[:, 0].min() - 1, stop = x_set[:, 0].max() + 1, step =
```

```
0.01),   nm.arange(start = x_set[:, 1].min() - 1, stop = x_set[:, 1].max() + 1, step
= 0.01))
mtp.contourf(X1, X2, gnb.predict(nm.array([X1.ravel(), X2.ravel()]).T).reshape(X1.shape),
 alpha = 0.75, cmap = ListedColormap(('purple', 'green')))
mtp.xlim(X1.min(), X1.max())  mtp.ylim(X2.min(),
X2.max())  for i, j in enumerate(nm.unique(y_set)):
mtp.scatter(x_set[y_set == j, 0], x_set[y_set == j, 1],
c = ListedColormap(('purple', 'green'))(i), label = j) mtp.title('Naive
Bayes (test set)') mtp.xlabel('Age') mtp.ylabel('Estimated Salary')
mtp.legend()
mtp.show()
```

OUTPUT



[0 0 1 1 0 1 0 1 0 0 0 0 1 1 1 0 0 0 0 1 0 0 0 1 1 0 0 1 1 0 0 0 0 1 1 0 1
1 0 0 0 0 0 0 0 0 1 0 0 0 0 1 1 0 0 0 1 0 1 1 0 1 0 1 1 1 0 1 0 0 0 0 0 0 0 0 0 0
1 1]

Accuracy 91.25

PROGRAM NO : 06 **Date :08/12/2021**

AIM : Program to implement linear and multiple regression techniques using any standard dataset available in the public domain.

PROGRAM CODE

```
import numpy as np   from sklearn.linear_model
import LinearRegression x
= np.array([2,6,7,8]).reshape((-1,1))  y
= np.array([16,7,8,9])
model = LinearRegression()
model.fit(x,y)  r_sq =
model.score(x,y)
print("Score:",r_sq)
print("Intercept: ",model.intercept_)
print("Slope:",model.coef_)  y_pred
= model.predict(x)  print("Y-
prediction : ",y_pred)
```

OUTPUT

```
Score: 0.7556626506024098
Intercept: 17.759036144578314
Slope: [-1.34939759]
Y-prediction :  [15.06024096 9.6626506 8.31325301  6.96385542]
Process finished with exit code 0
```

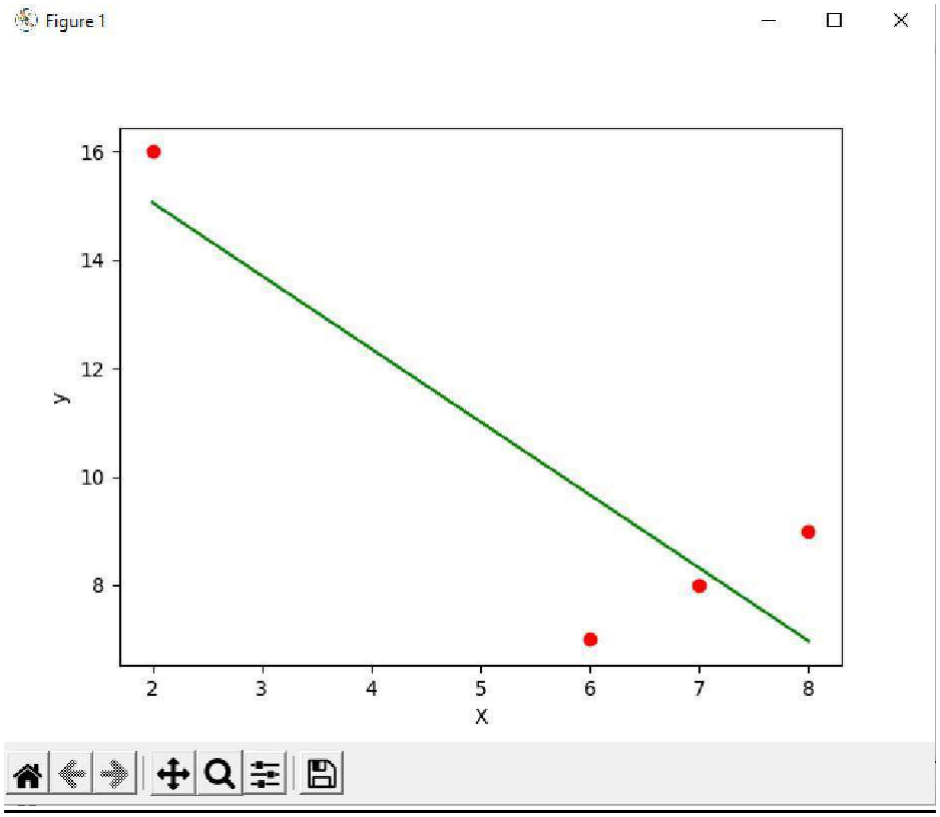
PROGRAM NO : 07 **Date :08/12/2021**

AIM : Program to implement Linear and Multiple regression techniques using any standard dataset available in public domain and evaluate its performance.

PROGRAM CODE

```
import numpy as np import

matplotlib.pyplot as plt x

= np.array([2,6,7,8]) y

= np.array([16,7,8,9])

n=np.size(x) n_x =

np.mean(x)  n_y =

np.mean(y)

SS__xy = np.sum(y*x)-n* n_y*n_x

SS__xx = np.sum(x*x)-n* n_x*n_x b_1

= SS__xy/SS__xx b_0 = n_y - b_1*n_x

y_pred = b_1 * x + b_0 print(y_pred)

plt.scatter(x, y, color='red') plt.plot(x,

y_pred, color='green') plt.xlabel('X')

plt.ylabel('y') plt.show()
```

OUTPUT



[15.06024096 9.6626506 8.31325301 6.96385542]

PROGRAM NO : 08 **Date :15/12/2021**

AIM : Program to implement Linear and Multiple regression techniques using cars dataset available in public domain and evaluate its performance

PROGRAM CODE

```
import pandas from sklearn import

linear_model df =

pandas.read_csv("cars.csv") X =

df[['Weight', 'Volume']] y = df['CO2'] regr

= linear_model.LinearRegression()

regr.fit(X, y)

#predict the CO2 predictedCO2 =

regr.predict([[2300, 1300]]) print(predictedCO2)
```

OUTPUT

```
[107.2087328]

Process finished with exit code 0
```

PROGRAM NO : 09 **Date :15/12/2021**

AIM : Program to implement multiple linear regression techniques using Boston dataset available in the public domain and evaluate its performance and plotting graph.

PROGRAM CODE

```
import matplotlib.pyplot as plt  import
numpy as np  from sklearn import datasets,
linear_model, metrics from sklearn.metrics
import r2_score boston =
datasets.load_boston(return_X_y=False) X
= boston.data y = boston.target from
sklearn.model_selection import
train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.4,random_state=1) reg
= linear_model.LinearRegression() reg.fit(X_train, y_train) V=reg.predict(X_test)
result=r2_score(y_test, V) print("accuracy :", result) print('Coefficients: ', reg.coef_)
print('Variance score:{}'.format(reg.score(X_test, y_test)))
```

OUTPUT

