# 20MCA241 DATA SCIENCE LAB

*Lab Report Submitted By*

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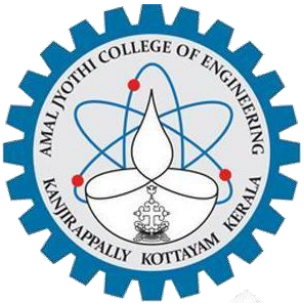
**Reg. No.: AJC20MCA-2041**

*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**

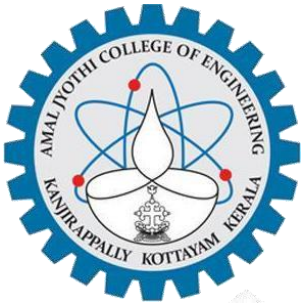
[Affiliated to APJ Abdul Kalam Technological University, Kerala. Approved by AICTE, Accredited by NAAC with 'A' grade. Koovappally, Kanjirappally, Kottayam, Kerala – 686518]

**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 **HIMA M S (Reg.No:AJC20MCA-2041)** 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.

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**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,matrix2)
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:

4       4       11
6       4       6
9       11      5

Matrix2:

8       10      10
11      9       8

8       11      10

Adding

12      14      21
17      13      14
17      22      15

Subtraction

-4      -6      1
-5      -5      -2
1       0       -5
```

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 3 2

matrix 2

2 3 3

3 3 2

2 3 3

Transpose

12 17 17

14 13 22

21 14 15

Process finished with exit code 0

**PROGRAM NO : 02** **Date :01/12/2021**

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

**PROGRAM CODE**

```
from scipy. linalg import svd
from numpy import array
A= ([[1,2,5], [2,0,1], [1,4,4]])
print(A)
X, B, T=svd(A)
print("decomposition")
print(X)
print("inverse")
print(B)
print("transpose")
print(T)
```

**OUTPUT**

```
 [[1, 2, 5], [2, 0, 1], [1, 4, 4]]
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
```

**PROGRAM NO : 03** **Date :01/12/2021**

**AIM :Program to implement k-NN Classification using any standard dataset available in the public domain and find the accuracy of the algorithm using built-in 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
```

**PROGRAM NO : 04** **Date :01/12/2021**

**AIM : Program to implement k-NN Classification using any random dataset without using in-build 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
from sklearn.model_selection import train_test_split from sklearn.preprocessing import
StandardScaler from sklearn.naive_bayes import GaussianNB
from sklearn.metrics import confusion_matrix,accuracy_score
dataset=pd.read_csv('Social_Network_Ads.csv')
x=dataset.iloc[:,[2,3]].values
y=dataset.iloc[:,-1].values x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.30)
sc=StandardScaler()
x_train=sc.fit_transform(x_train)
x_test=sc.transform(x_test)
classifier=GaussianNB()
classifier.fit(x_train,y_train)
y_pred=classifier.predict(x_test) print(y_pred)
ac = accuracy_score(y_test,y_pred)
print(ac)
```

**OUTPUT**

```
C:\Users\ajcemca\PycharmProjects\pythonProject\venv\Scripts\python.exe C:/Users/ajce
[0 0 0 0 0 1 1 1 0 0 1 0 1 0 0 0 1 1 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 0 0 0
 1 1 0 1 0 0 0 0 0 0 1 1 1 0 1 0 1 0 0 1 1 0 1 0 0 0 0 0 0 1 0 0 0 1 1 1 0
 1 1 0 1 0 0]
0.875
```

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

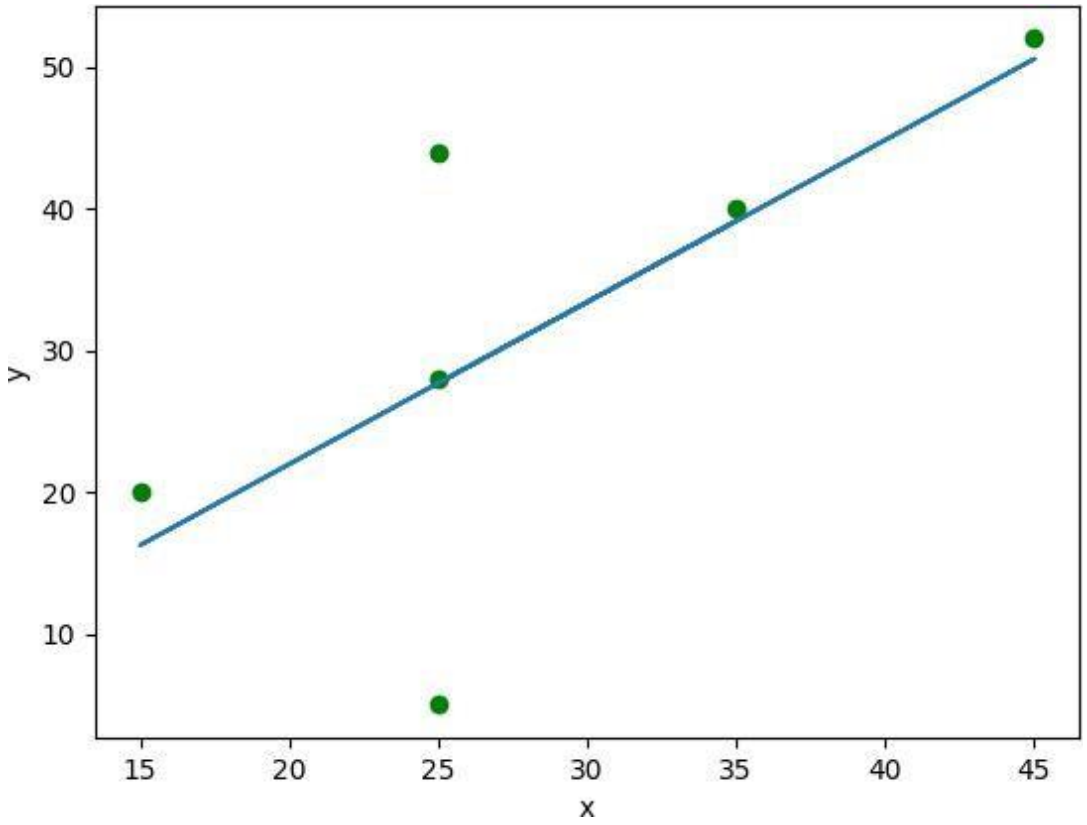
**AIM : Program to implement linear and multiple regression techniques using any standard dataset available in the public domain.**

**PROGRAM CODE**

