1. **The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)**

AIM:

The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result.

EXPLANATION:

F : Friday

A : Absent

Based on the given problem statement,

The probability that it is Friday and that a student is absent is 3%

i.e. P(A ∩ F)= 3% = 3 / 100 = 0.03

and The probability that it is Friday is 20%

i.e. P(F)=20% = 20/100 = 0.2

Then, The probability that a student is absent given that today is Friday

P(A | F)

By the definition of Baye's rule(conditional probability), we have

P(A | F) = P(A ∩ F) / P(F)

SOURCE CODE :

```
# The probability that it is Friday and that a student is absent is 3%
pAF=0.03
print("The probability that it is Friday and that a student is absent :",pAF)
# The probability that it is Friday is 20%
pF=0.2
print("The probability that it is Friday : ",pF)
# The probability that a student is absent given that today is Friday
pResult=(pAF/pF)
# Display the Result
print("The probability that a student is absent given that today is Friday : ",pResult * 100,"%")
```

OUTPUT:

```
The probability that it is Friday and that a student is absent: 0.03
The probability that it is Friday:  0.2
The probability that a student is absent given that today is
Friday:  15.0 %
```

2. Extract the data from database using python

AIM:
Extract the data from database using python

EXPLANATION:

===> First You need to Create a Table (students) in Mysql Database (SampleDB)

===> Open Command prompt and then execute the following command to enter into MySQL prompt.