```
accuracy : 0.7209056672661767
Coefficients: [-8.95714048e-02 6.73132853e-02  5.04649248e-02 2.18579583e+00
```

-1.72053975e+01 3.63606995e+00 2.05579939e-03 -1.36602886e+00

2.89576718e-01 -1.22700072e-02 -8.34881849e-01 9.40360790e-03

-5.04008320e-01]

Variance score:0.720905667266176

Process finished with exit code 0

PROGRAM NO : 10 **Date :22/12/2021**

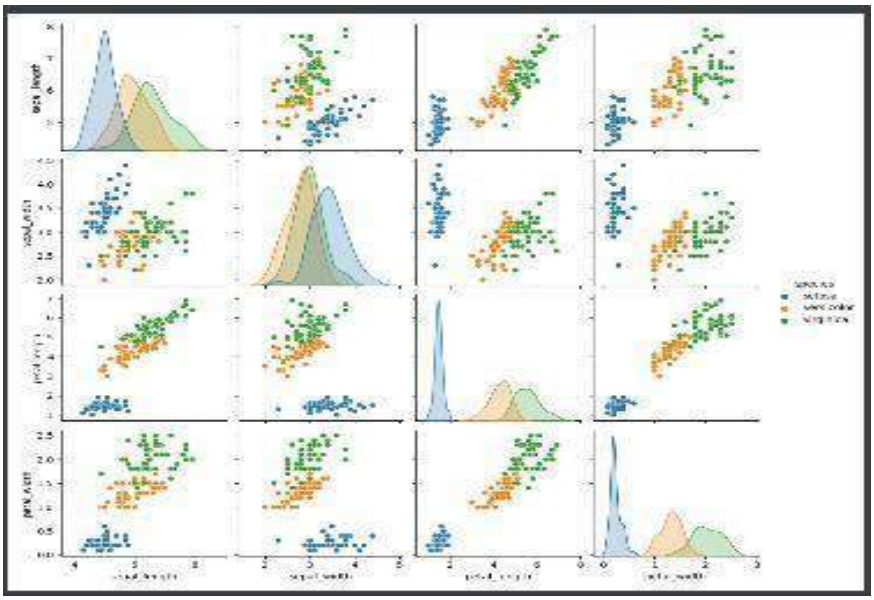
AIM : Program to implement decision tree using any standard dataset available in the public domain and find the accuracy of the algorithm

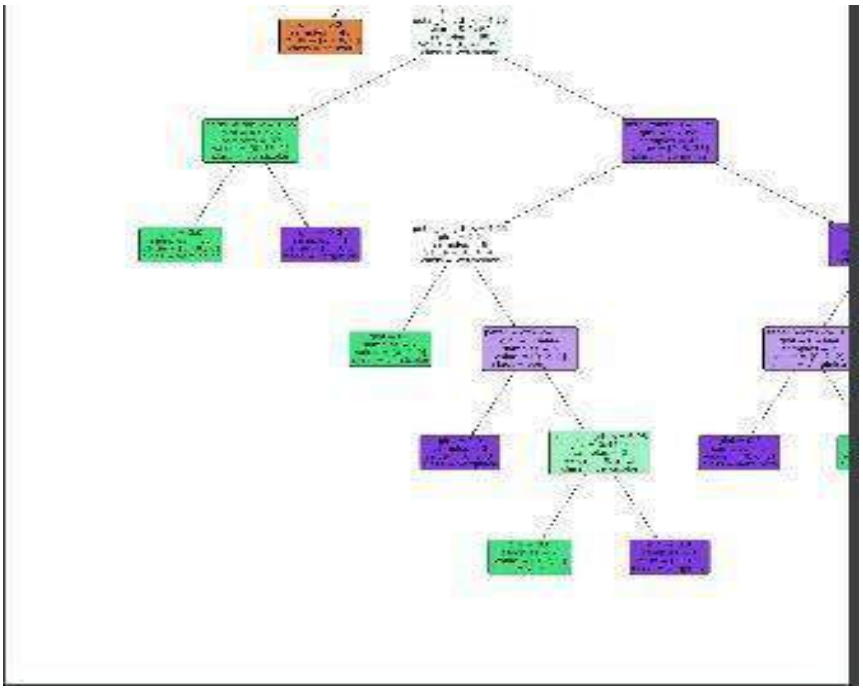
PROGRAM CODE

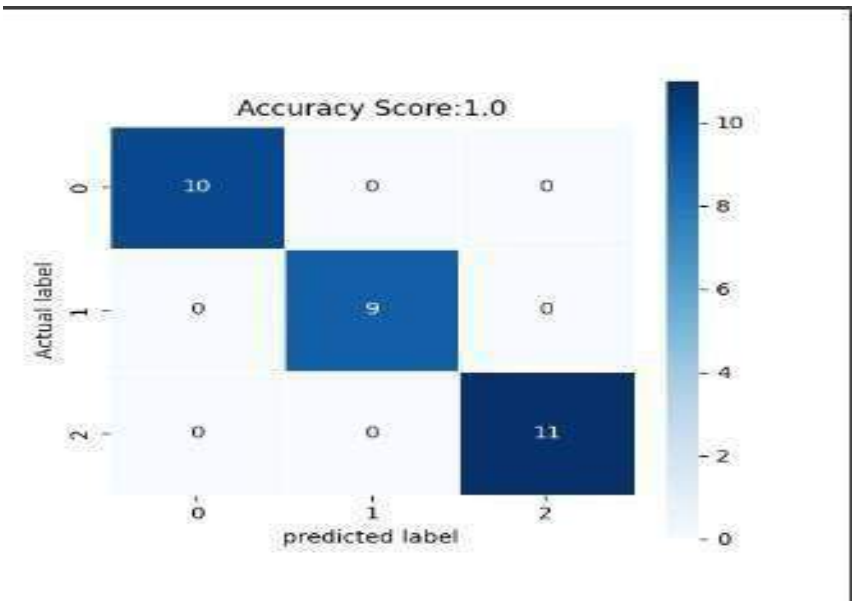
```
Import pandas as pd import numpy as np  import matplotlib.pyplot as
plt  import seaborn as sns  from sklearn.preprocessing import
LabelEncoder  from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier  from  sklearn.metrics
import classification_report, confusion_matrix
from  sklearn.tree import  plot_tree
df=sns.load_dataset('iris')
print(df.head()) print(df.info())
df.isnull().any() print(df.shape)
sns.pairplot(data=df, hue ='species')
plt.savefig("pne.png") sns.heatmap(df.corr())
plt.savefig("next.png")
target =df['species']  df1 =
df.copy()  df1 =
df1.drop('species', axis=1)
print(df1.shape) print(df1.head())
 x=df1  print(target)
le = LabelEncoder() target
=le.fit_transform(target)
print(target)
y= target x_train,  x_test, y_train, y_test = train_test_split(x, y, test_size=0.2,
random_state= 42)  print("training split input" , x_train.shape) print("test split
input",x_test.shape)  dtree=DecisionTreeClassifier()
dtree.fit(x_train, y_train)  print("decision tree classifer created")
y_pred = dtree.predict(x_test) print("classification report-
```