```
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression x=np.array([5,15,25,35,45,55]).reshape((-1,1))
y=np.array([5,20,14,32,22,38])
print(x)
print(y)
model=LinearRegression() model.fit(x,y) r_sq=model.score(x,y)
print('coefficent of determination: ',r_sq)
print('intercept: ',model.intercept_)
print('slope : ',model.coef_)
y_pred=model.predict(x)
print('Predicted response: ',y_pred) plt.scatter(x,y,color="g")
plt.plot(x,y_pred) plt.xlabel('x')
plt.ylabel('y')
plt.show()
```

**OUTPUT**

```
C:\Users\ajcemca\PycharmProjects\pythonProject\venv\Scripts\python.exe C:/Users/ajcemca/Pycharm
[[ 5]
 [15]
 [25]
 [35]
 [45]
 [55]]
[ 5 20 14 32 22 38]
coefficent of determination:  0.7158756137479542
intercept:  5.633333333333329
slope :  [0.54]
Predicted response:  [ 8.33333333 13.73333333 19.13333333 24.53333333 29.93333333 35.33333333]
```



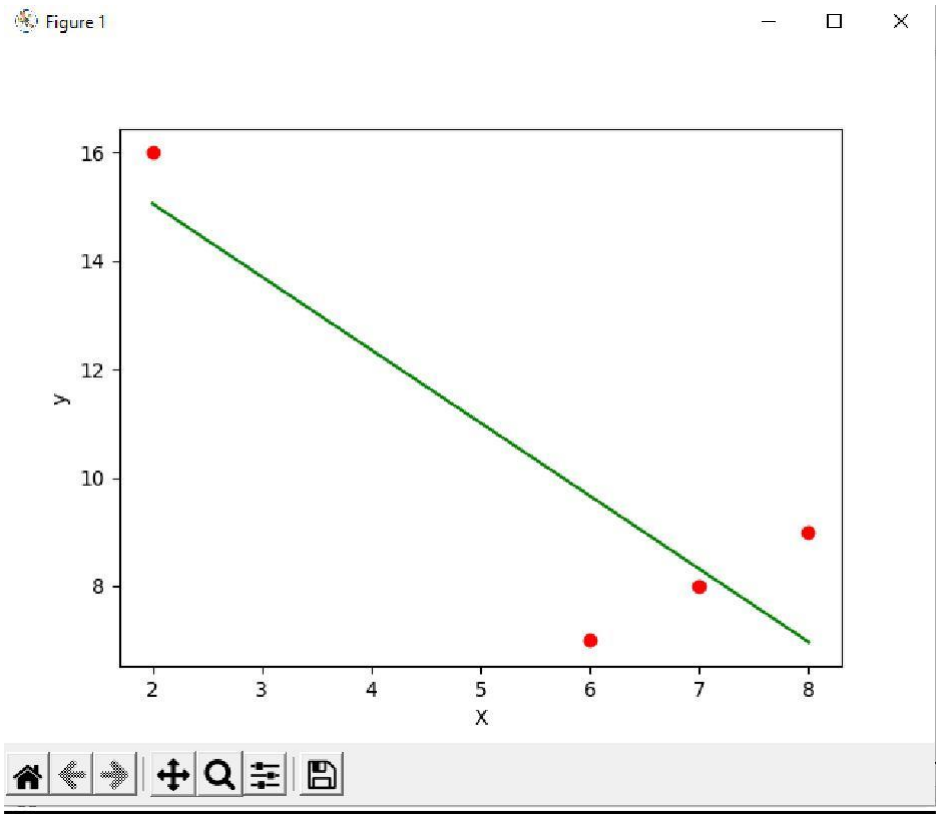
**PROGRAM NO : 07** **Date :08/12/2021**

**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 : 08** **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**

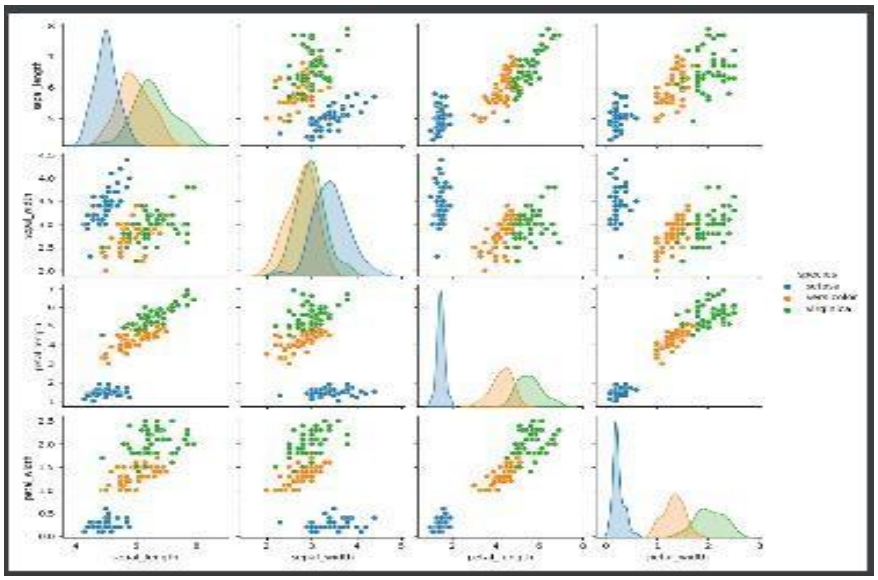
**AIM : Program to implement decision tree using any standard dataset available in the public domain and find the accuracy of the algorithm**

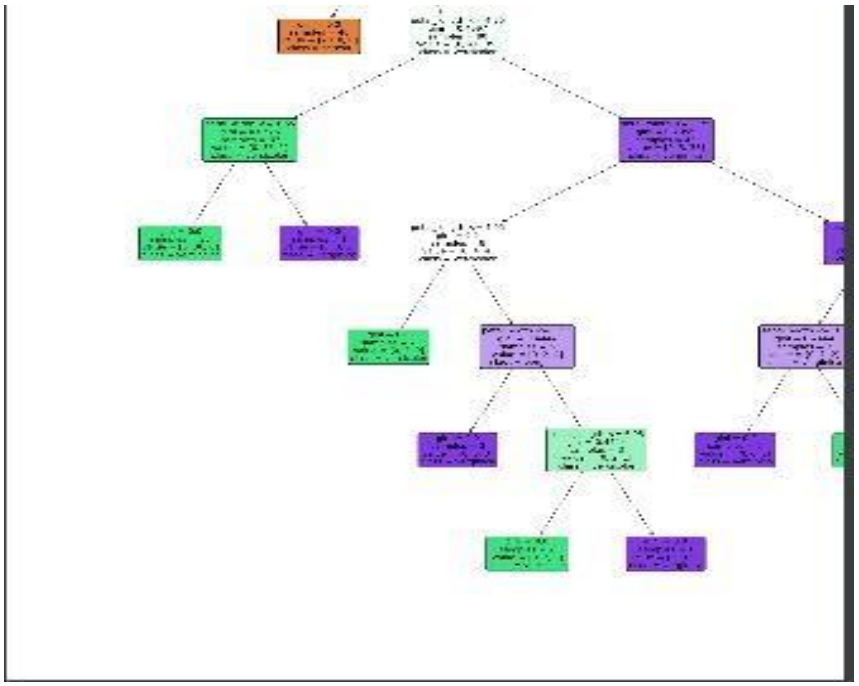
**PROGRAM CODE**

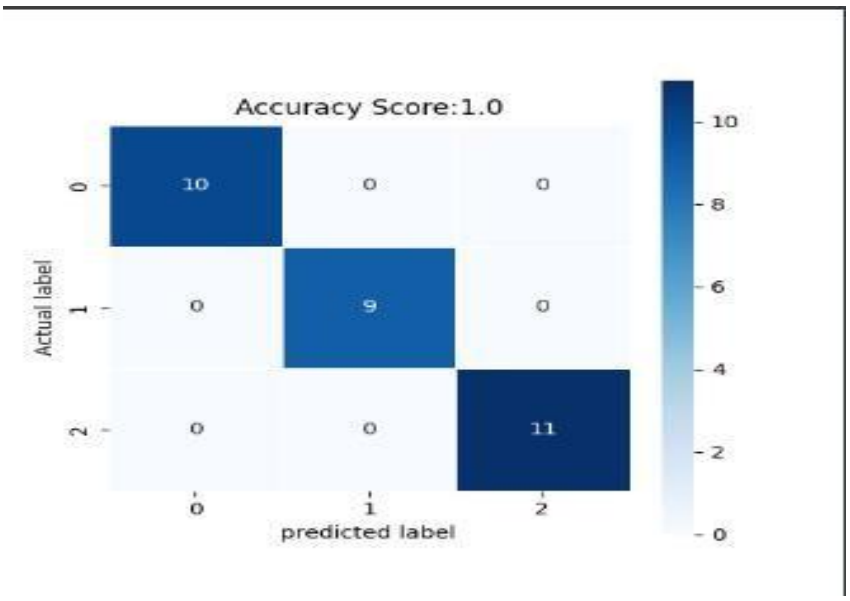
```
Import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.preprocessing import LabelEncoder
from sklearn.model_selection import train_test_split
from  sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import classification_report, confusion_matrix
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**