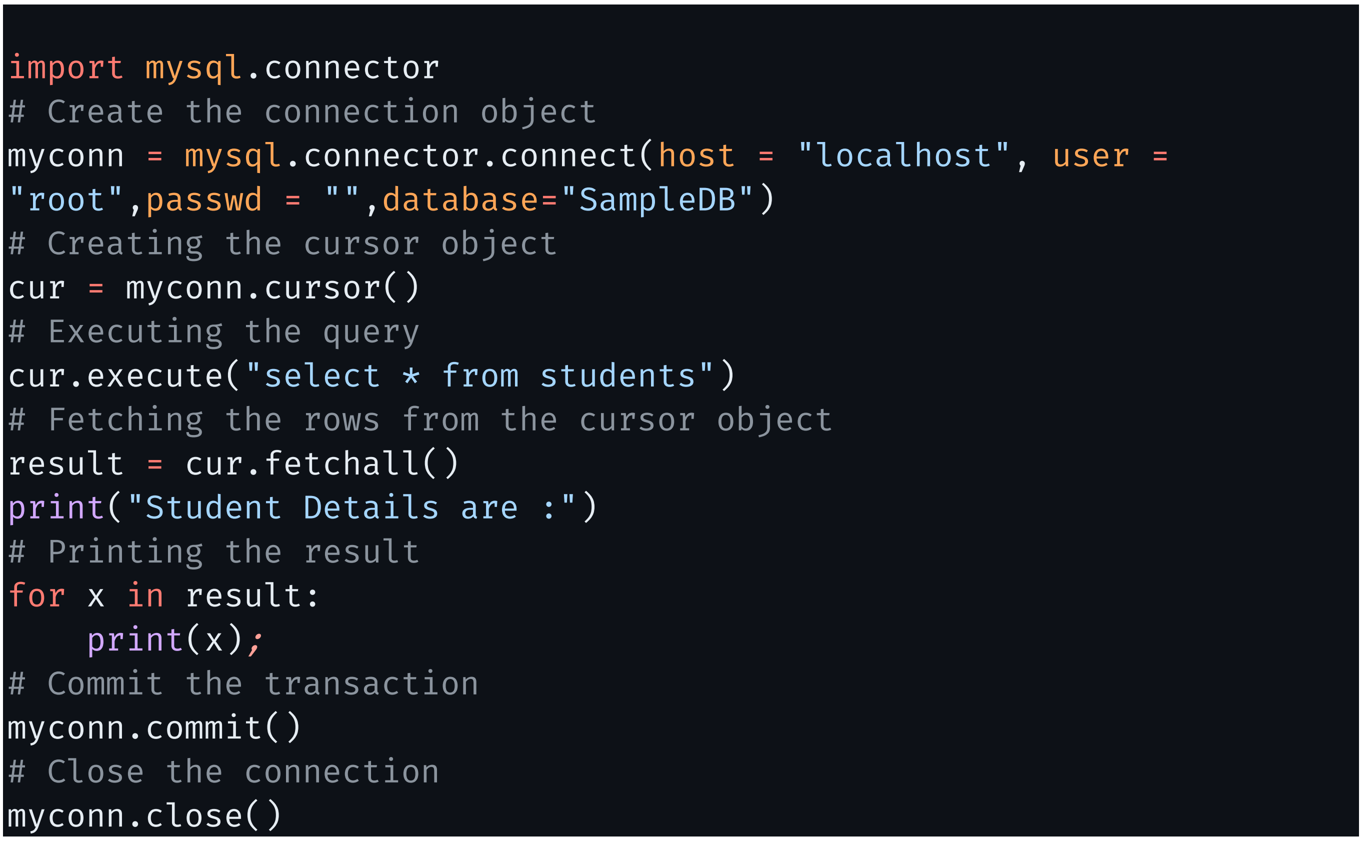
--> mysql -u root -p

And then, you need to execute the following commands at MySQL prompt to create table in the database.
--> create database SampleDB;
--> use SampleDB;
--> CREATE TABLE students (sid VARCHAR(10),sname VARCHAR(10),age int);
--> INSERT INTO students VALUES('s521','Jhon Bob',23);
--> INSERT INTO students VALUES('s522','Dilly',22);
--> INSERT INTO students VALUES('s523','Kenney',25);
--> INSERT INTO students VALUES('s524','Herny',26);

==> Next,Open Command propmt and then execute the following command to install mysql.connector package to connect with mysql database through python.

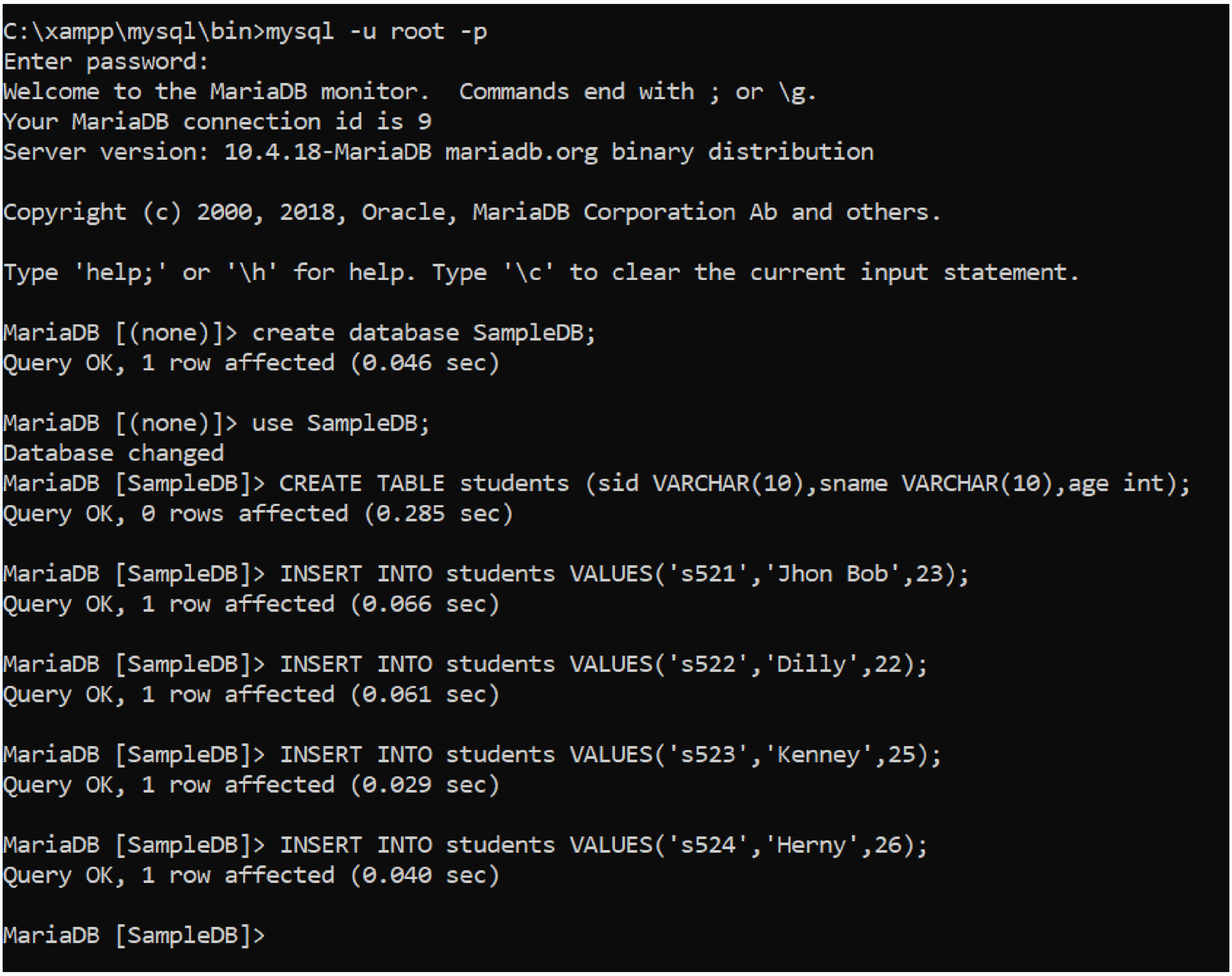
--> pip install mysql.connector (Windows)
--> sudo apt-get install mysql.connector (linux)

