20MCA241 DATA SCIENCE LAB

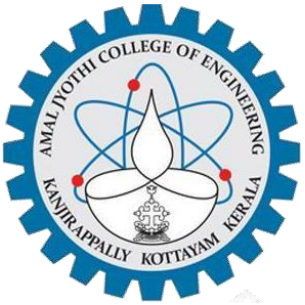
Lab Report Submitted By

ALEENA JOSEPH

Reg. No.: AJC20MCA-2008

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 **ALEENA JOSEPH (Reg.No:AJC20MCA-2008)** 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. Meera Rose Mathew
Staff In-Charge

Rev.Fr.Dr.Rubin Thottupurathu Jose
Head of the Department

Internal Examiner

External Examine

CONTENT

11	**Program to implement K-Means clustering technique using any standard dataset available in the public domain.**	**05/01/2022**	**22**	
12	**Program to implement K-Means clustering technique using any standard dataset available in the public domain.**	**05/01/2022**	**25**	
13	**Programs on convolutional neural networ to classify images from any standard dataset in the public domain.**	**02/02/2022**	**27**	
14	**Program to implement a simple web crawler using python.**	**16/02/2022**	**31**	
15	**Program to implement a simple web crawler using python.**	**16/02/2022**	**34**	
16	**Program to implement scrap of any website.**	**16/02/2022**	**36**	
17	**Program for Natural Language Processing which performs n-grams.**	**16/02/2022**	**38**	
18	**Program for Natural Language Processing which performs n-grams(Using in built functions).**	**16/02/2022**	**39**	
19	**Program for Natural Language Processing which performs speech tagging.**	**16/02/2022**	**40**	
20	**Write python program for natural language processing with chunking.**	**23/02/2022**	**41**	
21	**Write python program for natural language processing with chunking.**	**23/02/2022**	**42**	

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

AIM: Perform all matrix operation using python

Program Code:

```
import numpy

x = numpy.array([[1, 2], [3, 4]])
y = numpy.array([[5, 6], [7, 8]])

print ("The matrices are: ")
print ("First matrix:")
print (x)
print ("Second matrix: ")
print(y)

#Addition--- add()
print ("matrix addition:")
print (numpy.add(x,y))

#Subtraction ------ subtract()
print ("matrix Subtraction:")
print (numpy.subtract(x,y))

#Division ------- divide()
print ("matrix Division")
print (numpy.divide(x,y))

#Multiplication ------- multiply
print ("matrix Multiplication")
print (numpy.multiply(x,y))

#Product of matrix ---- dot()
print ("Product of 2 matrix: ")
print (numpy.dot(x,y))

#Square root ----sqrt()
print ("Square root of matrix X: ")
print (numpy.sqrt(x))


#Summation ---- sum()
print ("Summation of matrix X: ")
print  (numpy.sum(x,axis=0))
print ("Summation of matrix Y: ")
print (numpy.sum(y,axis=1))
```

```
#Transposition------T
print ("Transposition of matrix X: ")
print(x.T)
print ("Transposition of matrix Y: ")
print(y.T)
```

Output:

```
The matrices are:
First matrix:
[[1 2]
 [3 4]]
Second matrix:
[[5 6]
 [7 8]]
matrix addition:
[[ 6  8]
 [10 12]]
matrix Subtraction:
[[-4 -4]
 [-4 -4]]
matrix Division
[[0.2        0.33333333]
 [0.42857143 0.5       ]]
matrix Multiplication
[[ 5 12]
 [21 32]]
Product of 2 matrix:
[[19 22]
 [43 50]]
```

```
Square root of matrix X:
[[1.         1.41421356]
 [1.73205081 2.        ]]
Square root of matrix X:
[[1.         1.41421356]
 [1.73205081 2.        ]]
Summation of matrix X:
[4 6]
Summation of matrix Y:
[11 15]
Transposition of matrix X:
[[1 3]
 [2 4]]
Transposition of matrix Y:
[[5 7]
 [6 8]]

Process finished with exit code 0
```

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

AIM: Program to perform SVD using python

Program Code:

```
from numpy import array
from scipy.linalg import svd                    #a function in SCIPY
A = ([[8,4,5,7], [4,1,6,9], [6,1,0,9]]);

print("ACTUAL MATRIX IS: ")
print(A);
U, s, VT = svd(A)                          # U, s, VT are just 3 variables
                                    # U= decomposed s=inverse  #VT=transpos

print("DECOMPOSED MATRIX: ")
print(U);

print("INVERSE MATRIX: ")
print(s);

print("TRANSPOS MATRIX: ")
print(VT);
```

OUTPUT:

```
C:\Users\mca\PycharmProjects\svd\venv\Scripts\python.exe C:/Users
ACTUAL MATRIX IS:
[[8, 4, 5, 7], [4, 1, 6, 9], [6, 1, 0, 9]]
DECOMPOSED MATRIX:
[[-0.62412923  0.35812463 -0.69441303]
 [-0.57698231  0.38802636  0.7186981 ]
 [-0.52683405 -0.84922452  0.03554702]]
INVERSE MATRIX:
[19.24390834  4.59023347  3.82122341]
TRANSPOS MATRIX:
[[-0.54365086 -0.18708951 -0.34205838 -0.74326128]
 [-0.14775821  0.21160151  0.89729234 -0.35813234]
 [-0.64566487 -0.52951811  0.21985719  0.50437116]
 [-0.51548824  0.79989555 -0.17182941  0.25478155]]

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 in build function

Program Code:

```
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split

 #Split arrays or matrices into random train and test subsets

from sklearn.datasets import load_iris

#Load and return the iris dataset (classification).

from sklearn.metrics import accuracy_score

# to load dataset values
dataset = load_iris()

# features & target
d = dataset.data                    # feature
t = dataset.target                    # target

d_train, d_test, t_train, t_test = train_test_split(d, t, test_size=0.2, random_state=40)

knn = KNeighborsClassifier(n_neighbors=10)

knn.fit(d_train, t_train)

   #Fit the k-nearest neighbors classifier from      the training dataset.

print(knn.predict(d_test))

a = knn.predict(d_test)
ac = accuracy_score(t_test, a)     #store accuracy value
print("Accuracy value is : ")

print(ac)
```

Output:

```
C:\Users\mca\PycharmProjects\svd\venv\Scripts\python.exe C:/Users/mca/PycharmProjects/svd/KNN.py
[0 1 1 0 0 2 0 1 1 1 1 2 0 2 0 0 0 0 2 2 0 2 0 1 2 0 1 2 2 2]
Accuracy value is :
0.9

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 euclidian_distance(row1, row2):
distance = 0.0
for i in range(len(row1) - 1):
distance += (row1[i] - row2[i]) ** 2
return sqrt(distance)
# locat the most similar neighbor
def get_neighbors(train, test_row, num_neighbors):
distances = list()
for train_row in train:
dist = euclidian_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]                #store the data of neighbors
prediction = max(set(output_values), key=output_values.count)
return prediction
```

```
# test distance function
dataset = [[2.5477838, 2.753590, 0],
[1.45778788,2.7767373, 0],
[3.678838, 4.6788288, 0],
[1.436773, 1.53773, 0],
[3.76888389, 3.6748, 0],
[7.7848848, 2.759256, 1],
[5.782356, 2.246378, 1],
[6.777878, 1.49078, 1],
[8.677728889, -0.7588392, 1],
 [7.675637, 3.59340, 1]]
prediction = predict_classification(dataset, dataset[0], 3)
print("Expexted %d,Got %d."%(dataset[0][-1],prediction))
```

Output:

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

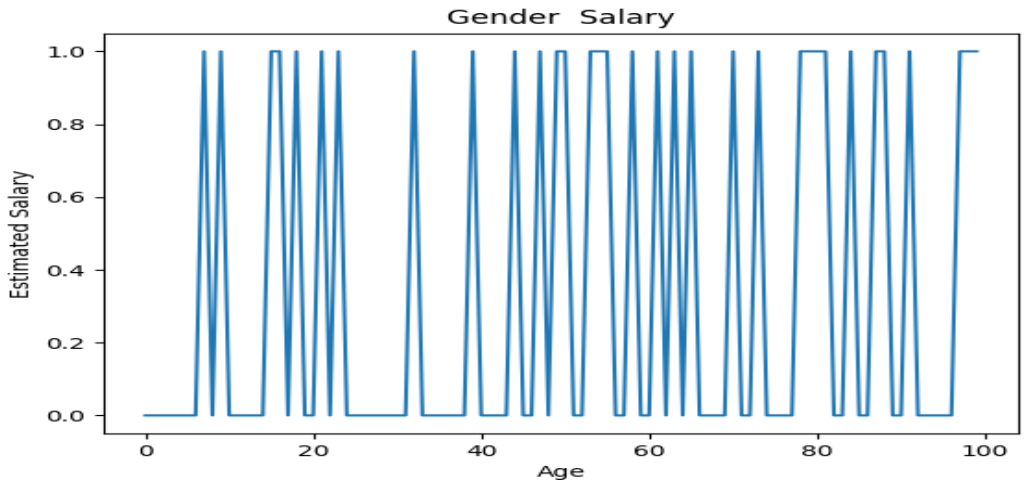
AIM: Program to implement Naïve Bayes Algorithm using any standard dataset available in the public domain and find the accuracy of the algorithm

Program Code:

```
# Random Forest Classification

# Importing the libraries
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd

# Importing the dataset
dataset = pd.read_csv('Social_Network_Ads.csv')
X = dataset.iloc[:, [2, 3]].values
y = dataset.iloc[:, 4].values

# Splitting the dataset into the Training set and Test set

from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.25, random_state = 0)

# Feature Scaling
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
X_train = sc.fit_transform(X_train)
X_test = sc.transform(X_test)

# Fitting Random Forest Classification to the Training set
from sklearn.ensemble import RandomForestClassifier
classifier = RandomForestClassifier(n_estimators = 10, criterion = 'entropy', random_state = 0)
classifier.fit(X_train, y_train)

# Predicting the Test set results
y_pred = classifier.predict(X_test)
print(y_pred)
plt.plot(y_pred)
plt.title('Gender Salary')
plt.xlabel('Age')
plt.ylabel('Estimated Salary')
#plt.legend()
plt.show()
```

Output:

```
C:\Users\mca\PycharmProjects\svd\venv\Scripts\python.exe C:/Users/mca/PycharmProjects/svd/nb.py
[0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 1 1 0 1 0 0 1 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0
 0 0 1 0 0 0 0 1 0 0 1 0 1 1 0 0 1 1 1 0 0 1 0 0 1 0 1 0 1 0 0 0 0 1 0 0 1
 0 0 0 0 1 1 1 1 0 0 1 0 0 1 1 0 0 1 0 0 0 0 0 1 1 1]
```



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

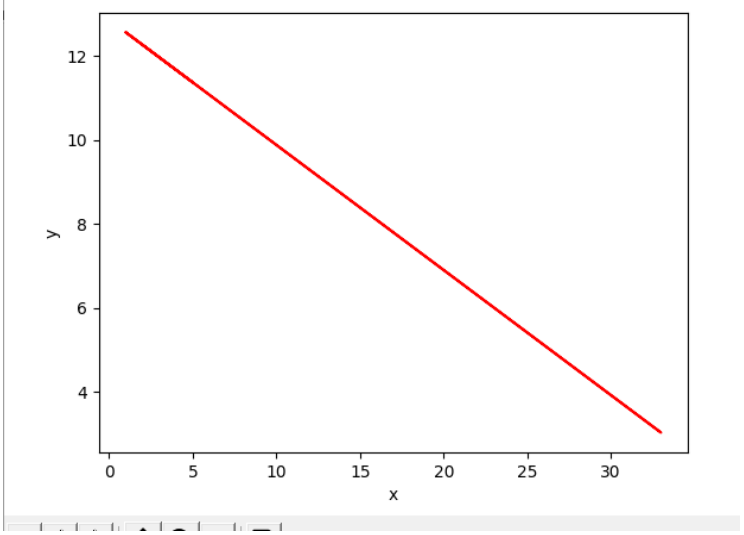
AIM: Program to implement linear and multiple regression techniques using any standard dataset available in the public domain

Program Code:

```
import matplotlib.pyplot as plt
import numpy as np
from sklearn.linear_model import LinearRegression
import matplotlib.pyplot as plt
x = np.array([1,5,1,9,33,2]).reshape((-1, 1))
y = np.array([2,7,1,9,3,40])
print(x)
print(y)
model=LinearRegression()
model.fit(x, y)
r_sq=model.score(x,y)
print('Coefficient od determination: ', r_sq)
print('Intercept: ', model.intercept_)
print('Slope: ', model.coef_)
y_pred=model.predict(x)

plt.plot(x, y_pred, color="r")
plt.xlabel('x')
plt.ylabel('y')
plt.show()
```

Output:

```
C:\Users\MCA\PycharmProjects\svd\venv\Scripts\python.exe C:/
[[ 1]
 [ 5]
 [ 1]
 [ 9]
 [33]
 [ 2]]
[ 2  7  1  9  3 40]
Coefficient od determination:  0.06192782703681465
Intercept:  12.869489685124865
Slope:  [-0.29837134]
```



PROGRAM NO: 07 **Date:** 15/12/2021

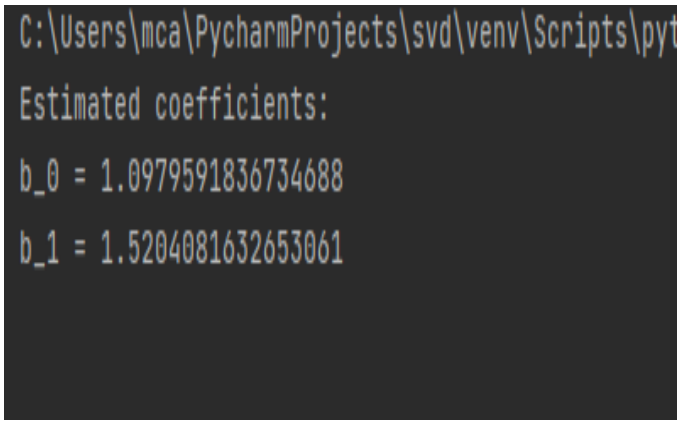
AIM: Program to implement linear and multiple regression techniques using any standard dataset available in the public domain

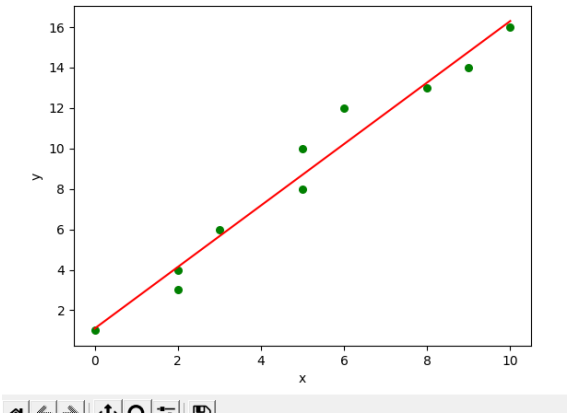
Program Code:

```
import numpy as np
import matplotlib.pyplot as plt


def estimate_coef(x, y):
# number of observations/points
n = np.size(x)

# mean of x and y vector
m_x = np.mean(x)
m_y = np.mean(y)

# calculating cross-deviation and deviation about x
SS_xy = np.sum(y * x) - n * m_y * m_x
SS_xx = np.sum(x * x) - n * m_x * m_x

# calculating regression coefficients
b_1 = SS_xy / SS_xx
b_0 = m_y - b_1 * m_x

return (b_0, b_1)


def plot_regression_line(x, y, b):
# plotting the actual points as scatter plot
plt.scatter(x, y, color="g",
marker="o", s=30)

# predicted response vector
y_pred = b[0] + b[1] * x

# plotting the regression line
plt.plot(x, y_pred, color="r")

# putting labels
plt.xlabel('x')
plt.ylabel('y')

# function to show plot
plt.show()
```

```
def main():
# observations / data
x = np.array([0, 2, 2, 3, 5, 5, 6, 8, 9, 10])
y = np.array([1, 3, 4, 6, 8, 10, 12, 13, 14, 16])

# estimating coefficients
b = estimate_coef(x, y)
print("Estimated coefficients:\nb_0 = {}  \
\nb_1 = {}".format(b[0], b[1]))

# plotting regression line
plot_regression_line(x, y, b)


if__name__== "_main_":
main()
```

Output:





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 as pd
import numpy as np
import matplotlib.pyplot as plt
dataset = pd.read_csv("cars.csv")
dataset.head()
dataset.describe()
X = dataset[['Weight', 'Volume']]
y = dataset['CO2']
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=0)
from sklearn.linear_model import LinearRegression

regressor = LinearRegression()
regressor.fit(X_train, y_train)
r2_score = regressor.score(X_test,y_test)
print("Accuracy: ")
print(r2_score*100,'%')

coeff_df = pd.DataFrame(regressor.coef_, X.columns, columns=['Coefficient'])
coeff_df
print("co-efficient of correlation: ")
print(regressor.coef_)
```

Output:

```
C:\Users\ajcemca\PycharmProjects\aleena\venv\Scripts\
Accuracy:
40.61589718966062 %
co-efficient of correlation:
[0.00728963 0.0076251 ]

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

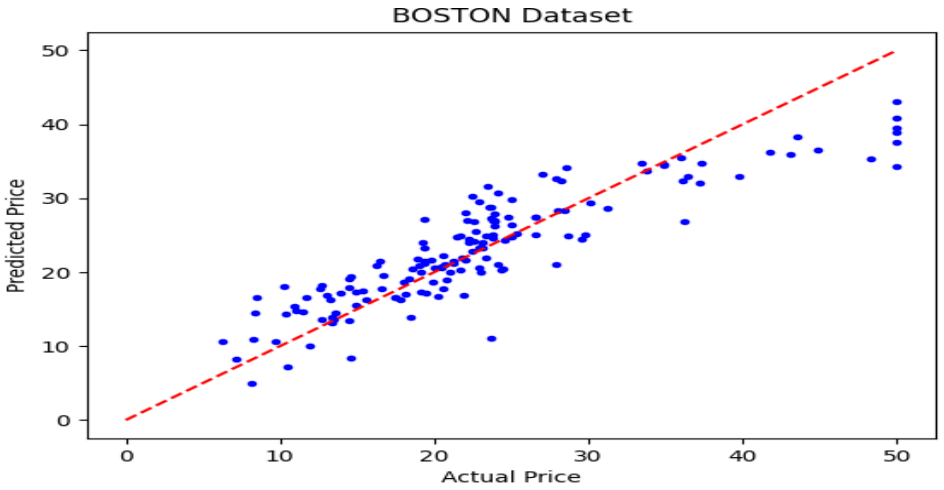
Program Code:

```
import matplotlib.pyplot as plt
from sklearn import datasets, linear_model, metrics
from sklearn.metrics import mean_squared_error, 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=0.3, random_state=1)
reg = linear_model.LinearRegression()
reg.fit(X_train, y_train)
predicted = reg.predict(X_test)
# Regression coefficient
print('Coefficients are:\n', reg.coef_)
# Intecept
print('\nIntercept : ', reg.intercept_)
# variance score: 1 means perfect prediction
print('Variance score: ', reg.score(X_test, y_test))

# Mean Squared Error
print("Mean squared error: %.2f" % mean_squared_error(y_test, predicted))
# Original data of X_test
expected = y_test
```

```
# Plot a graph for expected and predicted values
plt.title('BOSTON Dataset')
plt.scatter(expected, predicted, c='b', marker='.', s=36)
plt.plot([0, 50], [0, 50], '--r')
plt.xlabel('Actual Price')
plt.ylabel('Predicted Price')
plt.show()
```

Output:

```
Coefficients are:
 [-9.85424717e-02  6.07841138e-02  5.91715401e-02  2.43955988e+00
 -2.14699650e+01  2.79581385e+00  3.57459778e-03 -1.51627218e+00
  3.07541745e-01 -1.12800166e-02 -1.00546640e+00  6.45018446e-03
 -5.68834539e-01]

Intercept :  46.39649387182355
Variance score:  0.7836295385076291
Mean squared error: 19.83
```



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

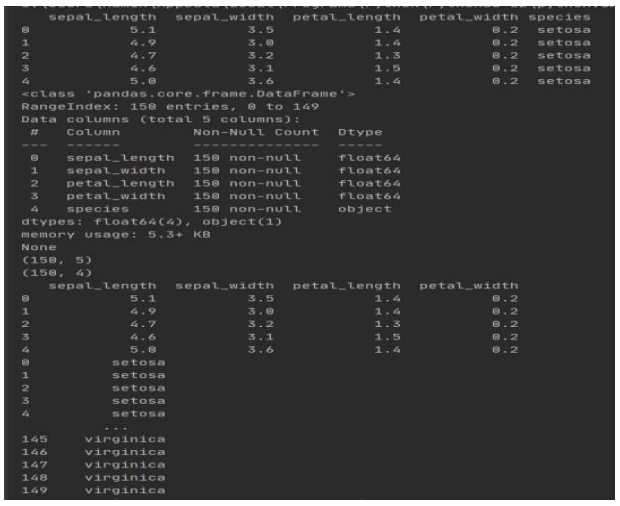
AIM: Program to implement decision tree using any standard dataset available in the public domain and find the accuracy of the algorithm

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")

#correlation matrix
sns.heatmap(df.corr())
plt.savefig("one.png")
target = df['species']
df1 = df.copy()
df1 = df1.drop('species', axis=1)
print(df1.shape)
print(df1.head())

#defining attributes
x=df1
print(target)

#label encoding
le = LabelEncoder()
target = le.fit_transform(target)      #learn scaling parameters(species)
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("Testing split input: ", x_test.shape)
```