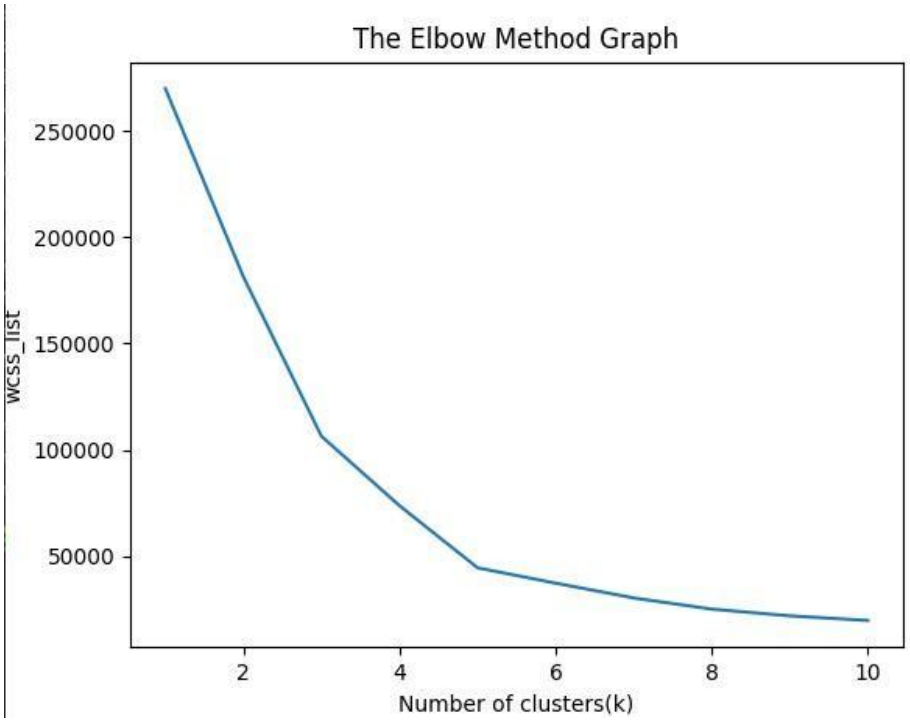
**AIM : Program to implement K-Means clustering technique using any standard dataset available in the public domain**

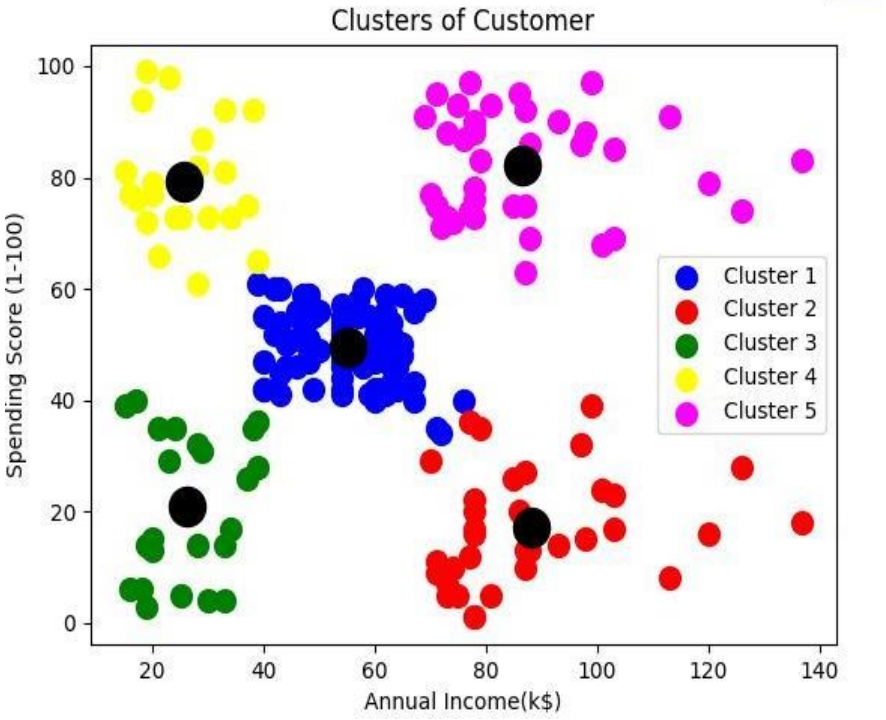
**PROGRAM CODE**

```
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',label='Cluster 4')

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


The Elbow Method Graph
wcss_list
250000
200000
150000
100000
50000
2
4
6
8
10
Number of clusters(k)


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

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

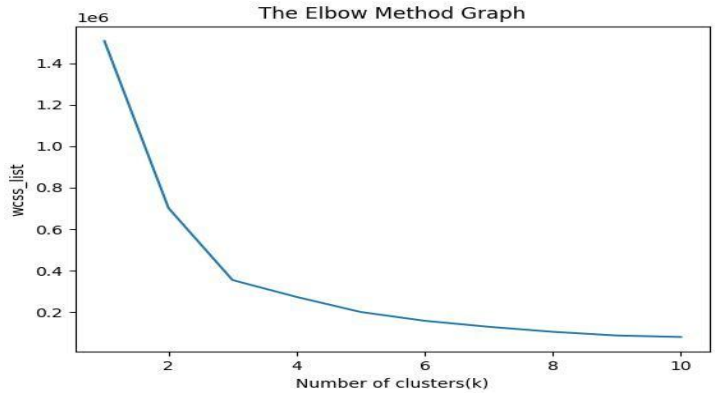
**AIM : Program to implement K-Means clustering technique using any standard dataset available in the public domain.**

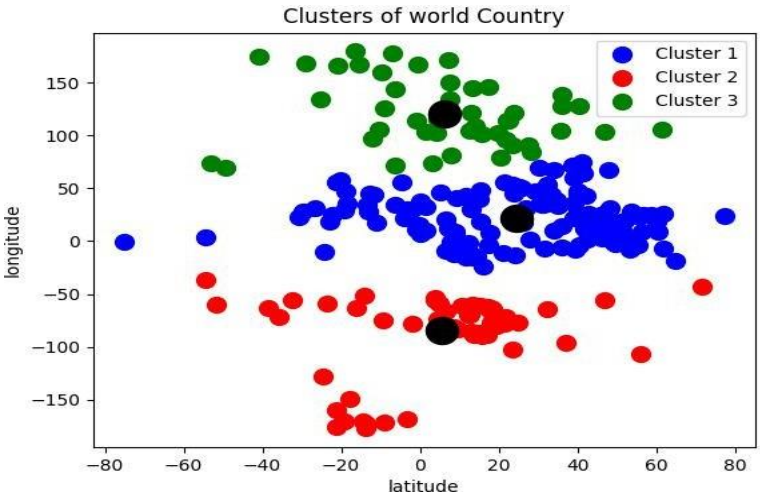
**PROGRAM CODE**