SOURCE CODE:

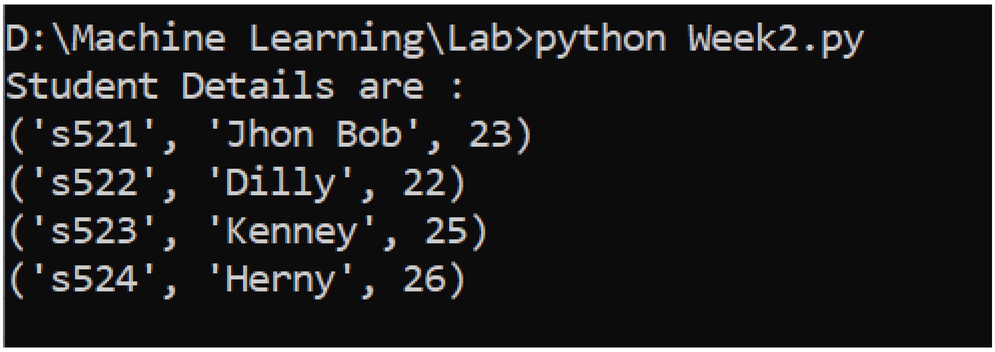


```
import mysql.connector
# Create the connection object
myconn = mysql.connector.connect(host = "localhost", user =
"root",passwd = "",database="SampleDB")
# Creating the cursor object
cur = myconn.cursor()
# Executing the query
cur.execute("select * from students")
# Fetching the rows from the cursor object
result = cur.fetchall()
print("Student Details are :")
# Printing the result
for x in result:
    print(x);
# Commit the transaction
myconn.commit()
# Close the connection
myconn.close()
```

OUTPUT



```
C:\xampp\mysql\bin>mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 9
Server version: 10.4.18-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> create database SampleDB;
Query OK, 1 row affected (0.046 sec)

MariaDB [(none)]> use SampleDB;
Database changed
MariaDB [SampleDB]> CREATE TABLE students (sid VARCHAR(10),sname VARCHAR(10),age int);
Query OK, 0 rows affected (0.285 sec)

MariaDB [SampleDB]> INSERT INTO students VALUES('s521','Jhon Bob',23);
Query OK, 1 row affected (0.066 sec)

MariaDB [SampleDB]> INSERT INTO students VALUES('s522','Dilly',22);
Query OK, 1 row affected (0.061 sec)

MariaDB [SampleDB]> INSERT INTO students VALUES('s523','Kenney',25);
Query OK, 1 row affected (0.029 sec)

MariaDB [SampleDB]> INSERT INTO students VALUES('s524','Herny',26);
Query OK, 1 row affected (0.040 sec)

MariaDB [SampleDB]>
```



```
D:\Machine Learning\Lab>python Week2.py
Student Details are :
('s521', 'Jhon Bob', 23)
('s522', 'Dilly', 22)
('s523', 'Kenney', 25)
('s524', 'Herny', 26)
```

3. Implement k-nearest neighbours classification using python

AIM :

Implement k-nearest neighbours classification using python.

EXPLANATION:

===> To run this program you need to install the sklearn Module

===> Open Command propmt and then execute the following command to install sklearn Module

---> pip install scikit-learn

In this program, we are going to use iris dataset.And this dataset Split into training(70%) and test set(30%).