```
\n",classification_report(y_test,y_pred)) cm =
confusion_matrix(y_test,y_pred)
plt.figure(figsize=(5,5))
sns.heatmap(data=cm,linewidths=.5,annot=True,square=True,cmap='Blues')
plt.ylabel('Actual label')  plt.xlabel('predicted label')  all_sample_title =
'Accuracy Score:{0}'.format(dtree.score(x_test,y_test))
plt.title(all_sample_title,size=12) plt.savefig("two.png")
plt.figure(figsize=(20,20))
dec_tree=plot_tree(decision_tree=dtree,feature_names=df1.columns,class_names
=["setosa","vercic olor","verginica"],filled=True ,precision=4,rounded=True)
plt.savefig("three.png")
```

OUTPUT






Accuracy Score:1.0
Actual label
predicted label
10
0
0
0
9
0
0
0
11
0
1
2
10
8
6
4
2
0

PROGRAM NO : 11 **Date :05/01/2022**

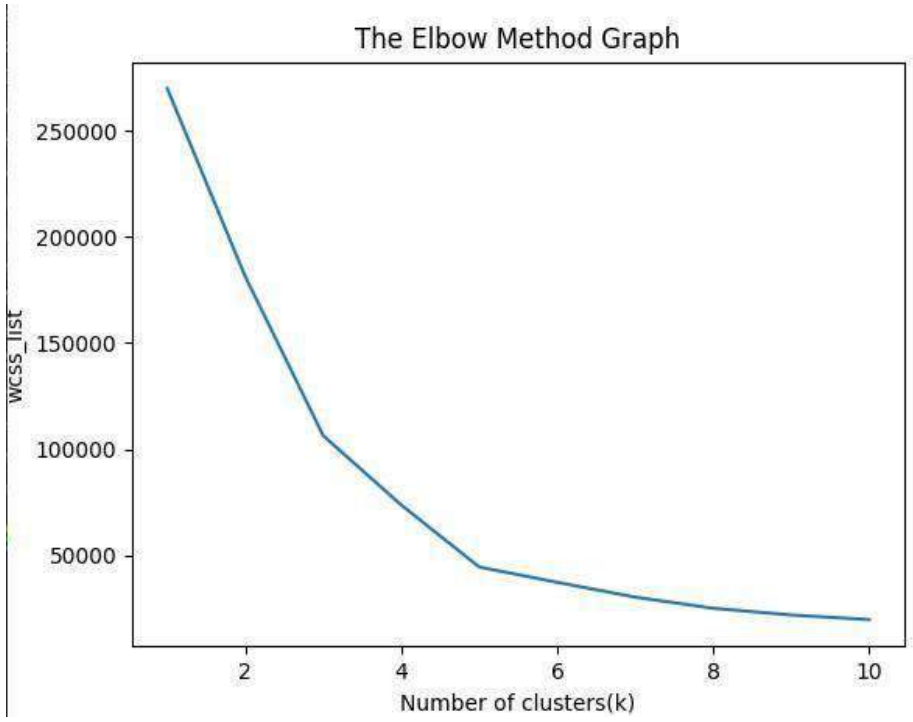
AIM : Program to implement K-Means clustering technique using any standard dataset available in the public domain

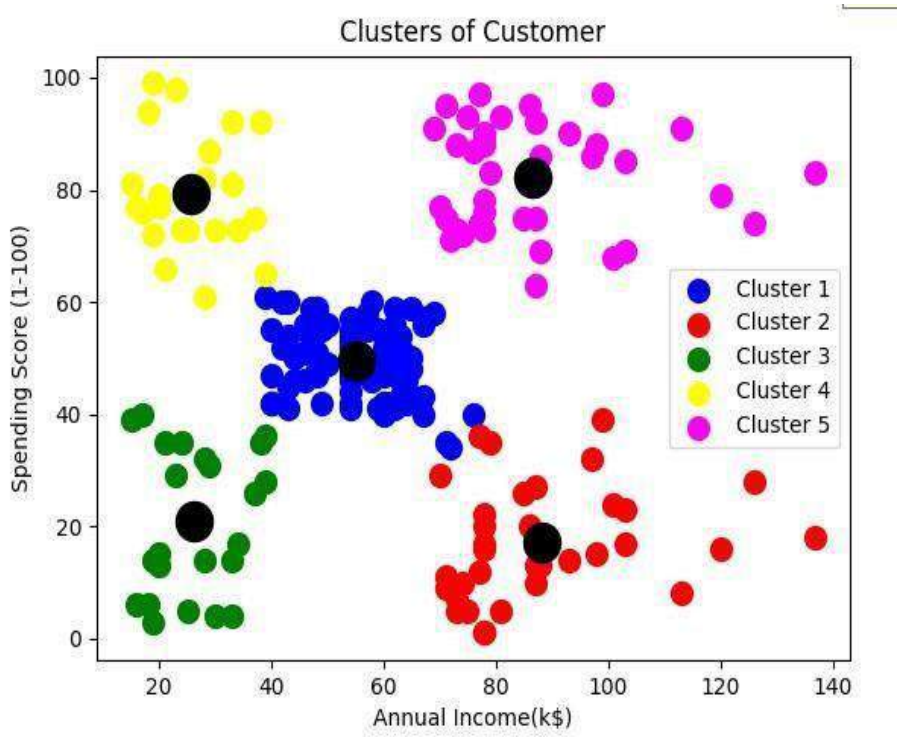
PROGRAM CODE

```
import numpy as nm  import

matplotlib.pyplot as mtp import pandas as

pd

dataset=pd.read_csv('Mall_Customers.csv')

x=dataset.iloc[:,[3,4]].values print(x) from

sklearn.cluster import KMeans wcss_list=[]

for i in range(1,11):

 kmeans=KMeans(n_clusters=i,init='k-means++',random_state=42)

kmeans.fit(x)     wcss_list.append(kmeans.inertia_) mtp.plot(range(1,11),

wcss_list) mtp.title('The Elbow Method Graph') mtp.xlabel('Number of

clusters(k)') mtp.ylabel('wcss_list') mtp.show()

kmeans=KMeans(n_clusters=5,init='k-means++',random_state=42)

y_predict=kmeans.fit_predict(x) print('predict=',y_predict)

mtp.scatter(x[y_predict==0,0],x[y_predict==0,1],s=100,c='blue',label=

'Cluster 1')

mtp.scatter(x[y_predict==1,0],x[y_predict==1,1],s=100,c='red',label='

Cluster 2')
```

```
mtp.scatter(x[y_predict==2,0],x[y_predict==2,1],s=100,c='green',label
='Cluster 3')

mtp.scatter(x[y_predict==3,0],x[y_predict==3,1],s=100,c='yellow',lab

el='Cluster 4')

mtp.scatter(x[y_predict==4,0],x[y_predict==4,1],s=100,c='magenta',la

bel='Cluster 5')

mtp.scatter(kmeans.cluster_centers_[:,0],kmeans.cluster_centers_[:,1],

s=300,c='black') mtp.title('Clusters of Customer') mtp.xlabel('Annual

Income(k$)') mtp.ylabel('Spending Score (1-100)') mtp.legend();

mtp.show()
```

OUTPUT




Clusters of Customer
Spending Score (1-100)
Annual Income(k$)
Cluster 1
Cluster 2
Cluster 3
Cluster 4
Cluster 5
0
20
40
60
80
100
120
140

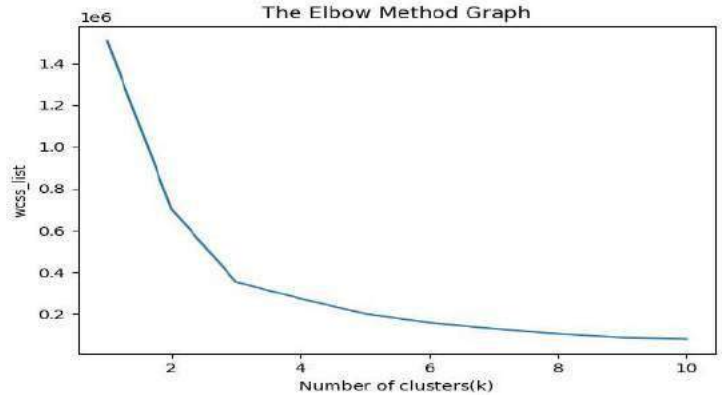
PROGRAM NO : 12 **Date :05/01/2022**

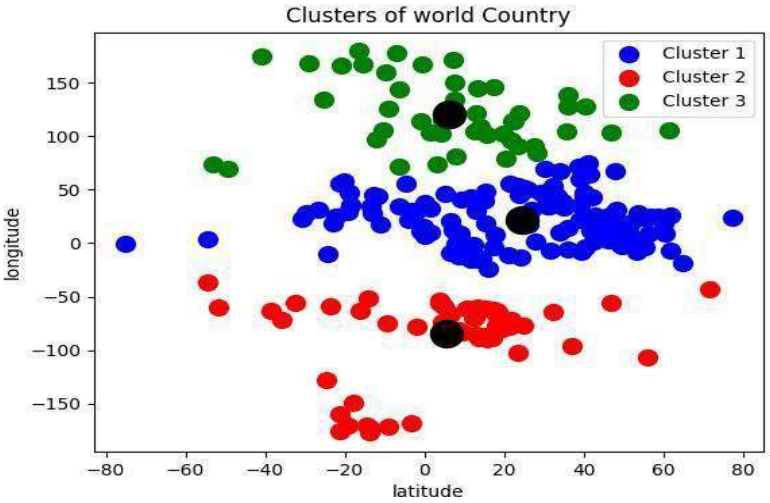
AIM : Program to implement K-Means clustering technique using any standard dataset available in the public domain.

PROGRAM CODE