```
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**

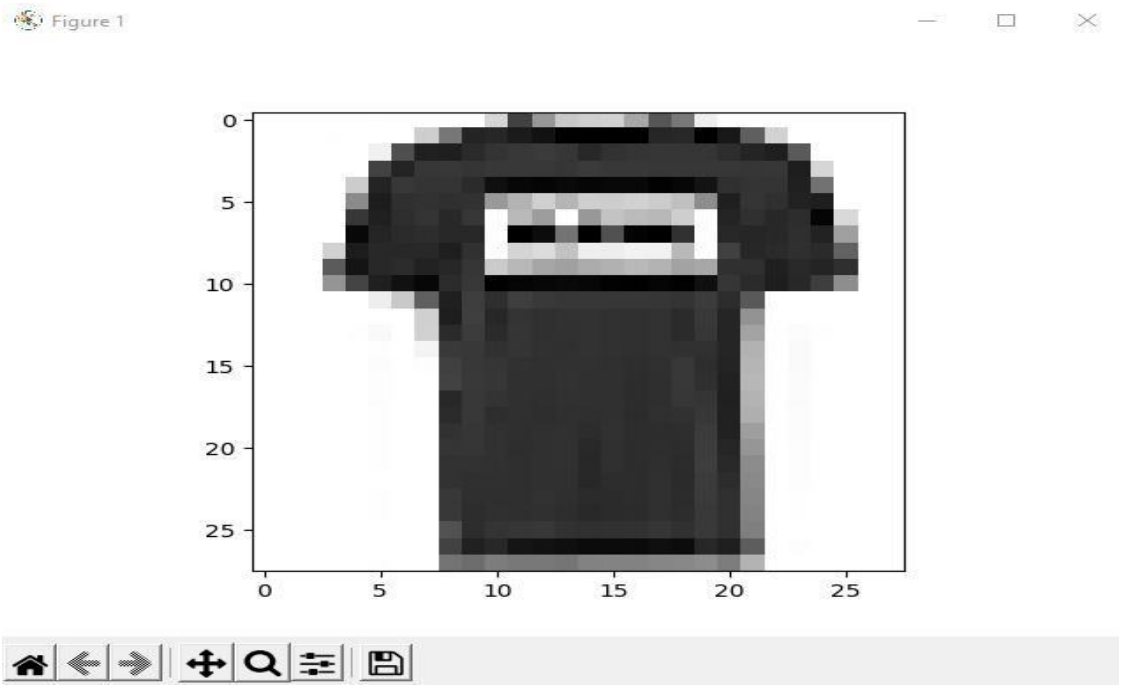
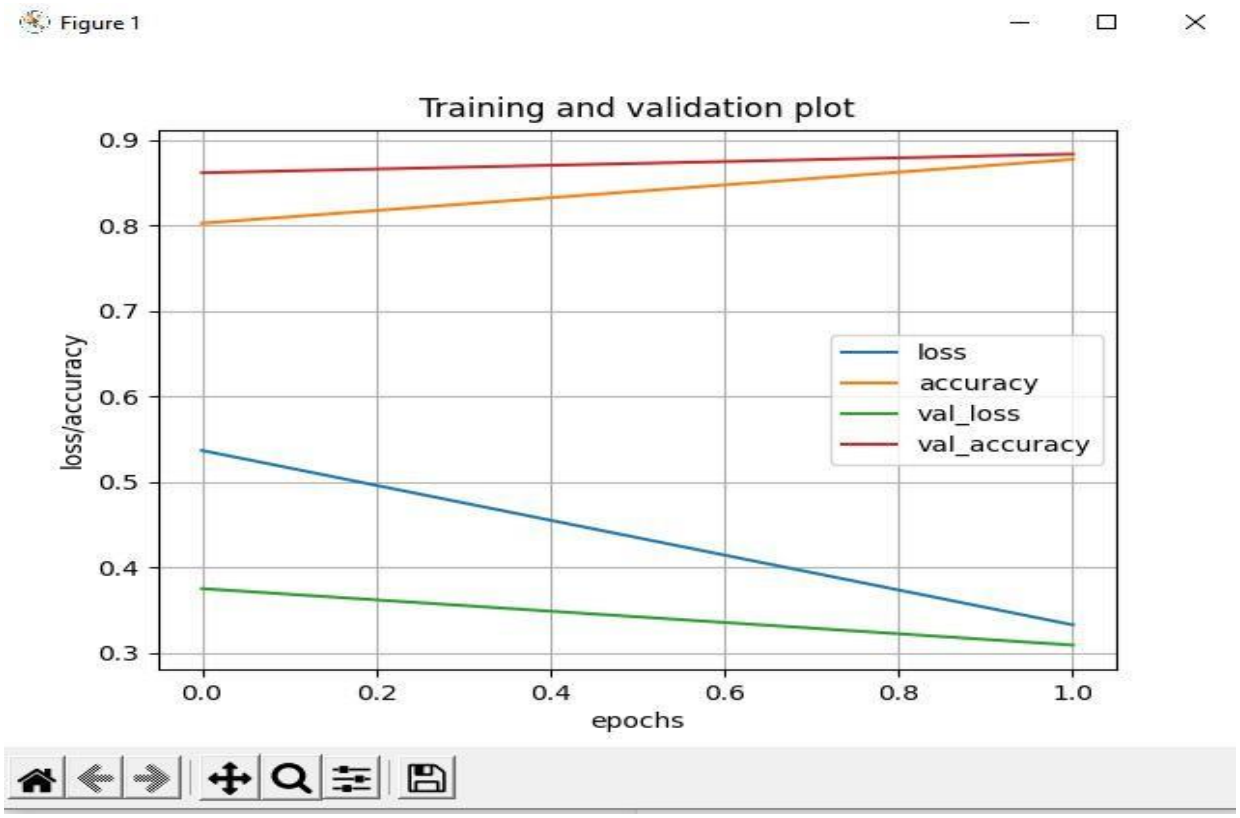