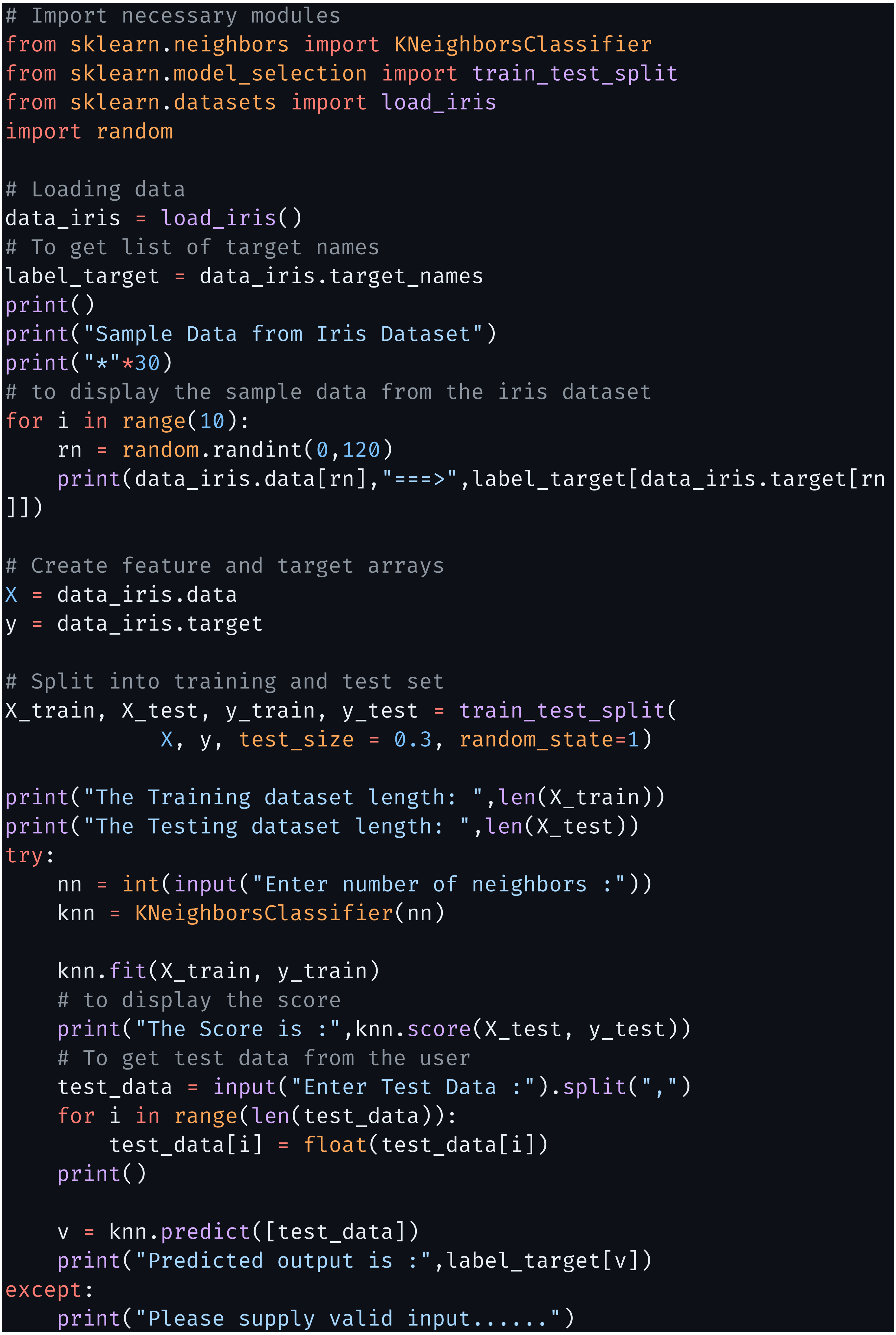
The iris dataset conatins the following features

---> sepal length (cm)
---> sepal width (cm)
---> petal length (cm)
---> petal width (cm)

The Sample data in iris dataset format is [5.4 3.4 1.7 0.2]

Where	5.4 ---> sepal length (cm)
	3.4 ---> sepal width (cm)
	1.7 ---> petal length (cm)
	0.2 ---> petal width (cm)