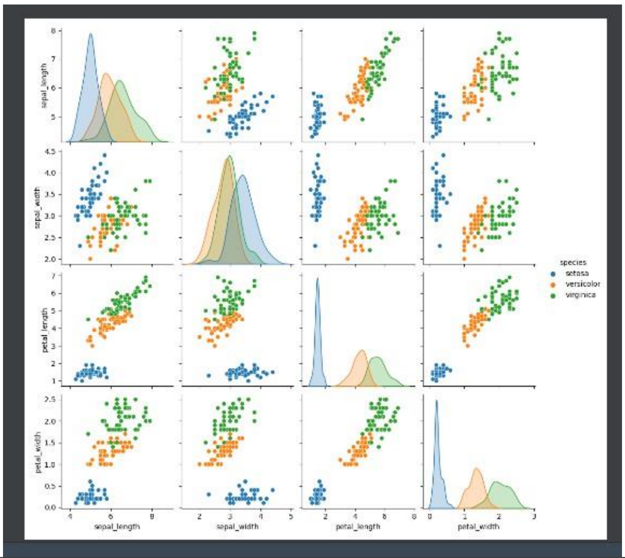
```
#defining the decision tree algorithm
dtree = DecisionTreeClassifier()
dtree.fit(x_train, y_train)
print('Decision tree classifier created')

#predicting the value of test data
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=15)
plt.savefig("two.png")

plt.figure(figsize=(20,20))
dec_tree = plot_tree(decision_tree=dtree,feature_names=df1.columns,class_names=["setosa",
"vercicolor", "verginica"], filled=True,precision=4,rounded=True)
plt.savefig("three.png")
```

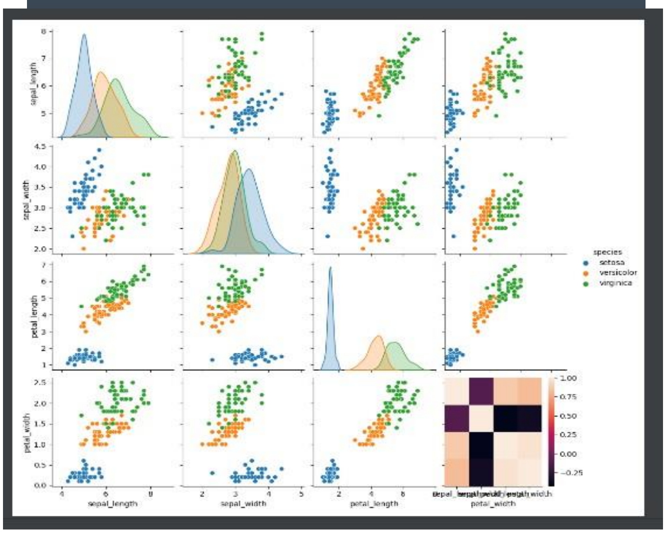
Output:

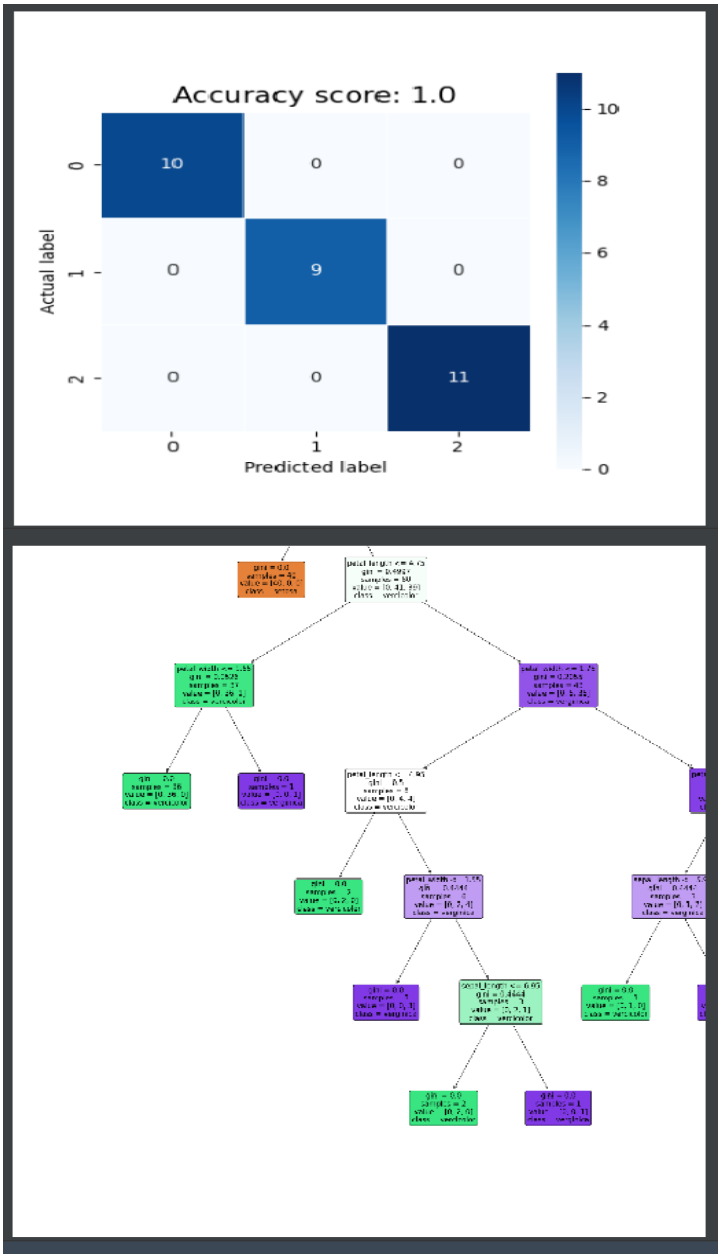


```
   sepal_length  sepal_width  petal_length  petal_width species
0           5.1          3.5           1.4          0.2  setosa
1           4.9          3.0           1.4          0.2  setosa
2           4.7          3.2           1.3          0.2  setosa
3           4.6          3.1           1.5          0.2  setosa
4           5.0          3.6           1.4          0.2  setosa
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   sepal_length  150 non-null    float64
 1   sepal_width   150 non-null    float64
 2   petal_length  150 non-null    float64
 3   petal_width   150 non-null    float64
 4   species       150 non-null    object
dtypes: float64(4), object(1)
memory usage: 5.3+ KB
None
(150, 5)
(150, 4)
   sepal_length  sepal_width  petal_length  petal_width
0           5.1          3.5           1.4          0.2
1           4.9          3.0           1.4          0.2
2           4.7          3.2           1.3          0.2
3           4.6          3.1           1.5          0.2
4           5.0          3.6           1.4          0.2
0        setosa
1        setosa
2        setosa
3        setosa
4        setosa
       ...
145    virginica
146    virginica
147    virginica
148    virginica
149    virginica
```

```
Name: species, Length: 150, dtype: object
[0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2
 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
 2 2]
Training split input:  (120, 4)
Testing split input:  (30, 4)
Decision tree classifier created
Classification report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        10
           1       1.00      1.00      1.00         9
           2       1.00      1.00      1.00        11

    accuracy                           1.00        30
   macro avg       1.00      1.00      1.00        30
weighted avg       1.00      1.00      1.00        30


Process finished with exit code 0
```






Accuracy score: 1.0
Actual label
Predicted label
0
1
2
10
0
0
0
9
0
0
0
11
10
8
6
4
2
0

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

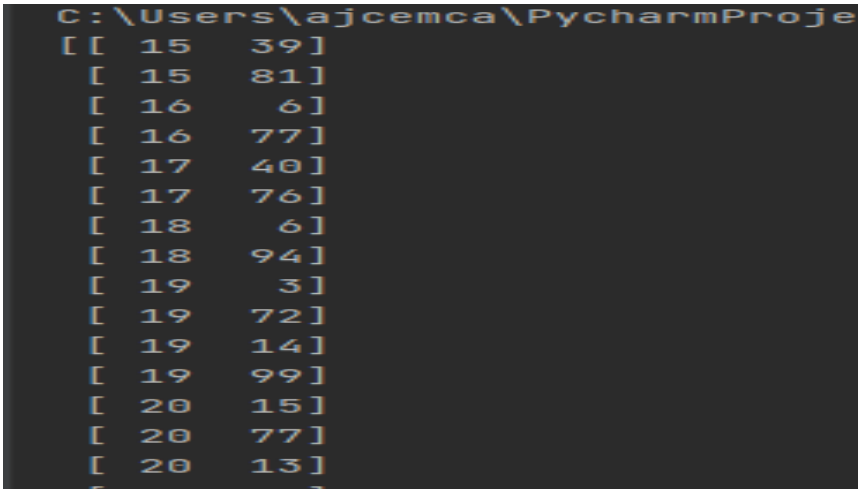
AIM: Program to implement K-Means clustering technique using any standard dataset available in the public domain.