Figure 1
0
5
10
15
20
25
0
5
10
15
20
25


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
8ag
Coat
Dress
T-Shirt/Top
Pullover
Coat
Coat
Sandal
Dress
Shirt
Shirt
T-Shirt/Top
8ag
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**

**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**


Reader Mode
Wikipedia, the free encyclopedia; Main Page; /wiki/Wikipedia
Wikipedia, the free encyclopedia; Main Page; /wiki/Free_content
Wikipedia, the free encyclopedia; Main Page; /wiki/Encyclopedia
Wikipedia, the free encyclopedia; Main Page; /wiki/English_language
Wikipedia, the free encyclopedia; Main Page; /wiki/SS_Choctaw
Wikipedia, the free encyclopedia; Main Page; /wiki/Cargo_ship
Wikipedia, the free encyclopedia; Main Page; /wiki/Great_Lakes
Wikipedia, the free encyclopedia; Main Page; /wiki/Lake_freighter
Wikipedia, the free encyclopedia; Main Page; /wiki/Whaleback
Wikipedia, the free encyclopedia; Main Page; /wiki/Alexander_McDougall_(ship_designer)
Wikipedia, the free encyclopedia; Main Page; /wiki/American_Ship_Building_Company
Wikipedia, the free encyclopedia; Main Page; /wiki/Cleveland
Wikipedia, the free encyclopedia; Main Page; /wiki/Michigan
Wikipedia, the free encyclopedia; Main Page; /wiki/Detroit
Wikipedia, the free encyclopedia; Main Page; /wiki/Escanaba,_Michigan
Wikipedia, the free encyclopedia; Main Page; /wiki/Marquette,_Michigan
Wikipedia, the free encyclopedia; Main Page; /wiki/Glossary_of_nautical_terms#upbound
Wikipedia, the free encyclopedia; Main Page; /wiki/Iron_ore
Wikipedia, the free encyclopedia; Main Page; /wiki/Lake_Huron
Wikipedia, the free encyclopedia; Main Page; /wiki/New_Presque_Isle_Light
Wikipedia, the free encyclopedia; Main Page; /wiki/Glossary_of_nautical_terms#canaller