SOURCE CODE :



```
# Import necessary modules
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
from sklearn.datasets import load_iris
import random

# Loading data
data_iris = load_iris()
# To get list of target names
label_target = data_iris.target_names
print()
print("Sample Data from Iris Dataset")
print("*"*30)
# to display the sample data from the iris dataset
for i in range(10):
    rn = random.randint(0,120)
    print(data_iris.data[rn],"===>",label_target[data_iris.target[rn
]])

# Create feature and target arrays
X = data_iris.data
y = data_iris.target

# Split into training and test set
X_train, X_test, y_train, y_test = train_test_split(
            X, y, test_size = 0.3, random_state=1)

print("The Training dataset length: ",len(X_train))
print("The Testing dataset length: ",len(X_test))
try:
    nn = int(input("Enter number of neighbors :"))
    knn = KNeighborsClassifier(nn)

    knn.fit(X_train, y_train)
    # to display the score
    print("The Score is :",knn.score(X_test, y_test))
    # To get test data from the user
    test_data = input("Enter Test Data :").split(",")
    for i in range(len(test_data)):
        test_data[i] = float(test_data[i])
    print()

    v = knn.predict([test_data])
    print("Predicted output is :",label_target[v])
except:
    print("Please supply valid input......")
```

OUTPUT:

```
Sample Data from Iris Dataset
******************************
[5.7 2.6 3.5 1. ] ===> versicolor
[5.1 3.8 1.6 0.2] ===> setosa
[6.  2.2 5.  1.5] ===> virginica
[5.7 4.4 1.5 0.4] ===> setosa
[6.6 2.9 4.6 1.3] ===> versicolor
[4.4 3.2 1.3 0.2] ===> setosa
[6.  2.9 4.5 1.5] ===> versicolor
[5.7 4.4 1.5 0.4] ===> setosa
[6.4 2.7 5.3 1.9] ===> virginica
[6.6 3.  4.4 1.4] ===> versicolor
The Training dataset length:  105
The Testing dataset length:  45
Enter number of neighbors :10
The Score is : 0.9777777777777777
Enter Test Data :6.2, 2.6, 3.4, 0.6

Predicted output is : ['versicolor']
```

4. **Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k-means clustering with 3 means (i.e., 3centroids)**

AIM:

Given the following data, which specify classifications for nine ombinationsof VAR1 and VAR2 predict a classification for a case where VAR1=0.906and VAR2=0.606, using the result of k-means clustering with 3 means (i.e., 3centroids)

EXPLANATION:

===> To run this program you need to install the sklearn Module

===> Open Command propmt and then execute the following command to install sklearn Module

---> pip install scikit-learn

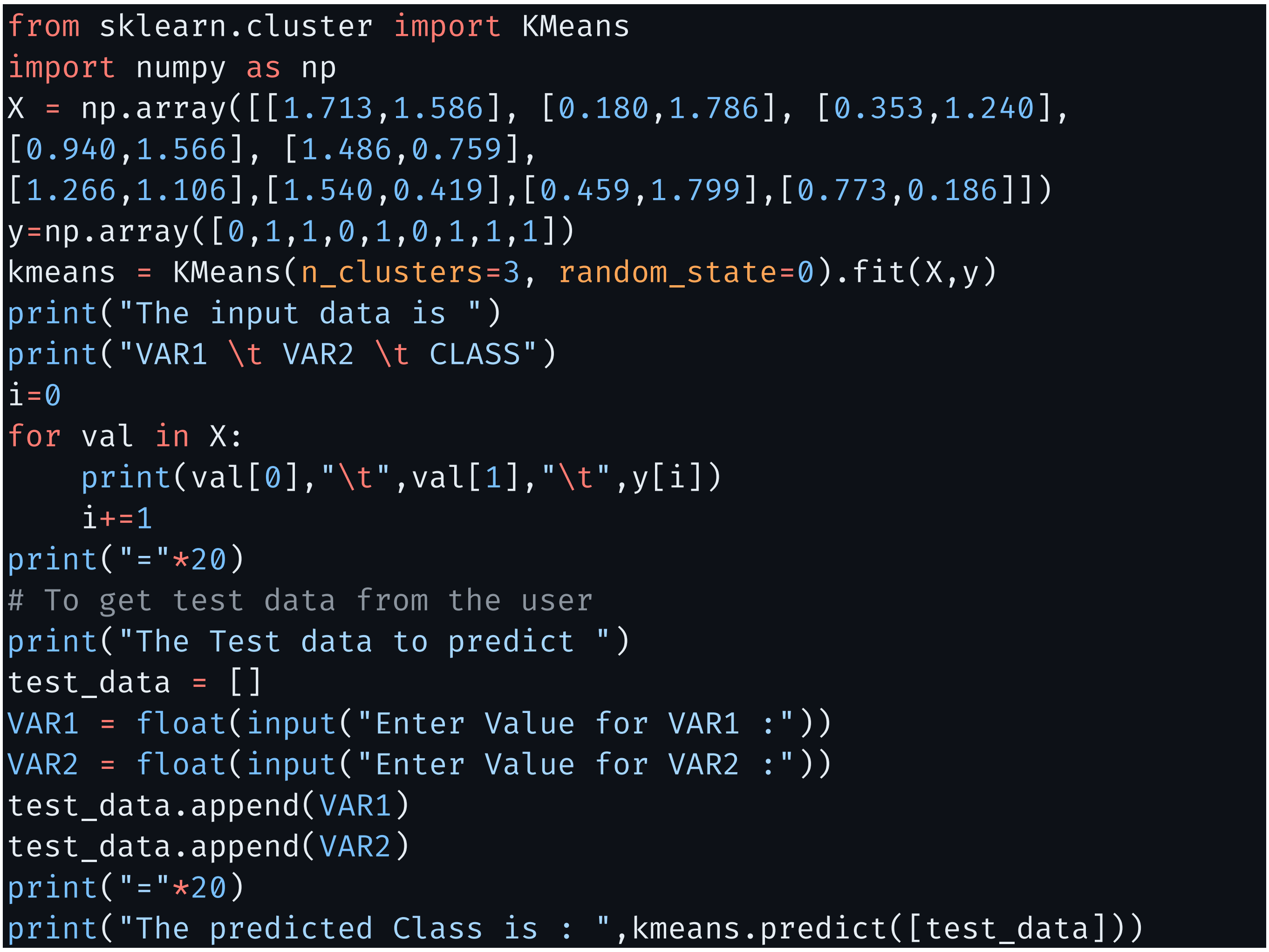
In this program, we are going to use the following data