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(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='green',label='cluster 2')

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

mtp.scatter(x[y_predict ==3,0],x[y_predict ==3,1],s=100,c='cyan',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',label='clust
er')

mtp.title('Clusters of customers')

mtp.xlabel('Annual Income (K$)')

mtp.ylabel('Spending Score(1-100)')

mtp.legend()

mtp.show()
```

Output:



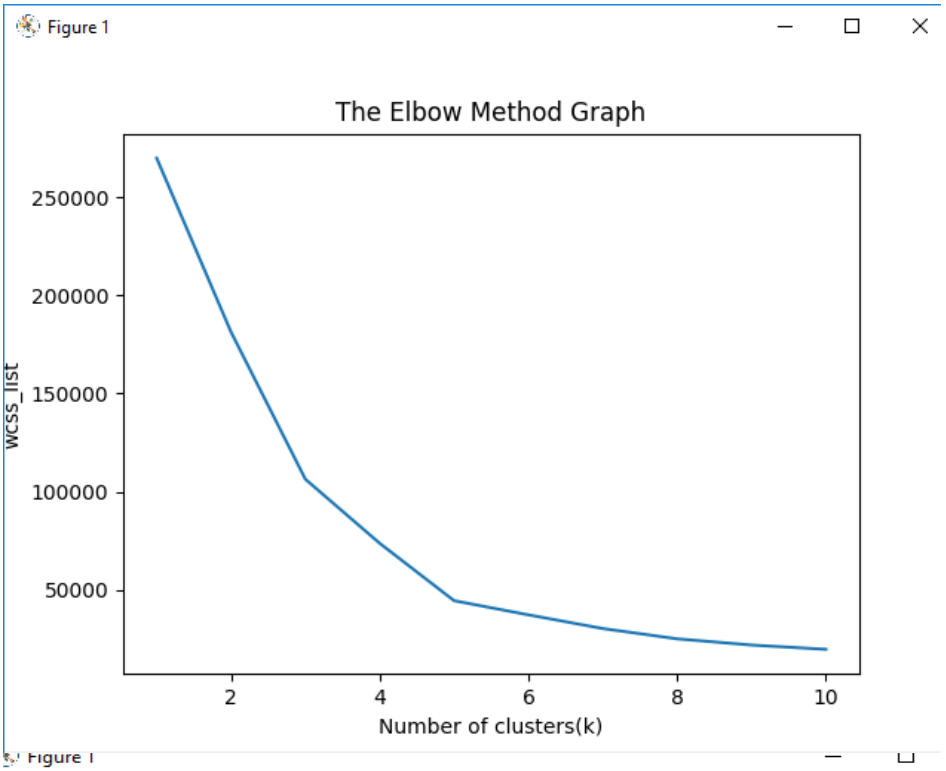
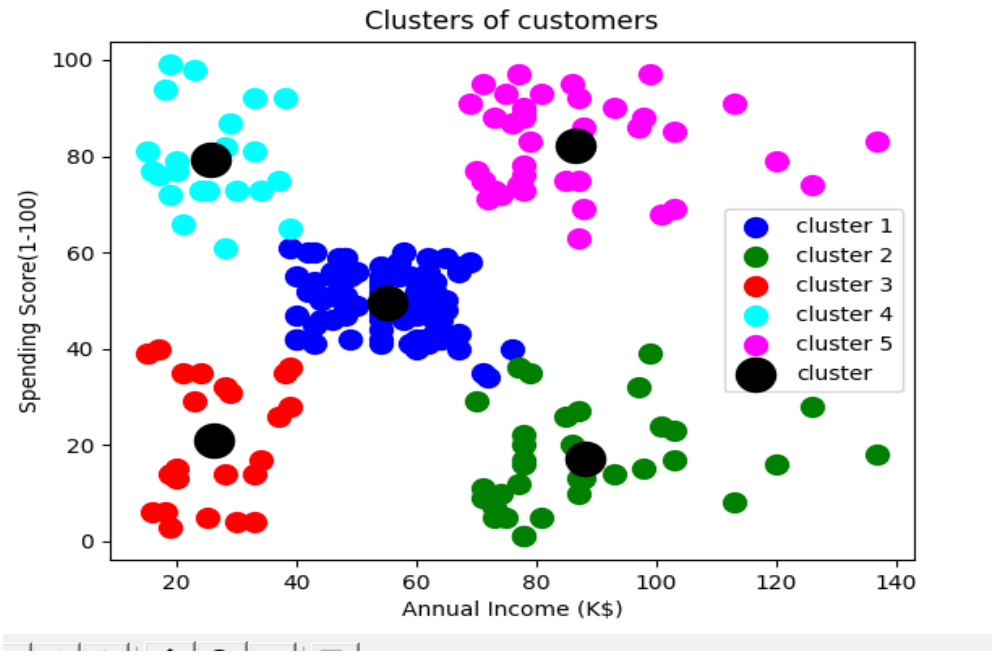


Figure 1
The Elbow Method Graph
wcss_list
250000
200000
150000
100000
50000
2
4
6
8
10
Number of clusters(k)


Clusters of customers
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
cluster

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

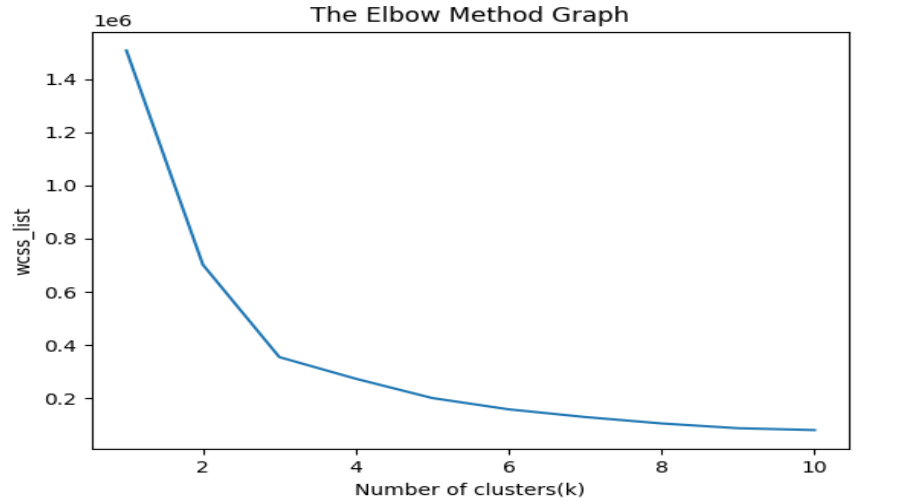
AIM: Program to implement K-Means clustering technique using any standard dataset available in the public domain

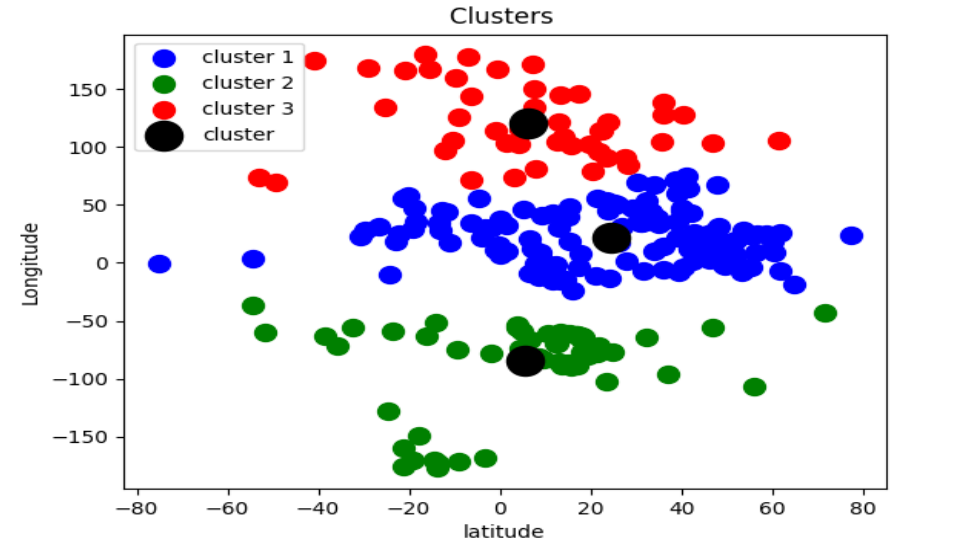
Program Code:

```
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(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='green',label='cluster 2')
mtp.scatter(x[y_predict ==2,0],x[y_predict ==2,1],s=100,c='red',label='cluster 3')
mtp.scatter(kmeans.cluster_centers_[:,0],kmeans.cluster_centers_[:,1],s=300,c='black',label='clust
er')
mtp.title('Clusters of customers')
mtp.xlabel('Annual Income (K$)')
mtp.ylabel('Spending Score(1-100)')
mtp.legend()
mtp.show()
```

Output:

```
C:\Users\ajcemca\PycharmProjects\Rmca_DLMLLab_28
[[  4.25462450e+01   1.60155400e+00]
 [  2.34240760e+01   5.38478180e+01]
 [  3.39391100e+01   6.77099530e+01]
 [  1.70608160e+01  -6.17964280e+01]
 [  1.82205540e+01  -6.30686150e+01]
 [  4.11533320e+01   2.01683310e+01]
 [  4.00690990e+01   4.50381890e+01]
 [  1.22260790e+01  -6.90600870e+01]
 [ -1.12026920e+01   1.78738870e+01]
 [ -7.52509730e+01  -7.13890000e-02]
 [ -3.84160970e+01  -6.36166720e+01]
 [ -1.42709720e+01  -1.70132217e+02]
 [  4.75162310e+01   1.45500720e+01]
 [ -2.52743980e+01   1.33775136e+02]
 [  1.25211100e+01  -6.99683380e+01]
 [  4.01431050e+01   4.75769270e+01]
 [  4.39158860e+01   1.76790760e+01]
 [  1.31938870e+01  -5.95431980e+01]
 [  2.36849940e+01   9.03563310e+01]
```





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

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

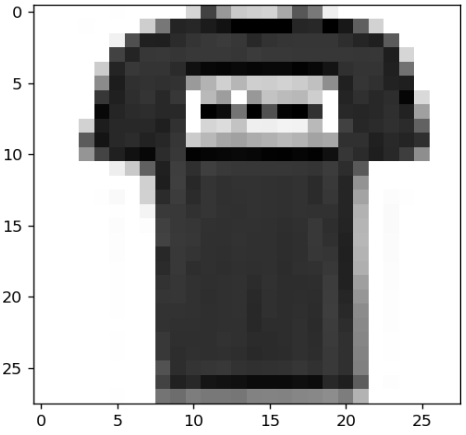
Program Code:

```
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)