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

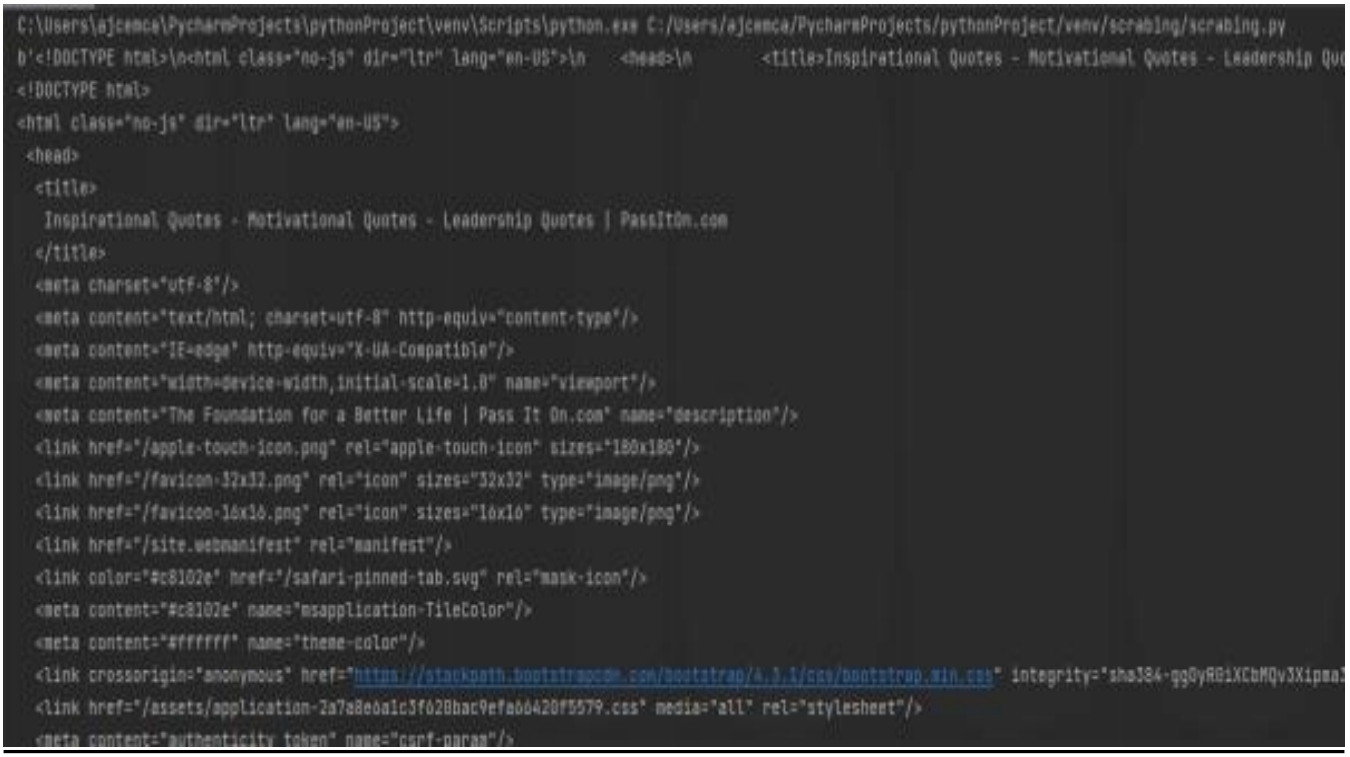
**AIM : Program to implement scrap of any website.**

**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-margin-30px-top'}):
        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**



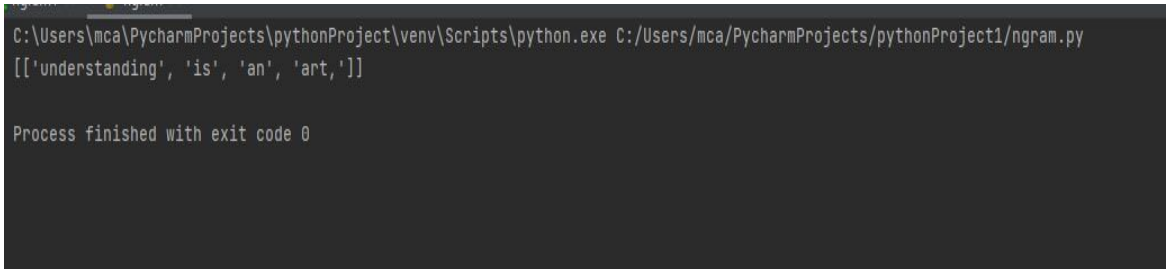
**PROGRAM NO : 17** **Date :16/02/2022**