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

And, we need apply k-means clustering with 3 means (i.e., 3 centroids)

Finally, you need to predict the class for the VAR1=0.906 and VAR2=0.606

SOURCE CODE:



```python
from sklearn.cluster import KMeans
import numpy as np
X = np.array([[1.713,1.586], [0.180,1.786], [0.353,1.240],
[0.940,1.566], [1.486,0.759],
[1.266,1.106],[1.540,0.419],[0.459,1.799],[0.773,0.186]])
y=np.array([0,1,1,0,1,0,1,1,1])
kmeans = KMeans(n_clusters=3, random_state=0).fit(X,y)
print("The input data is ")
print("VAR1 \t VAR2 \t CLASS")
i=0
for val in X:
    print(val[0],"\t",val[1],"\t",y[i])
    i+=1
print("="*20)
# To get test data from the user
print("The Test data to predict ")
test_data = []
VAR1 = float(input("Enter Value for VAR1 :"))
VAR2 = float(input("Enter Value for VAR2 :"))
test_data.append(VAR1)
test_data.append(VAR2)
print("="*20)
print("The predicted Class is : ",kmeans.predict([test_data]))
```

OUTPUT:

```
The input data is
VAR1         VAR2   CLASS
1.713        1.586  0
0.18         1.786  1
0.353        1.24   1
0.94         1.566  0
1.486        0.759  1
1.266        1.106  0
1.54         0.419  1
0.459        1.799  1
0.773        0.186  1
====================
The Test data to predict
Enter Value for VAR1 :0.906
Enter Value for VAR2 :0.606
====================
The predicted Class is :  [0]
```

5. **The following training examples map descriptions of individuals onto high, medium and low credit-worthiness. Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of 'golf' and the conditional probability of 'single' given 'medRisk' in the dataset**

AIM:

The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

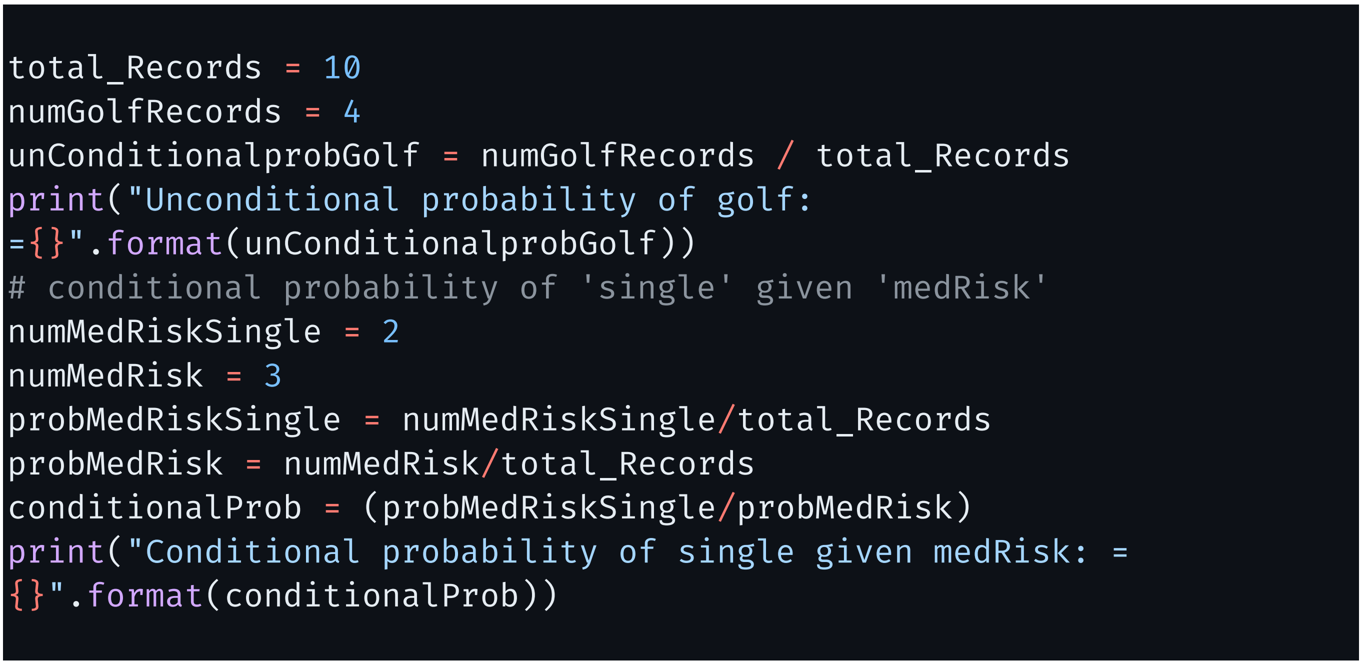
medium skiing design single twenties no -> highRisk
high golf trading married forties yes -> lowRisk
low speedway transport married thirties yes -> medRisk
medium football banking single thirties yes -> lowRisk
high flying media married fifties yes -> highRisk
low football security single twenties no -> medRisk
medium golf media single thirties yes -> medRisk
medium golf transport married forties yes -> lowRisk
high skiing banking single thirties yes -> highRisk
low golf unemployed married forties yes -> highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of 'golf' and the conditional probability of 'single' given 'medRisk' in the dataset

EXPLANATION:

In the given data set,
----> The total number of records are 10.
----> The number of records which contains 'golf' are 4.
----> Then, the Unconditional probability of golf :
= The number of records which contains 'golf' / total number of records
= 4 / 10
= 0.4
****
To find the Conditional probability of single given medRisk,
---> S : single
---> MR : medRisk
---> By the definition of Baye's rule(conditional probability), we have
P(S | MR) = P(S ∩ MR) / P(MR)
Based on the given problem statement,
P(S ∩ MR) = The number of MedRisk with Single records / total number of Records
= 2 / 10 = 0.2
and
P(MR) = The number of records with MedRisk /total number of Records
= 3 / 10 = 0.3
Then, the Conditional probability of single given medRisk
P(S | MR) = 0.2 / 0.3
= 0.66666

SOURCE CODE:



```
total_Records = 10
numGolfRecords = 4
unConditionalprobGolf = numGolfRecords / total_Records
print("Unconditional probability of golf:
={}".format(unConditionalprobGolf))
# conditional probability of 'single' given 'medRisk'
numMedRiskSingle = 2
numMedRisk = 3
probMedRiskSingle = numMedRiskSingle/total_Records
probMedRisk = numMedRisk/total_Records
conditionalProb = (probMedRiskSingle/probMedRisk)
print("Conditional probability of single given medRisk: =
{}".format(conditionalProb))
```

OUTPUT:

```
Unconditional probability of golf: =0.4
Conditional probability of single given medRisk: = 0.6666666666666667
```