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','Bag','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',i
nput_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))
```

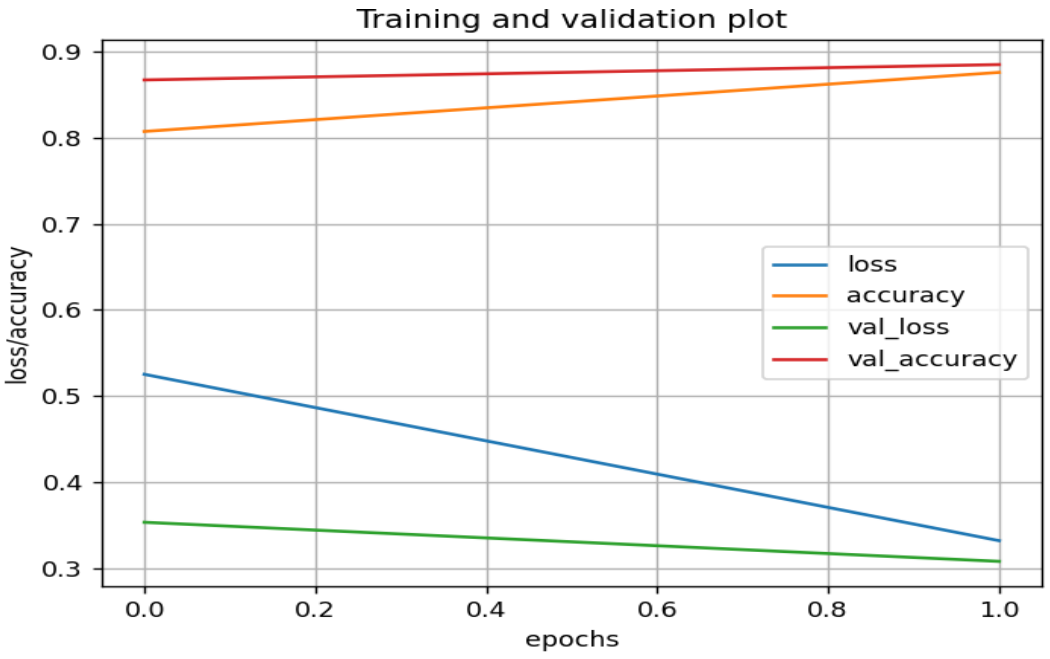
Output:




```
(60000, 28, 28) (10000, 28, 28)
2022-02-02 12:03:16.761271: W tensorflow/stream_executor/platform/default/dso_l
2022-02-02 12:03:16.763256: W tensorflow/core/common_runtime/gpu/gpu_device.cc:
Skipping registering GPU devices...
2022-02-02 12:03:16.773939: I tensorflow/core/platform/cpu_feature_guard.cc:151
To enable them in other operations, rebuild TensorFlow with the appropriate comp
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 28, 28, 32)        1600

 max_pooling2d (MaxPooling2D  (None, 14, 14, 32)       0
 )

 conv2d_1 (Conv2D)           (None, 14, 14, 64)        18496

 max_pooling2d_1 (MaxPooling  (None, 7, 7, 64)         0
 2D)

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

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

=================================================================
Total params: 38,560
Trainable params: 38,560
Non-trainable params: 0
```

```
Trainable params: 38,560
Non-trainable params: 0
_________________________________________________________________
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 28, 28, 32)        1600

 max_pooling2d (MaxPooling2D  (None, 14, 14, 32)       0
 )

 conv2d_1 (Conv2D)           (None, 14, 14, 64)        18496

 max_pooling2d_1 (MaxPooling  (None, 7, 7, 64)         0
 2D)

 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 [==============================] - 74s 43ms/step - loss: 0.5097 - accuracy: 0.8133 - val_loss: 0.3481 - val_accuracy: 0.8688
Epoch 2/2
1688/1688 [==============================] - 73s 43ms/step - loss: 0.3272 - accuracy: 0.8795 - val_loss: 0.3289 - val_accuracy: 0.8763
313/313 [==============================] - 4s 13ms/step - loss: 0.3441 - accuracy: 0.8721
 Test Loss :0.34412604570388794, Test Accuracy : 0.8720999956130981

Process finished with exit code 0
```



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

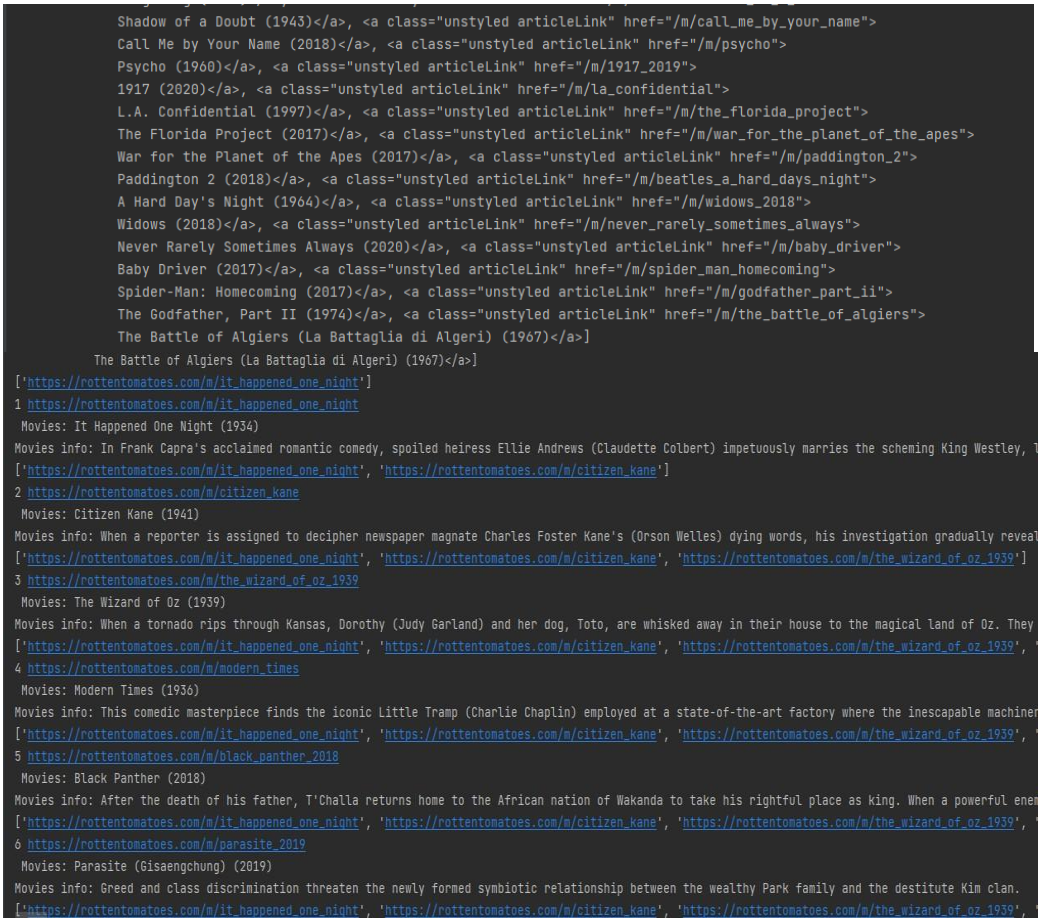
AIM: Program to implement a simple web crawler using python

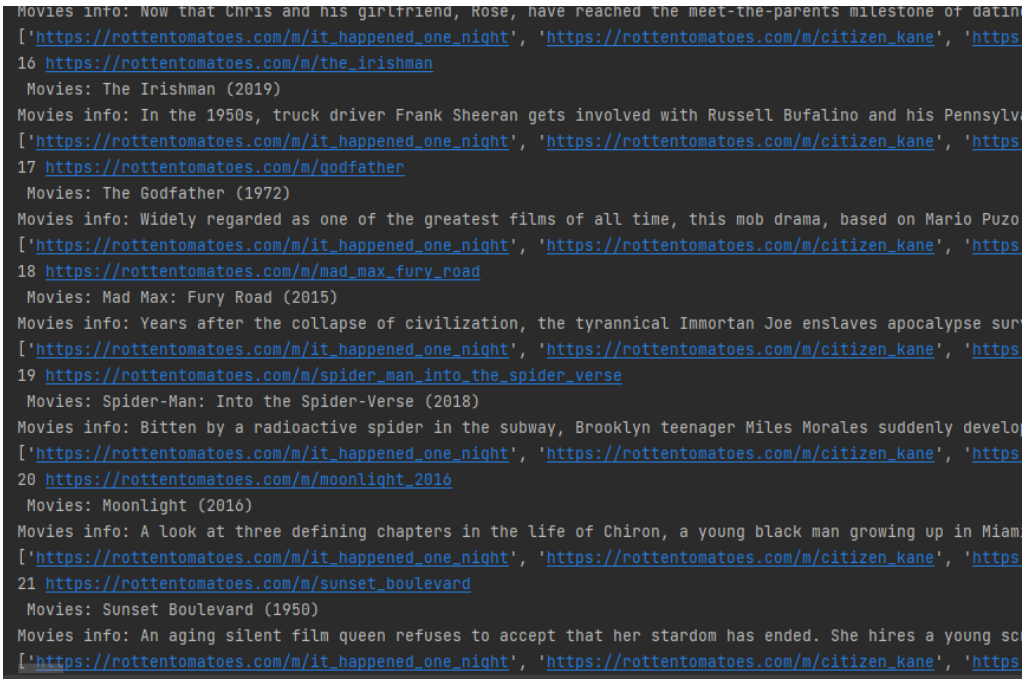
Program Code:

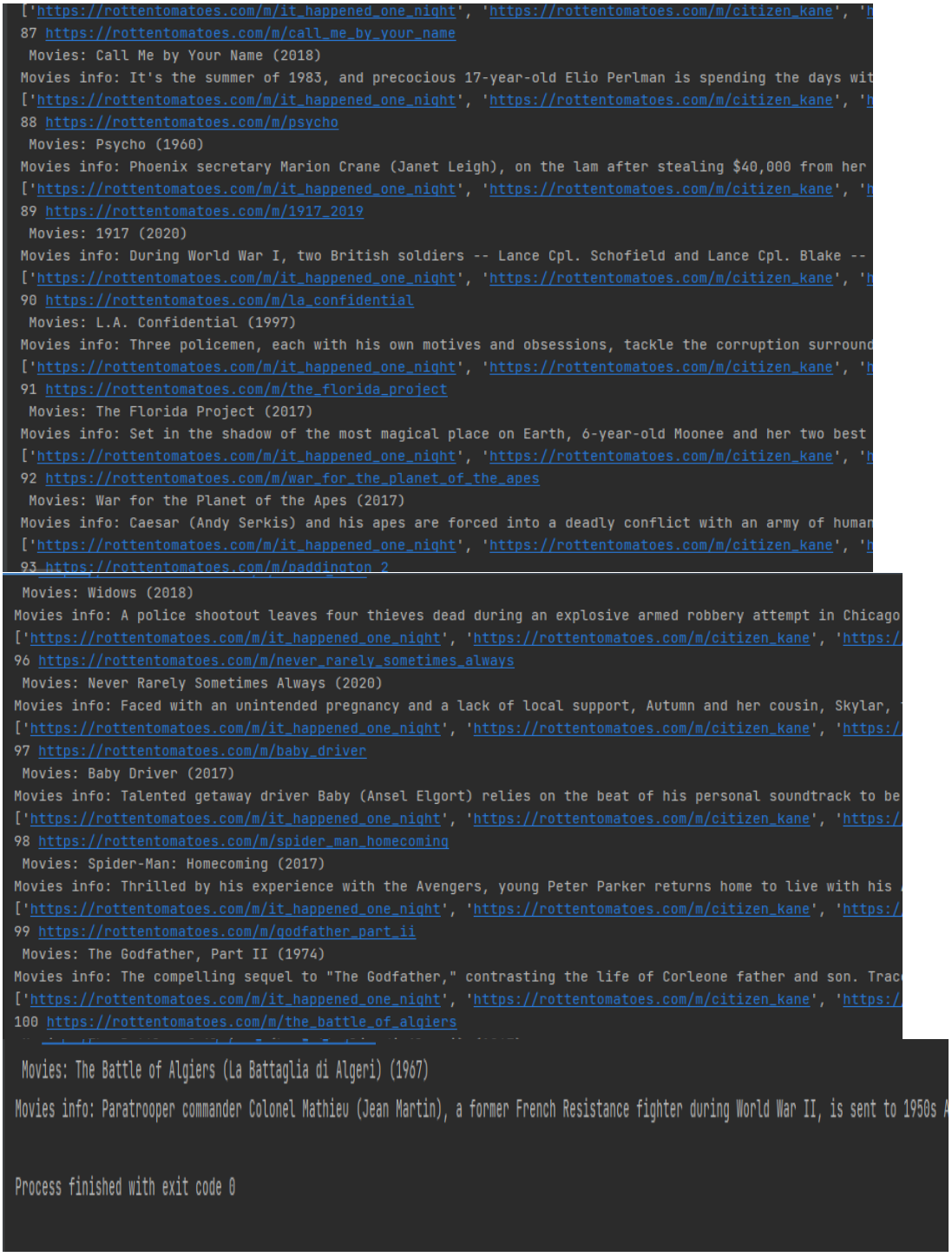
```
import requests
import lxml
from bs4 import BeautifulSoup
url = "https://rottentomatoes.com/top/bestofrt/"
header = {
   'User-Agent': 'Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like
Gecko) Chrome/63.0.3239.132 Safari/537.36 QIHU 360SE'
}
f = requests.get(url,headers=header)
movies_lst = []
soup = BeautifulSoup(f.content, 'lxml')
movies = soup.find('table',{
   'class': 'table'
}) .find_all('a')
print(movies)
num = 0
for anchor in movies:
urls = 'https://rottentomatoes.com' + anchor['href']
movies_lst.append(urls)
print(movies_lst)
num += 1
movie_url = urls
movie_f = requests.get(movie_url, headers=header)
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', 'Movies: ' + anchor.string.strip())
print('Movies info: ' + movie_content.string.strip())
```

Output:

```
C:\Users\mca\PycharmProjects\svd\venv\Scripts\python.exe C:/Users/mca/PycharmProjects/svd/Lab/webscrap.py
[<a class="unstyled articleLink" href="/m/it_happened_one_night">
            It Happened One Night (1934)</a>, <a class="unstyled articleLink" href="/m/citizen_kane">
            Citizen Kane (1941)</a>, <a class="unstyled articleLink" href="/m/the_wizard_of_oz_1939">
            The Wizard of Oz (1939)</a>, <a class="unstyled articleLink" href="/m/modern_times">
            Modern Times (1936)</a>, <a class="unstyled articleLink" href="/m/black_panther_2018">
            Black Panther (2018)</a>, <a class="unstyled articleLink" href="/m/parasite_2019">
            Parasite (Gisaengchung) (2019)</a>, <a class="unstyled articleLink" href="/m/avengers_endgame">
            Avengers: Endgame (2019)</a>, <a class="unstyled articleLink" href="/m/1003707-casablanca">
            Casablanca (1942)</a>, <a class="unstyled articleLink" href="/m/knives_out">
            Knives Out (2019)</a>, <a class="unstyled articleLink" href="/m/us_2019">
            Us (2019)</a>, <a class="unstyled articleLink" href="/m/toy_story_4">
            Toy Story 4 (2019)</a>, <a class="unstyled articleLink" href="/m/lady_bird">
            Lady Bird (2017)</a>, <a class="unstyled articleLink" href="/m/mission_impossible_fallout">
            Mission: Impossible - Fallout (2018)</a>, <a class="unstyled articleLink" href="/m/blackkklansman">
            BlacKkKlansman (2018)</a>, <a class="unstyled articleLink" href="/m/get_out">
            Get Out (2017)</a>, <a class="unstyled articleLink" href="/m/the_irishman">
            The Irishman (2019)</a>, <a class="unstyled articleLink" href="/m/godfather">
            The Godfather (1972)</a>, <a class="unstyled articleLink" href="/m/mad_max_fury_road">
```


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)]
The Battle of Algiers (La Battaglia di Algeri) (1967)]
['https://rottentomatoes.com/m/it_happened_one_night']
1 https://rottentomatoes.com/m/it_happened_one_night
Movies: It Happened One Night (1934)
Movies info: In Frank Capra's acclaimed romantic comedy, spoiled heiress Ellie Andrews (Claudette Colbert) impetuously marries the scheming King Westley,
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane']
2 https://rottentomatoes.com/m/citizen_kane
Movies: Citizen Kane (1941)
Movies info: When a reporter is assigned to decipher newspaper magnate Charles Foster Kane's (Orson Welles) dying words, his investigation gradually reveal
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https://rottentomatoes.com/m/the_wizard_of_oz_1939']
3 https://rottentomatoes.com/m/the_wizard_of_oz_1939
Movies: The Wizard of Oz (1939)
Movies info: When a tornado rips through Kansas, Dorothy (Judy Garland) and her dog, Toto, are whisked away in their house to the magical land of Oz. They
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https://rottentomatoes.com/m/the_wizard_of_oz_1939',
4 https://rottentomatoes.com/m/modern_times
Movies: Modern Times (1936)
Movies info: This comedic masterpiece finds the iconic Little Tramp (Charlie Chaplin) employed at a state-of-the-art factory where the inescapable machine
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https://rottentomatoes.com/m/the_wizard_of_oz_1939',
5 https://rottentomatoes.com/m/black_panther_2018
Movies: Black Panther (2018)
Movies info: After the death of his father, T'Challa returns home to the African nation of Wakanda to take his rightful place as king. When a powerful ene
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https://rottentomatoes.com/m/the_wizard_of_oz_1939',
6 https://rottentomatoes.com/m/parasite_2019
Movies: Parasite (Gisaengchung) (2019)
Movies info: Greed and class discrimination threaten the newly formed symbiotic relationship between the wealthy Park family and the destitute Kim clan.
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https://rottentomatoes.com/m/the_wizard_of_oz_1939',


Movies info: Now that Chris and his girlfriend, Rose, have reached the meet-the-parents milestone of datin
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https
16 https://rottentomatoes.com/m/the_irishman
Movies: The Irishman (2019)
Movies info: In the 1950s, truck driver Frank Sheeran gets involved with Russell Bufalino and his Pennsylv
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https
17 https://rottentomatoes.com/m/godfather
Movies: The Godfather (1972)
Movies info: Widely regarded as one of the greatest films of all time, this mob drama, based on Mario Puzo
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https
18 https://rottentomatoes.com/m/mad_max_fury_road
Movies: Mad Max: Fury Road (2015)
Movies info: Years after the collapse of civilization, the tyrannical Immortan Joe enslaves apocalypse sur
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https
19 https://rottentomatoes.com/m/spider_man_into_the_spider_verse
Movies: Spider-Man: Into the Spider-Verse (2018)
Movies info: Bitten by a radioactive spider in the subway, Brooklyn teenager Miles Morales suddenly develo
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https
20 https://rottentomatoes.com/m/moonlight_2016
Movies: Moonlight (2016)
Movies info: A look at three defining chapters in the life of Chiron, a young black man growing up in Miam
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https
21 https://rottentomatoes.com/m/sunset_boulevard
Movies: Sunset Boulevard (1950)
Movies info: An aging silent film queen refuses to accept that her stardom has ended. She hires a young sc
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https


['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'h
87 https://rottentomatoes.com/m/call_me_by_your_name
Movies: Call Me by Your Name (2018)
Movies info: It's the summer of 1983, and precocious 17-year-old Elio Perlman is spending the days wit
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'h
88 https://rottentomatoes.com/m/psycho
Movies: Psycho (1960)
Movies info: Phoenix secretary Marion Crane (Janet Leigh), on the lam after stealing $40,000 from her
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'h
89 https://rottentomatoes.com/m/1917_2019
Movies: 1917 (2020)
Movies info: During World War I, two British soldiers -- Lance Cpl. Schofield and Lance Cpl. Blake --
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'h
90 https://rottentomatoes.com/m/la_confidential
Movies: L.A. Confidential (1997)
Movies info: Three policemen, each with his own motives and obsessions, tackle the corruption surround
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'h
91 https://rottentomatoes.com/m/the_florida_project
Movies: The Florida Project (2017)
Movies info: Set in the shadow of the most magical place on Earth, 6-year-old Moonee and her two best
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'h
92 https://rottentomatoes.com/m/war_for_the_planet_of_the_apes
Movies: War for the Planet of the Apes (2017)
Movies info: Caesar (Andy Serkis) and his apes are forced into a deadly conflict with an army of human
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'h
93 https://rottentomatoes.com/m/paddington_2
Movies: Widows (2018)
Movies info: A police shootout leaves four thieves dead during an explosive armed robbery attempt in Chicago
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https:/
96 https://rottentomatoes.com/m/never_rarely_sometimes_always
Movies: Never Rarely Sometimes Always (2020)
Movies info: Faced with an unintended pregnancy and a lack of local support, Autumn and her cousin, Skylar,
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https:/
97 https://rottentomatoes.com/m/baby_driver
Movies: Baby Driver (2017)
Movies info: Talented getaway driver Baby (Ansel Elgort) relies on the beat of his personal soundtrack to be
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https:/
98 https://rottentomatoes.com/m/spider_man_homecoming
Movies: Spider-Man: Homecoming (2017)
Movies info: Thrilled by his experience with the Avengers, young Peter Parker returns home to live with his
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https:/
99 https://rottentomatoes.com/m/godfather_part_ii
Movies: The Godfather, Part II (1974)
Movies info: The compelling sequel to "The Godfather," contrasting the life of Corleone father and son. Trac
['https://rottentomatoes.com/m/it_happened_one_night', 'https://rottentomatoes.com/m/citizen_kane', 'https:/
100 https://rottentomatoes.com/m/the_battle_of_algiers
Movies: The Battle of Algiers (La Battaglia di Algeri) (1967)
Movies info: Paratrooper commander Colonel Mathieu (Jean Martin), a former French Resistance fighter during World War II, is sent to 1950s A
Process finished with exit code 0

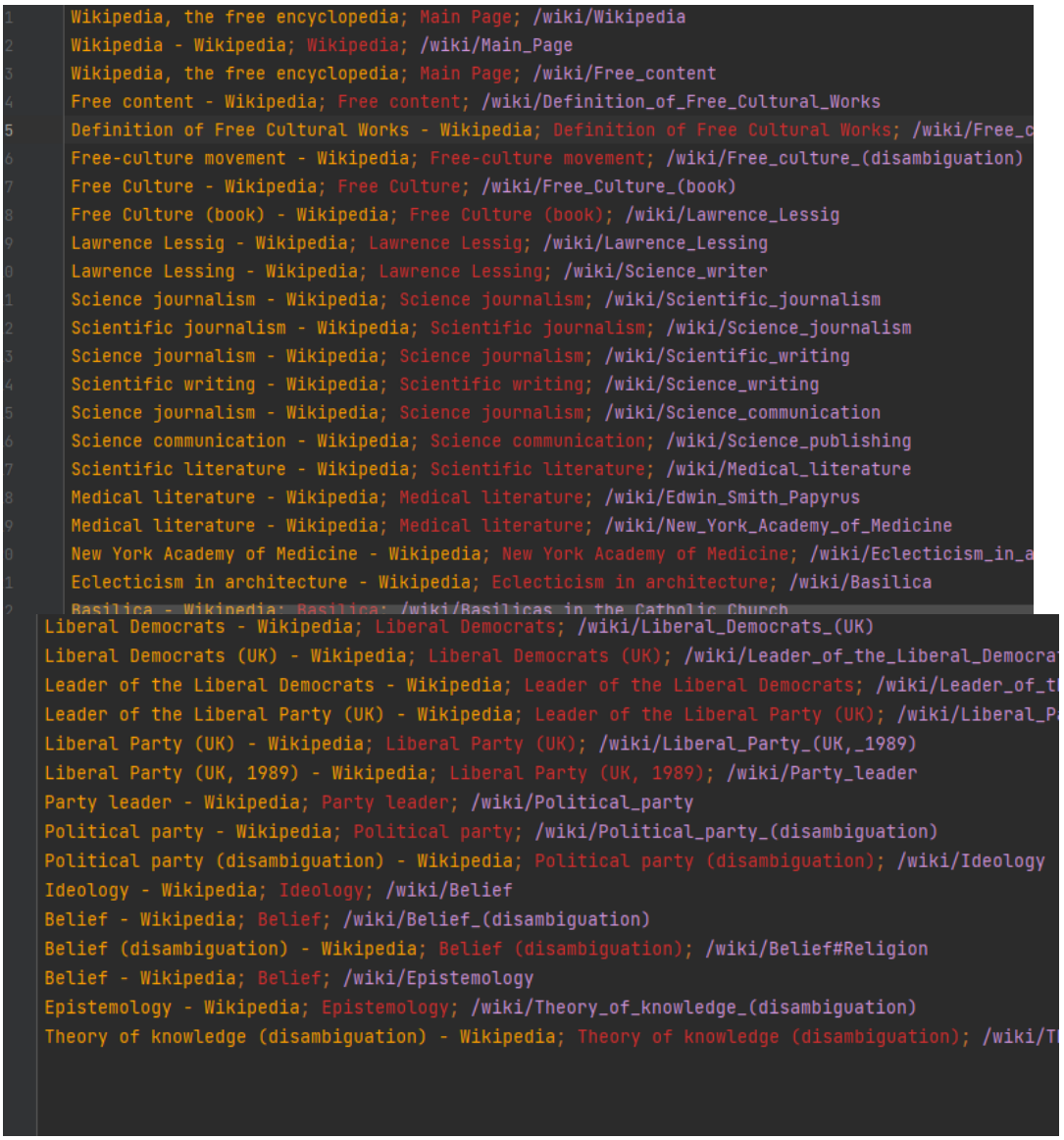
PROGRAM NO: 15 **Date:** 16/02/2022

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 = fhttps://en.wikipedia.org{link['href']}
pages_crawled.append(link['href'])
try:
with open('data.csv', 'a') as file:
file.write(f'{soup.title.text}; {soup.h1.text}; {link["href"]}\n')
crawler(new_link)
except:
continue


crawler("https://en.wikipedia.org")
```