```
import numpy as nm  import matplotlib.pyplot as mtp  import pandas as pd
dataset=pd.read_csv('world_country_and_usa_states_latitude_and_longitude_values.csv')
x=dataset.iloc[:,[1,2]].values  print(x)  from sklearn.cluster import KMeans wcss_list=[]
for i in range(1,11):
 kmeans=KMeans(n_clusters=i,init='k-means++',random_state=42)
kmeans.fit(x)     wcss_list.append(kmeans.inertia_)
mtp.plot(range(1,11), wcss_list) mtp.title('The Elbow Method
Graph')  mtp.xlabel('Number of clusters(k)')  mtp.ylabel('wcss_list')
mtp.show()  kmeans=KMeans(n_clusters=3,init='k-
means++',random_state=42) y_predict=kmeans.fit_predict(x)
print('predict=',y_predict)
mtp.scatter(x[y_predict==0,0],x[y_predict==0,1],s=100,c='blue',label
='Cluster 1')
mtp.scatter(x[y_predict==1,0],x[y_predict==1,1],s=100,c='red',label='
Cluster 2')
mtp.scatter(x[y_predict==2,0],x[y_predict==2,1],s=100,c='green',label
='Cluster 3')
mtp.scatter(kmeans.cluster_centers_[:,0],kmeans.cluster_centers_[:,1],
s=300,c='black') mtp.title('Clusters of world Country')
mtp.xlabel('latitude') mtp.ylabel('longitude') mtp.legend(); mtp.show()
```

OUTPUT


The Elbow Method Graph
1e6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
wcss_list
2
4
6
8
10
Number of clusters(k)


Clusters of world Country
Cluster 1
Cluster 2
Cluster 3
150
100
50
0
−50
−100
−150
longitude
−80
−60
−40
−20
0
20
40
60
80
latitude

PROGRAM NO : 13 **Date :02/02/2022**

AIM : Programs on convolutional neural network to classify images from any standard dataset in the public domain.

PROGRAM CODE

```
import numpy as np import pandas as pd

import matplotlib.pyplot as plt  import

tensorflow as tf from tensorflow import

keras np.random.seed(42) # tf.set.random.

seed(42)  fashion_mnist =

keras.datasets.fashion_mnist

(X_train, y_train), (X_test, y_test) = fashion_mnist.load_data() print(X_train.shape,

X_test.shape)

X_train = X_train / 255.0 X_test = X_test

/ 255.0 plt.imshow(X_train[1],

cmap='binary') plt.show()

np.unique(y_test)

class_names = ['T-Shirt/Top', 'Trouser', 'Pullover', 'Dress', 'Coat', 'Sandal', 'Shirt', 'Sneaker', '8ag', 'Ankle Boot'] n_rows = 5 n_cols = 10

plt.figure(figsize=(n_cols * 1.4, n_rows * 1.6)) for

row in range(n_rows):     for col in range(n_cols):

  index = n_cols * row + col         plt.subplot(n_rows, n_cols, index 1)

plt.imshow(X_train[index], cmap='binary', interpolation='nearest')   plt.axis('off')
```

```
plt.title(class_names[y_train[index]]) plt.show() model_CNN =
keras.models.Sequential()  model_CNN.add(keras.layers.Conv2D(filters=32,
kernel_size=7, padding='same',
activation='relu', input_shape=[28, 28, 1]))
model_CNN.add(keras.layers.MaxPooling2D(pool_size=2))
model_CNN.add(keras.layers.Conv2D(filters=64, kernel_size=3, padding='same',
activation='relu')) model_CNN.add(keras.layers.MaxPooling2D(pool_size=2))
model_CNN.add(keras.layers.Conv2D(filters=32, kernel_size=3, padding='same',
activation='relu')) model_CNN.add(keras.layers.MaxPooling2D(pool_size=2))

model_CNN.summary() model_CNN.add(keras.layers.Flatten())
model_CNN.add(keras.layers.Dense(units=128, activation='relu'))
model_CNN.add(keras.layers.Dense(units=64, activation='relu'))
model_CNN.add(keras.layers.Dense(units=10, activation='softmax'))
model_CNN.summary()
model_CNN.compile(loss='sparse_categorical_crossentropy', optimizer='adam',
metrics=['accuracy'])