**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**



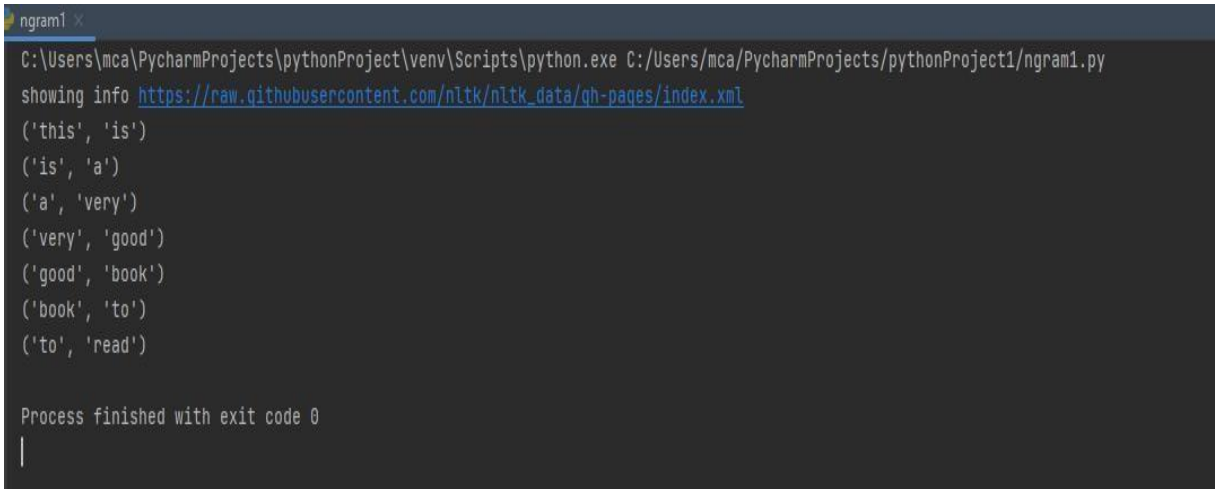
**PROGRAM NO : 18** **Date :16/02/2022**

**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 to study'

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**

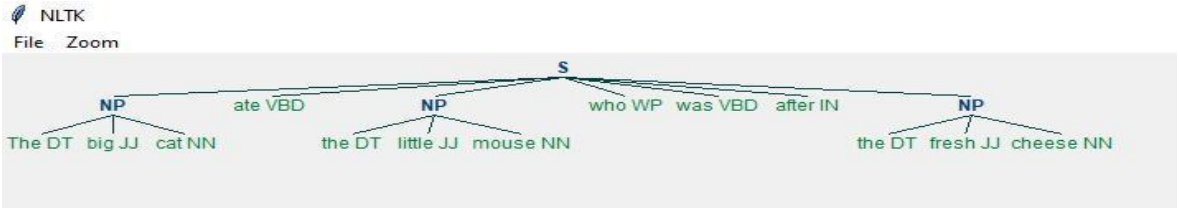
**AIM : Python program which performs Natural language processing which perform Chunking.**

**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**

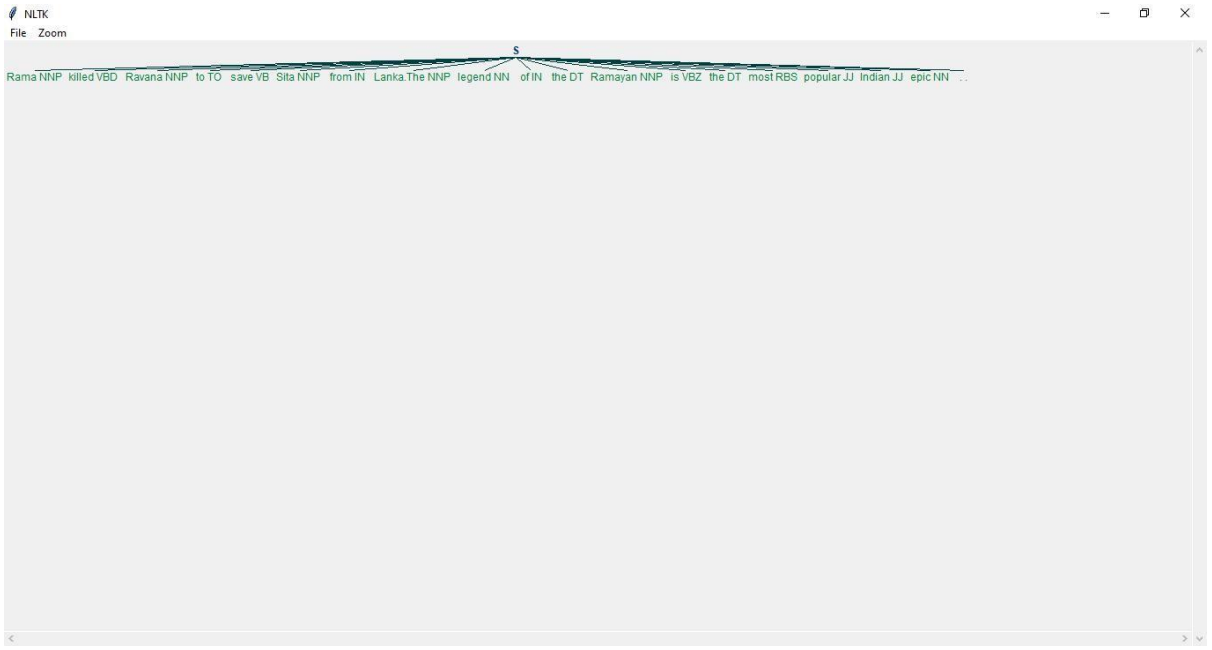
**AIM : Program for natural language processing which performs chunking.**

**PROGRAM CODE**

```
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 have already been shot in several language here in India based on the Ramayana."""


tokenize= nltk.sent_tokenize(sample_text)

for i in tokenize:

    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**


(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/NN
./.)


NLTK
File Zoom
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 NN .