Output:


Wikipedia, the free encyclopedia; Main Page; /wiki/Wikipedia
Wikipedia - Wikipedia; Wikipedia; /wiki/Main_Page
Wikipedia, the free encyclopedia; Main Page; /wiki/Free_content
Free content - Wikipedia; Free content; /wiki/Definition_of_Free_Cultural_Works
Definition of Free Cultural Works - Wikipedia; Definition of Free Cultural Works; /wiki/Free_c
Free-culture movement - Wikipedia; Free-culture movement; /wiki/Free_culture_(disambiguation)
Free Culture - Wikipedia; Free Culture; /wiki/Free_Culture_(book)
Free Culture (book) - Wikipedia; Free Culture (book); /wiki/Lawrence_Lessig
Lawrence Lessig - Wikipedia; Lawrence Lessig; /wiki/Lawrence_Lessing
Lawrence Lessing - Wikipedia; Lawrence Lessing; /wiki/Science_writer
Science journalism - Wikipedia; Science journalism; /wiki/Scientific_journalism
Scientific journalism - Wikipedia; Scientific journalism; /wiki/Science_journalism
Science journalism - Wikipedia; Science journalism; /wiki/Scientific_writing
Scientific writing - Wikipedia; Scientific writing; /wiki/Science_writing
Science journalism - Wikipedia; Science journalism; /wiki/Science_communication
Science communication - Wikipedia; Science communication; /wiki/Science_publishing
Scientific literature - Wikipedia; Scientific literature; /wiki/Medical_literature
Medical literature - Wikipedia; Medical literature; /wiki/Edwin_Smith_Papyrus
Medical literature - Wikipedia; Medical literature; /wiki/New_York_Academy_of_Medicine
New York Academy of Medicine - Wikipedia; New York Academy of Medicine; /wiki/Eclecticism_in_a
Eclecticism in architecture - Wikipedia; Eclecticism in architecture; /wiki/Basilica
Basilica - Wikipedia; Basilica; /wiki/Basilicas in the Catholic Church
Liberal Democrats - Wikipedia; Liberal Democrats; /wiki/Liberal_Democrats_(UK)
Liberal Democrats (UK) - Wikipedia; Liberal Democrats (UK); /wiki/Leader_of_the_Liberal_Democra
Leader of the Liberal Democrats - Wikipedia; Leader of the Liberal Democrats; /wiki/Leader_of_t
Leader of the Liberal Party (UK) - Wikipedia; Leader of the Liberal Party (UK); /wiki/Liberal_P
Liberal Party (UK) - Wikipedia; Liberal Party (UK); /wiki/Liberal_Party_(UK,_1989)
Liberal Party (UK, 1989) - Wikipedia; Liberal Party (UK, 1989); /wiki/Party_leader
Party leader - Wikipedia; Party leader; /wiki/Political_party
Political party - Wikipedia; Political party; /wiki/Political_party_(disambiguation)
Political party (disambiguation) - Wikipedia; Political party (disambiguation); /wiki/Ideology
Ideology - Wikipedia; Ideology; /wiki/Belief
Belief - Wikipedia; Belief; /wiki/Belief_(disambiguation)
Belief (disambiguation) - Wikipedia; Belief (disambiguation); /wiki/Belief#Religion
Belief - Wikipedia; Belief; /wiki/Epistemology
Epistemology - Wikipedia; Epistemology; /wiki/Theory_of_knowledge_(disambiguation)
Theory of knowledge (disambiguation) - Wikipedia; Theory of knowledge (disambiguation); /wiki/T