 X_train = X_train[..., np.newaxis] X_test = X_test[..., np.newaxis] history_CNN
= model_CNN.fit(X_train, y_train, epochs=2, validation_split=0.1)
pd.DataFrame(history_CNN.history).plot() plt.grid(True) plt.xlabel('epochs')
plt.ylabel('loss/accuracy') plt.title('Training and validation plot') plt.show() test_loss,
test_accuracy = model_CNN.evaluate(X_test, y_test) print(' Test Loss :{}, Test Accuracy :
{}'.format(test_loss, test_accuracy))
```

OUTPUT

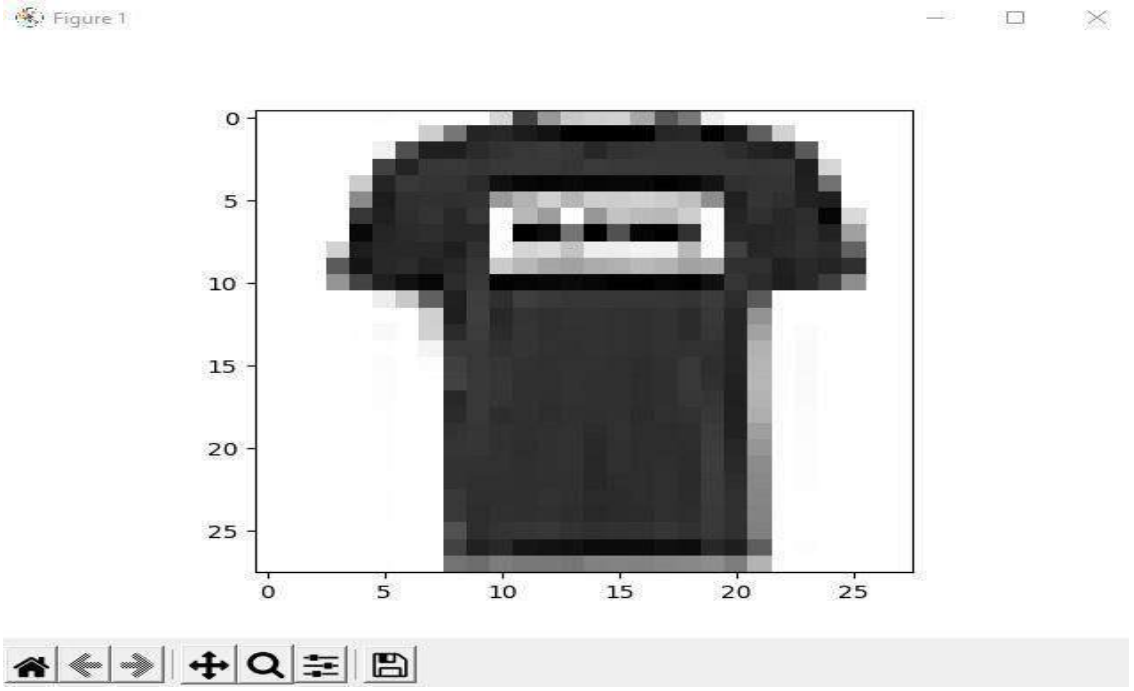
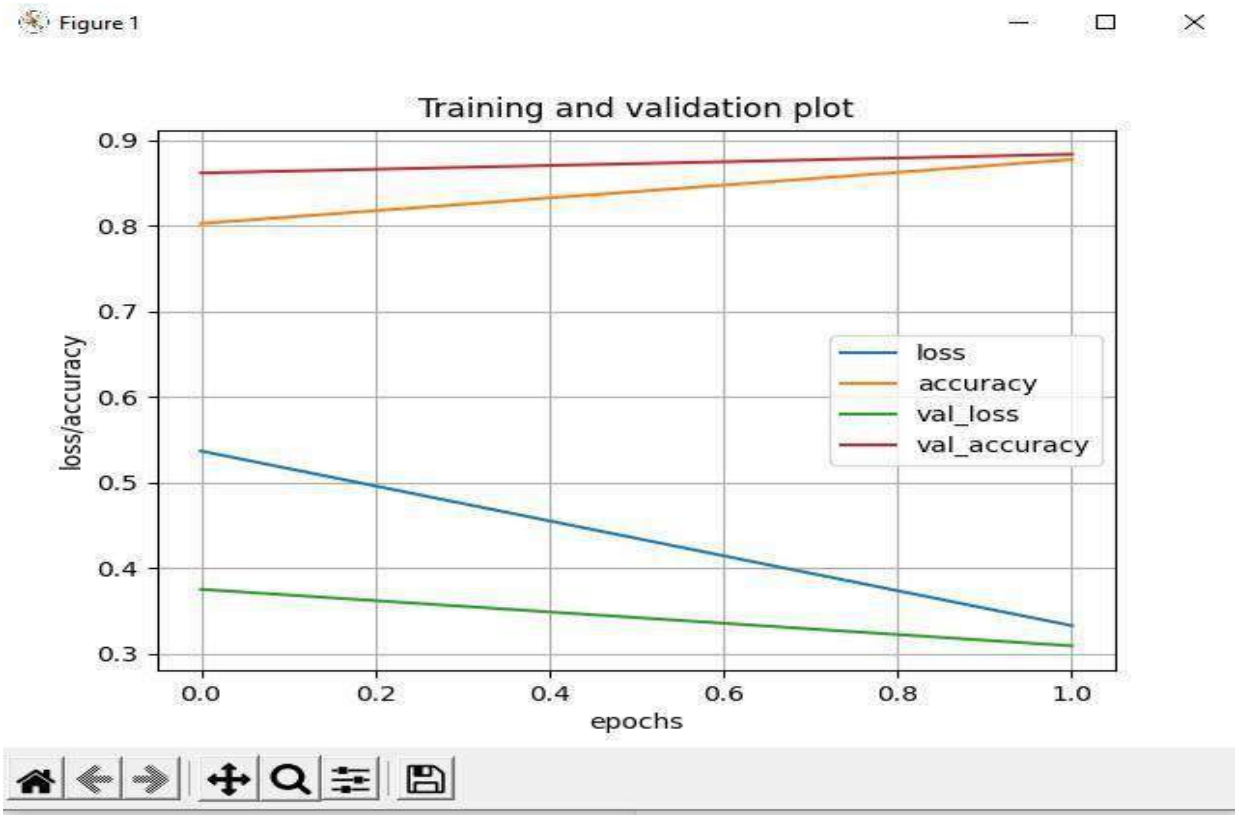


Figure 1
0
5
10
15
20
25
0
5
10
15
20
25


Figure 1
Ankle Boot T-Shirt/Top T-Shirt/Top Dress T-Shirt/Top Pullover Sneaker Pullover Sandal Sandal
T-Shirt/Top Ankle Boot Sandal Sandal Sneaker Ankle Boot Trouser T-Shirt/Top Shirt Coat
Dress Trouser Coat Bag Coat Dress T-Shirt/Top Pullover Coat Coat
Sandal Dress Shirt Shirt T-Shirt/Top Bag Sandal Pullover Trouser Shirt
Shirt Sneaker Ankle Boot Sandal Ankle Boot Pullover Sneaker Dress T-Shirt/Top Dress




```
conv2d_2 (Conv2D)           (None, 7, 7, 32)          18464

max_pooling2d_2 (MaxPooling  (None, 3, 3, 32)         0
2D)

flatten (Flatten)           (None, 288)               0

dense (Dense)               (None, 128)               36992

dense_1 (Dense)             (None, 64)                8256

dense_2 (Dense)             (None, 10)                650

=================================================================
Total params: 84,458
Trainable params: 84,458
Non-trainable params: 0
_________________________________________________________________
Epoch 1/2
1688/1688 [==============================] - 104s 61ms/step - loss: 0.5369 - accuracy: 0.8024 - val_loss: 0.3755 - val_accuracy: 0.8613
Epoch 2/2
1688/1688 [==============================] - 103s 61ms/step - loss: 0.3332 - accuracy: 0.8770 - val_loss: 0.3096 - val_accuracy: 0.8832
```

:

PROGRAM NO:14 **Date:16/02/2022**

AIM : Program to implement a simple web crawler using python.

PROGRAM CODE

```
import requests  import lxml from bs4  import

BeautifulSoup # import beautifulsoup4  url =

"https://www.rottentomatoes.com/top/bestofrt/"

headers = { 'User-Agents' : 'Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/63.0.3239.132 Safari/537.36 QIHU

36OSE'}  f = requests.get(url, headers = headers)  movies_list = []  soup =

BeautifulSoup(f.content, 'html.parser')  movies = soup.find('table', {'class' :

'table'}) .find_all('a')  print(movies)  num = 0 for anchor in movies:

  urls = 'https://www.rottentomatoes.com' + anchor['href']

movies_list.append(urls) print(movies_list) num +=1

movie_url=urls  #movie_url=movies_lst

movie_f=requests.get(movie_url,headers=headers)

movie_soup=BeautifulSoup(movie_f.content,'lxml')

movie_content=movie_soup.find('div',{

    'class':'movie_synopsis clamp clamp-6 js-clamp'
}) print(num,urls,'\n','Movie:' +

anchor.string.strip())

print('Movie info:' + movie_content.string.strip())
```

:

OUTPUT


webcrawler
C:\Users\ajcemca\PycharmProjects\pythonProject2\venv\Scripts\python.exe C:/Users/ajcemca/PycharmProjects/pythonProject2/webcrawler.py
[
It Happened One Night (1934),
Citizen Kane (1941),
The Wizard of Oz (1939),
Modern Times (1936),
Black Panther (2018),
Parasite (Gisaengchung) (2019),
Avengers: Endgame (2019),
Casablanca (1942),
Knives Out (2019),
Zootopia (2016),
Alien (1979),
King Kong (1933),
Shadow of a Doubt (1943),
Call Me by Your Name (2018),
Psycho (1960),
1917 (2020),
L.A. Confidential (1997),
The Florida Project (2017),
War for the Planet of the Apes (2017),
Paddington 2 (2018),
A Hard Day's Night (1964),
Widows (2018),
Never Rarely Sometimes Always (2020),
Baby Driver (2017),
Spider-Man: Homecoming (2017),
The Godfather, Part II (1974),
The Battle of Algiers (La Battaglia di Algeri) (1967)]
['https://www.rottentomatoes.com/m/it_happened_one_night', 'https://www.rottentomatoes.com/m/citizen_kane', 'https://www.rottentomatoes.com/m/the_wizard_of_o
1 https://www.rottentomatoes.com/m/the_battle_of_algiers
Movie:The Battle of Algiers (La Battaglia di Algeri) (1967)
Movie info:Paratrooper commander Colonel Mathieu (Jean Martin), a former French Resistance fighter during World War II, is sent to 1950s Algeria to reinforce
Process finished with exit code 0

:

PROGRAM NO:15 **Date :16/02/2022**

AIM : Program to implement a simple web crawler using python.

PROGRAM CODE

```
from bs4 import BeautifulSoup
import requests
pages_crawled=[ ]  def
crawler(url):
            page =requests.get(url)
 soup=BeautifulSoup(page.text,'html.parser')
links=soup.find_all('a')
          for link in links:
 if 'href' in link.attrs:


if link['href'].startswith('/wiki') and ':' not in link['href']:          if
link['href'] not in pages_crawled:
new_link = f"https://en.wikipedia.org{link['href']}"
pages_crawled.append(link['href'])
              try:
  with open('data.csv','a') as file:
                      file.write(f'{soup.title.text}:{link["href"]}\n')
crawler(new_link)
      except:
          continue
```

:

crawler('https://en.wikipedia.org')

OUTPUT

:

PROGRAM NO:16 **Date:16/02/2022**

AIM : Program to implement scrap of any website.

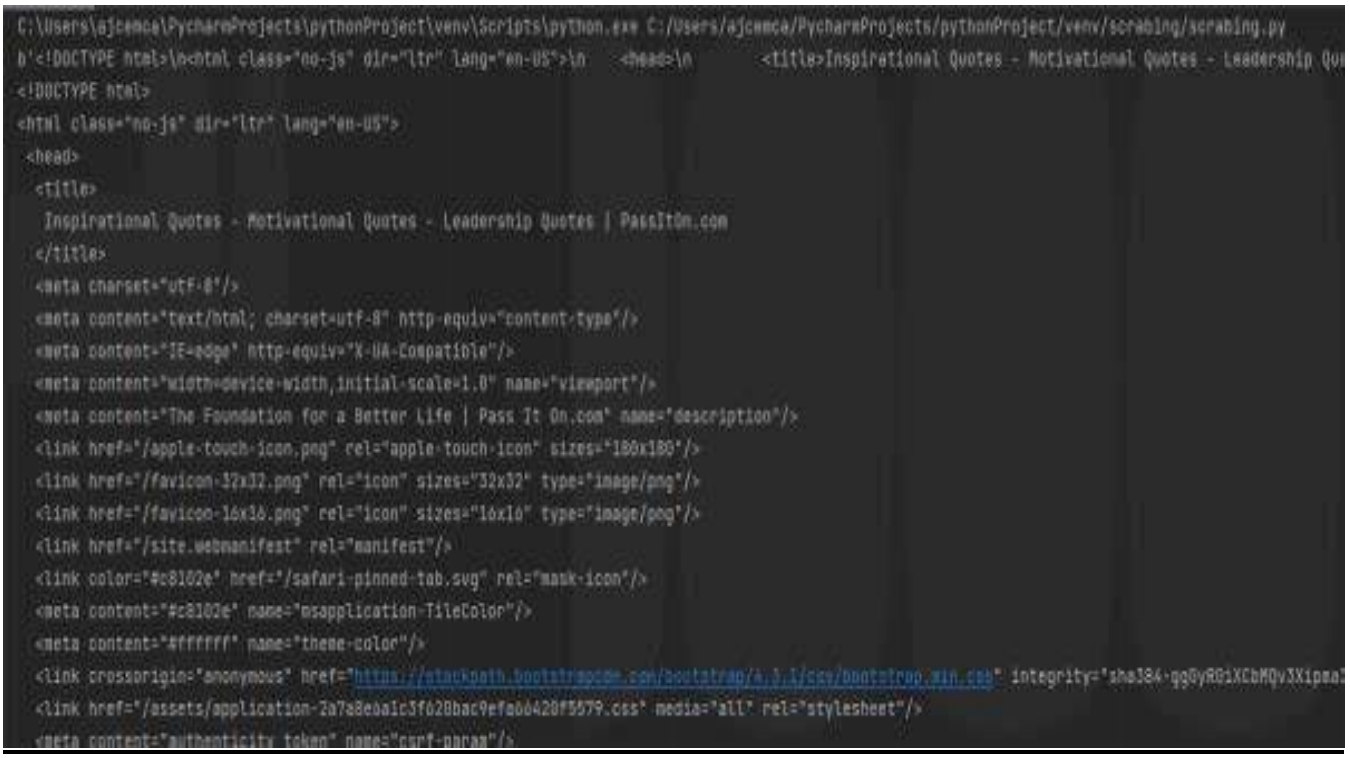
PROGRAM CODE

```
import requests from bs4 import
BeautifulSoup import csv
URL = "http://www.values.com/inspirational-quotes" r
= requests.get(URL) print(r.content)  soup =
BeautifulSoup(r.content, 'lxml') print(soup.prettify())
quotes = [] table = soup.find('div', attrs={'id':
'all_quotes'}) for row in table.findAll('div',
                attrs={'class': 'col-6 col-lg-3 text-center margin-30px-bottom sm-margin30pxtop'}):
        quote = {}
  quote['theme'] = row.h5.text    quote['url'] = row.a['href']
 quote['img'] = row.img['src']    quote['lines'] =
row.img['alt'].split(" #")[0]    quote['author'] =
row.img['alt'].split(" #")[1]
        quotes.append(quote)


filename = 'inspirational_quotes.csv' with
open(filename, 'w', newline='') as f:
        w = csv.DictWriter(f, ['theme', 'url', 'img', 'lines', 'author'])
```

:

```
w.writeheader()   for quote in
quotes:
    w.writerow(quote)
```

OUTPUT



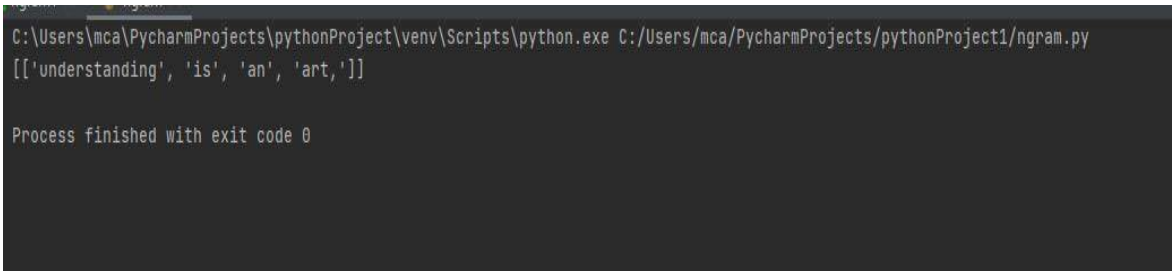
PROGRAM NO : 17 **Date :16/02/2022**

AIM : Program for Natural Language Processing which performs n-grams.

PROGRAM CODE