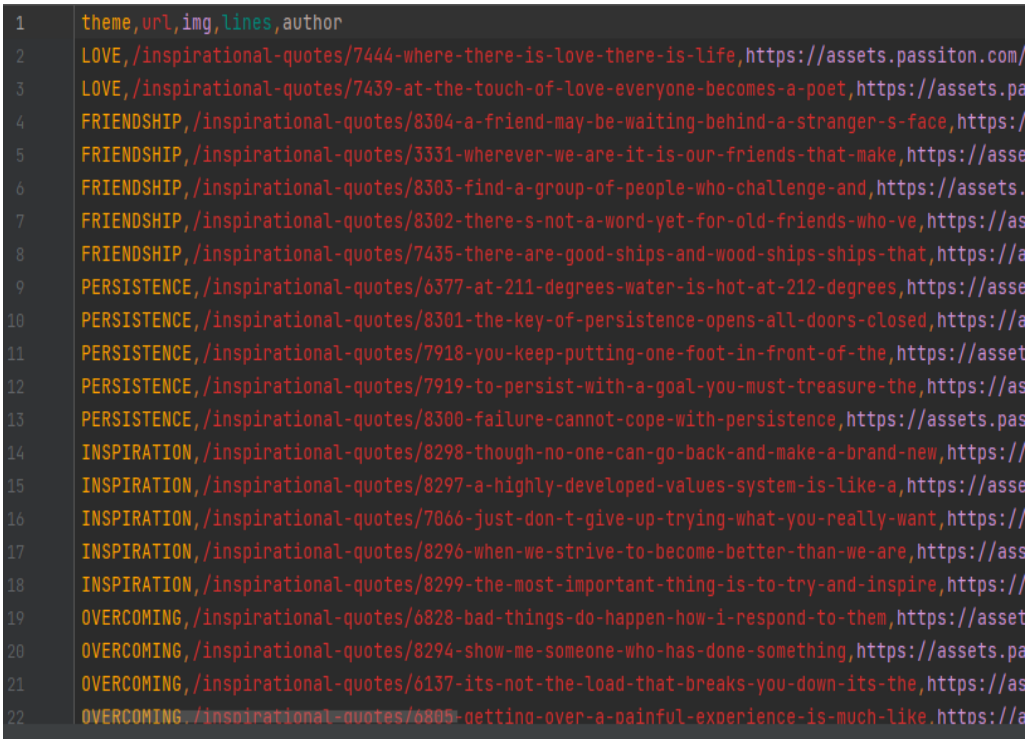
PROGRAM NO: 16 **Date:** 16/02/2022

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 = 'insp_QT.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:



```
theme,url,img,lines,author
LOVE,/inspirational-quotes/7444-where-there-is-love-there-is-life,https://assets.passiton.com/
LOVE,/inspirational-quotes/7439-at-the-touch-of-love-everyone-becomes-a-poet,https://assets.pa
FRIENDSHIP,/inspirational-quotes/8304-a-friend-may-be-waiting-behind-a-stranger-s-face,https:/
FRIENDSHIP,/inspirational-quotes/3331-wherever-we-are-it-is-our-friends-that-make,https://asse
FRIENDSHIP,/inspirational-quotes/8303-find-a-group-of-people-who-challenge-and,https://assets.
FRIENDSHIP,/inspirational-quotes/8302-there-s-not-a-word-yet-for-old-friends-who-ve,https://as
FRIENDSHIP,/inspirational-quotes/7435-there-are-good-ships-and-wood-ships-ships-that,https://a
PERSISTENCE,/inspirational-quotes/6377-at-211-degrees-water-is-hot-at-212-degrees,https://asse
PERSISTENCE,/inspirational-quotes/8301-the-key-of-persistence-opens-all-doors-closed,https://a
PERSISTENCE,/inspirational-quotes/7918-you-keep-putting-one-foot-in-front-of-the,https://asset
PERSISTENCE,/inspirational-quotes/7919-to-persist-with-a-goal-you-must-treasure-the,https://as
PERSISTENCE,/inspirational-quotes/8300-failure-cannot-cope-with-persistence,https://assets.pas
INSPIRATION,/inspirational-quotes/8298-though-no-one-can-go-back-and-make-a-brand-new,https://
INSPIRATION,/inspirational-quotes/8297-a-highly-developed-values-system-is-like-a,https://asse
INSPIRATION,/inspirational-quotes/7066-just-don-t-give-up-trying-what-you-really-want,https://
INSPIRATION,/inspirational-quotes/8296-when-we-strive-to-become-better-than-we-are,https://ass
INSPIRATION,/inspirational-quotes/8299-the-most-important-thing-is-to-try-and-inspire,https://
OVERCOMING,/inspirational-quotes/6828-bad-things-do-happen-how-i-respond-to-them,https://asset
OVERCOMING,/inspirational-quotes/8294-show-me-someone-who-has-done-something,https://assets.pa
OVERCOMING,/inspirational-quotes/6137-its-not-the-load-that-breaks-you-down-its-the,https://as
OVERCOMING,/inspirational-quotes/6805-getting-over-a-painful-experience-is-much-like,https://a
```

```
CREATIVITY,/inspirational-quotes/5577-the-creative-is-the-place-where-no-one-else-has,https://assets.passiton.com/quotes/quote_art
CREATIVITY,/inspirational-quotes/7345-creativity-is-allowing-yourself-to-make,https://assets.passiton.com/quotes/quote_artwork/734
CREATIVITY,/inspirational-quotes/7487-creativity-requires-the-courage-to-let-go-of,https://assets.passiton.com/quotes/quote_artwor
HUMILITY,/inspirational-quotes/8295-i-am-the-me-i-choose-to-be,https://assets.passiton.com/quotes/quote_artwork/8295/medium/202201
CREATIVITY,/inspirational-quotes/7809-creative-people-do-not-see-things-for-what-they,https://assets.passiton.com/quotes/quote_art
HOPE,/inspirational-quotes/8291-there-was-never-a-night-or-a-problem-that-could,https://assets.passiton.com/quotes/quote_artwork/8
HOPE,/inspirational-quotes/3560-hope-is-a-state-of-mind-not-of-the-world,https://assets.passiton.com/quotes/quote_artwork/3560/med
HOPE,/inspirational-quotes/6827-just-as-one-cannot-live-without-dreams-one,https://assets.passiton.com/quotes/quote_artwork/6827/m
HOPE,/inspirational-quotes/8290-we-have-always-held-to-the-hope-the-belief,https://assets.passiton.com/quotes/quote_artwork/8290/m
HOPE,/inspirational-quotes/7457-hope-smiles-from-the-threshold-of-the-year-to,https://assets.passiton.com/quotes/quote_artwork/745
```

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

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

Program Code:

```
def generate_ngrams(text, WordToCombine):
Words = text.split()
output = []
for i in range(len(Words) - WordToCombine + 1):
output.append(Words[i:i + WordToCombine])
return output
x=generate_ngrams(text='this is a very good book to study',WordToCombine=3)
print(x)
```

Output:

```
C:\Users\mca\PycharmProjects\svd\venv\Scripts\python.exe C:/Users/mca/PycharmProjects/svd/Lab/aaa.py
[['this', 'is', 'a'], ['is', 'a', 'very'], ['a', 'very', 'good'], ['very', 'good', 'book'], ['good', 'book', 'to'], ['book', 'to', 'study']]

Process finished with exit code 0
```

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

Output:

```
('This', 'is')
('is', 'a')
('a', 'very')
('very', 'good')
('good', 'book')
('book', 'to')
('to', 'study')

Process finished with exit code 0
```

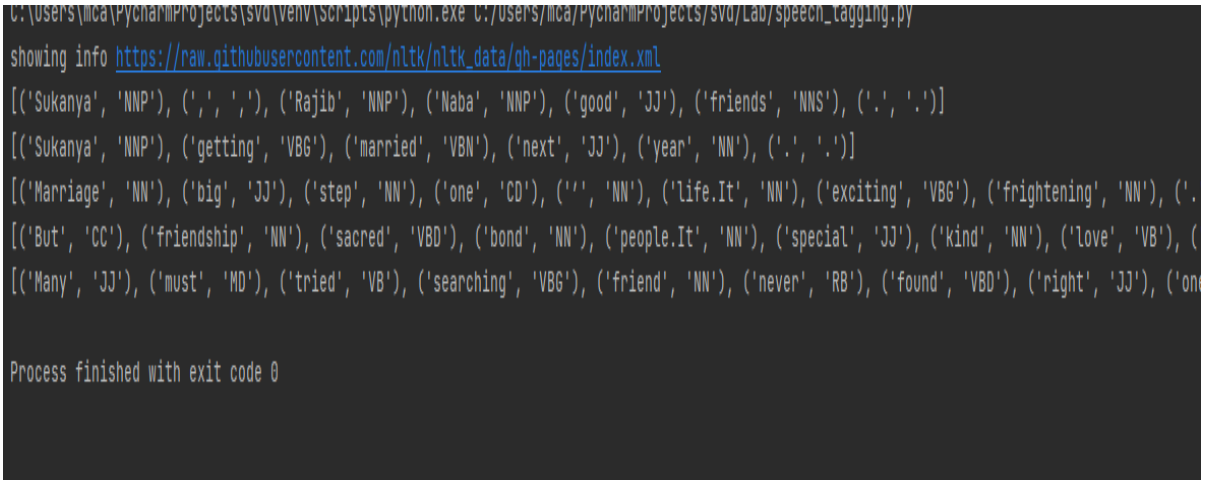
PROGRAM NO: 19 **Date:** 16/02/2022

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

Program Code:

```
import nltk
nltk.download()
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



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

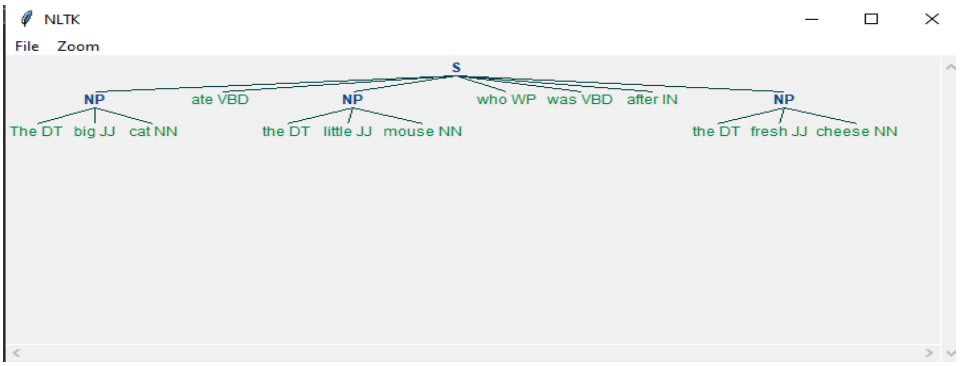
AIM: Write python program for natural language processing which perform chunking.

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 = "NP: {<DT>?<JJ>*<NN>}"
chunkParser = nltk.RegexpParser(grammer)
chunked = chunkParser.parse(new_tag)
print(chunked)
chunked.draw()
```

Output:

```
C:\Users\mca\PycharmProjects\svd\venv\Scripts\python.exe C:/Users/mca/PycharmProjects/svd/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', 'IN'),
(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: Write python program for natural language processing which perform chunking.

Program Code:

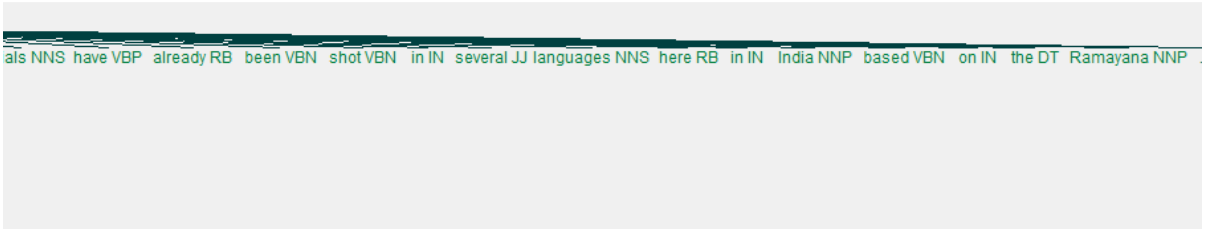
```
import nltk

nltk.download('averaged_perceptron_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)
# print(words)
tagged_words = nltk.pos_tag(words)
# print(tagged_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.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/RB
  in/IN
  India/NNP
  based/VBN
  on/IN
  the/DT
  Ramayana/NNP
  ./.)
```

```
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
```


S
is VBZ
the DT
most RBS
popular JJ
Indian JJ
epic.A NN
lot NN
of IN
movies NNS
and CC
serials


als NNS
have VBP
already RB
been VBN
shot VBN
in IN
several JJ
languages NNS
here RB
in IN
India NNP
based VBN
on IN
the DT
Ramayana NNP