```
def generate_ngrams(text, WordsToCombine):
 words = text.split()      output = []     for i in
range(len(words) - WordsToCombine + 1):
output.append(words[i:i+1 + WordsToCombine])
      return output
x=generate_ngrams(text='understanding is an art, not everyone is
    an artist', WordsToCombine=3)
print(x)
```

OUTPUT



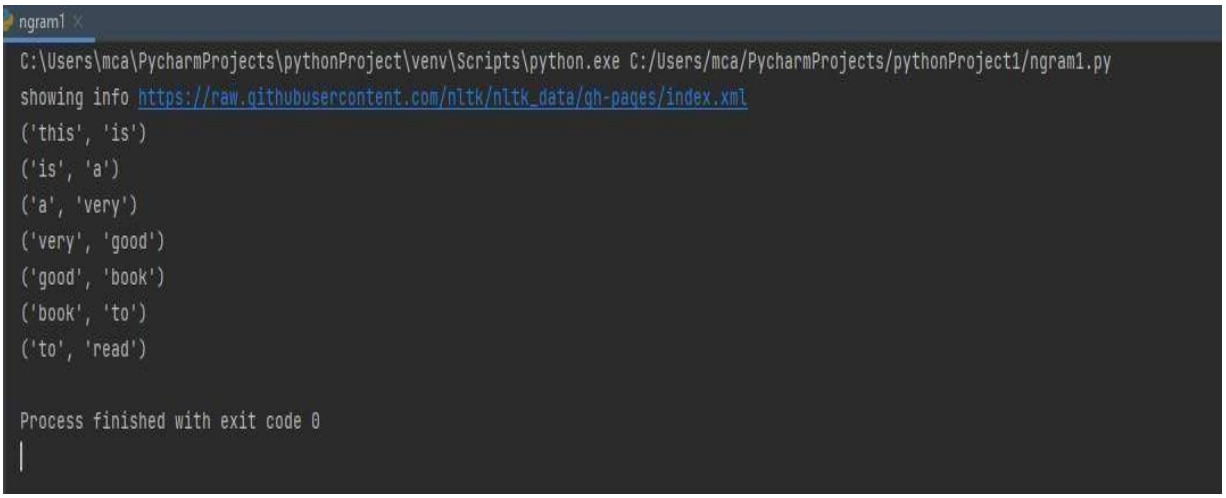
PROGRAM NO : 18 **Date :16/02/2022**

AIM : Program for Natural Language Processing which performs n-grams (Using in built functions).

PROGRAM CODE

```
import nltk nltk.download('punkt')
from nltk.util import ngrams
sampleText='this is a very good book
tostudy'
NGRAMS=ngrams(sequence=nltk.word_tokenize(sampleText),n
=2) for grams in NGRAMS:   print(grams)
```

OUTPUT



PROGRAM NO:19 **Date:16/02/2022**

AIM : Program for Natural Language Processing which performs speech tagging.

PROGRAM CODE

```
import nltk from nltk.corpus import stopwords from
nltk.tokenize import word_tokenize, sent_tokenize stop_words
= set(stopwords.words('english')) txt =
"Sukanya, Rajib and Naba are my good friends. " \
    "Sukanya is getting married next year. " \
    "Marriage is a big step in one’s life." \
    "It is both exciting and frightening. " \
    "But friendship is a sacred bond between people." \
    "It is a special kind of love between us. " \
    "Many of you must have tried searching for a friend " \
    "but never found the right
one." tokenized =
sent_tokenize(txt) for i in
tokenized:
  wordsList = nltk.word_tokenize(i)    wordsList = [w
for w in wordsList if not w in stop_words]    tagged =
nltk.pos_tag(wordsList)    print(tagged)
```

OUTPUT


nlp
C:\Users\mca\PycharmProjects\pythonProject\venv\Scripts\python.exe C:/Users/mca/PycharmProjects/pythonProject1/nlp.py
[('Sukanya', 'NNP'), (',', ','), ('Rajib', 'NNP'), ('Naba', 'NNP'), ('good', 'JJ'), ('friends', 'NNS'), ('.', '.')]
[('Sukanya', 'NNP'), ('getting', 'VBG'), ('married', 'VBN'), ('next', 'JJ'), ('year', 'NN'), ('.', '.')]
[('Marriage', 'NN'), ('big', 'JJ'), ('step', 'NN'), ('one', 'CD'), ('', 'NN'), ('life.It', 'NN'), ('exciting', 'VBG'), ('frightening', 'NN'), ('.', '.')]
[('But', 'CC'), ('friendship', 'NN'), ('sacred', 'VBD'), ('bond', 'NN'), ('people.It', 'NN'), ('special', 'JJ'), ('kind', 'NN'), ('love', 'VB'), ('us', 'PR
[('Many', 'JJ'), ('must', 'MD'), ('tried', 'VB'), ('searching', 'VBG'), ('friend', 'NN'), ('never', 'RB'), ('found', 'VBD'), ('right', 'JJ'), ('one', 'CD'
Process finished with exit code 0

PROGRAM NO:20 **Date:23/02/2022**

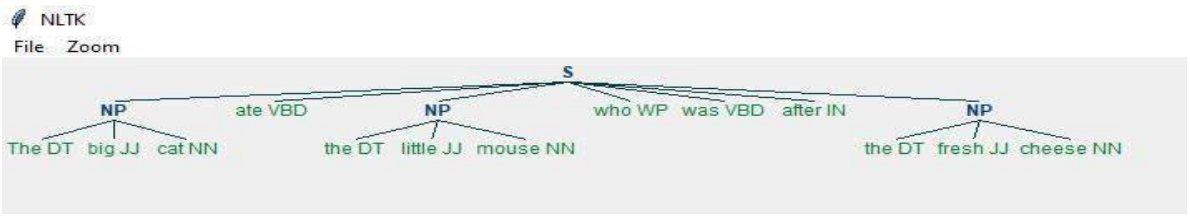
AIM : Python program which performs Natural language processing which perform Chunking.

PROGRAM CODE

```
import nltk new="The big cat ate the little mouse who was after the fresh cheese"
new_tokens=nltk.word_tokenize(new) print(new_tokens) new_tag=nltk.pos_tag(new_tokens)
print(new_tag) grammer=r"NP: {<DT>?<JJ>*<NN>}" chunkParser=nltk.RegexpParser(grammer)
chunked=chunkParser.parse(new_tag) print(chunked) chunked.draw()
```

OUTPUT

```
C:\Users\mca\PycharmProjects\pythonProject\venv\Scripts\python.exe C:/Users/mca/PycharmProjects/pythonProject1/chunking.py
['The', 'big', 'cat', 'ate', 'the', 'little', 'mouse', 'who', 'was', 'after', 'the', 'fresh', 'cheese']
[('The', 'DT'), ('big', 'JJ'), ('cat', 'NN'), ('ate', 'VBD'), ('the', 'DT'), ('little', 'JJ'), ('mouse', 'NN'), ('who', 'WP'), ('was', 'VBD'), ('after', 'I
(S
  (NP The/DT big/JJ cat/NN)
  ate/VBD
  (NP the/DT little/JJ mouse/NN)
  who/WP
  was/VBD
  after/IN
  (NP the/DT fresh/JJ cheese/NN))
```

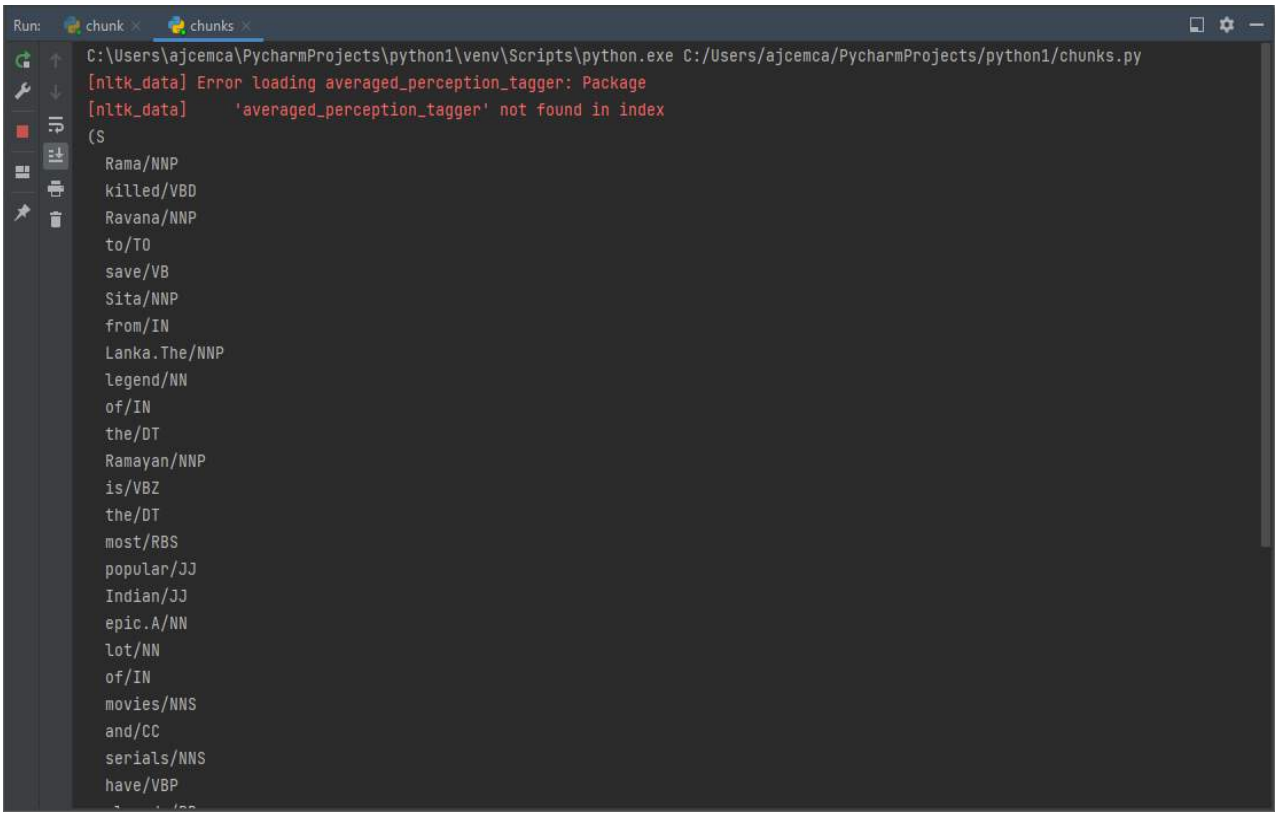


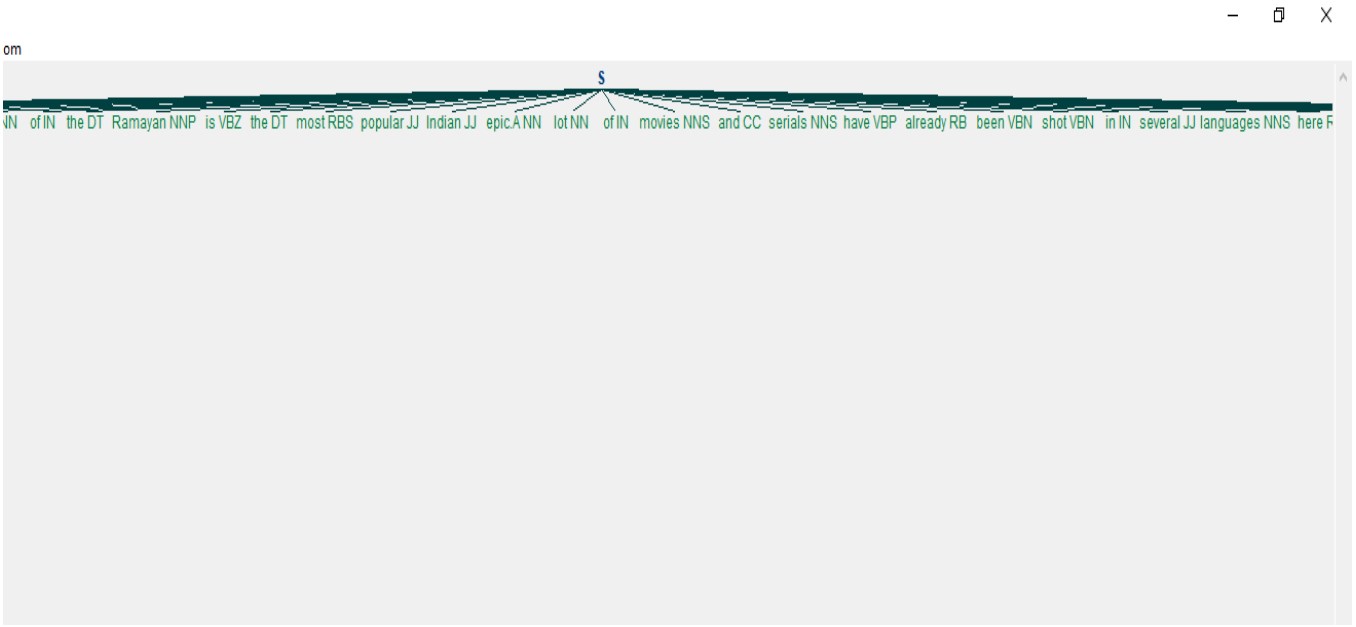
PROGRAM NO:21 **Date:23/02/2022**

AIM : Python program which performs Natural language processing which perform Chunking.

```
import nltk
nltk.download('averaged_perception_tagger')
sample_text="""
Rama killed Ravana to save Sita from Lanka.The legend of the Ramayan is the most popular Indian epic.A lot of movies
and serials have already been shot in several languages here in India based on the Ramayana."""

tokenized=nltk.sent_tokenize(sample_text)
for i in tokenized:
    words=nltk.word_tokenize(i)
    tagged_words=nltk.pos_tag(words)
    chunkGram=r"""VB: {}"""
    chunkParser=nltk.RegexpParser(chunkGram)
    chunked=chunkParser.parse(tagged_words)
    print(chunked)
    chunked.draw()
```

OUTPUT:


Run:
chunk
chunks
C:\Users\ajcemca\PycharmProjects\python1\venv\Scripts\python.exe C:/Users/ajcemca/PycharmProjects/python1/chunks.py
[nltk_data] Error loading averaged_perception_tagger: Package
[nltk_data] 'averaged_perception_tagger' not found in index
(S
Rama/NNP
killed/VBD
Ravana/NNP
to/TO
save/VB
Sita/NNP
from/IN
Lanka.The/NNP
legend/NN
of/IN
the/DT
Ramayan/NNP
is/VBZ
the/DT
most/RBS
popular/JJ
Indian/JJ
epic.A/NN
lot/NN
of/IN
movies/NNS
and/CC
serials/NNS
have/VBP


om
S
IN of IN the DT Ramayan NNP is VBZ the DT most RBS popular JJ Indian JJ epic.A NN lot NN of IN movies NNS and CC serials NNS have VBP already RB been VBN shot VBN in IN several JJ languages NNS here F