6. Implement linear regression using python

AIM:

Implement linear regression using python

EXPLANATION:

===> To run this program you need to install the pandas Module

---> pandas Module is used to read csv files

===> To install, Open Command propmt and then execute the following command

---> pip install pandas

And, then you need to install the matplotlib Module

---> matplotlib Module is used to plot the graphs

===> To install, Open Command propmt and then execute the following command

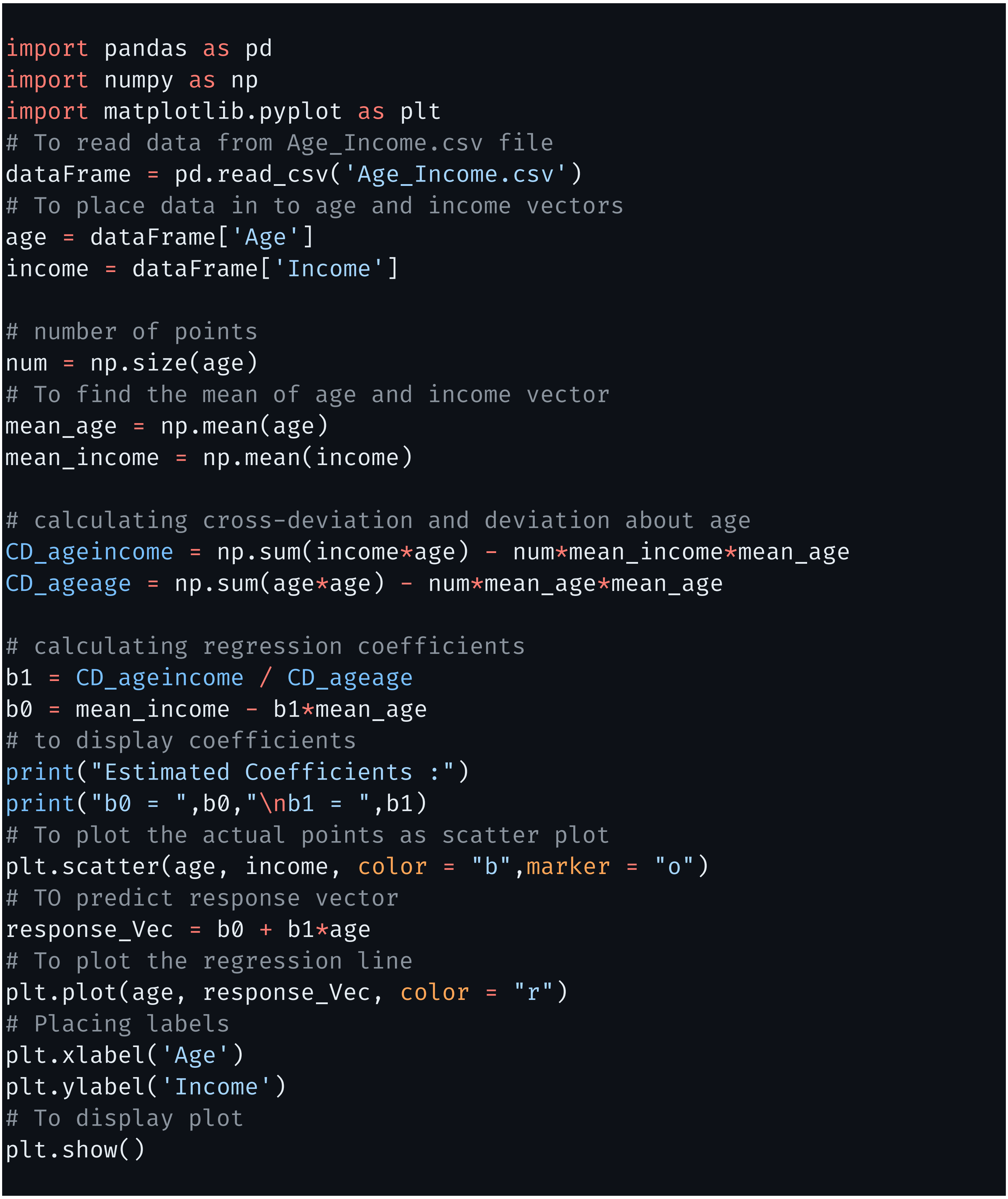
---> pip install matplotlib

Finally, you need to create dataset called "Age_Income.csv" file.

SOURCE CODE:

Age_Income.csv

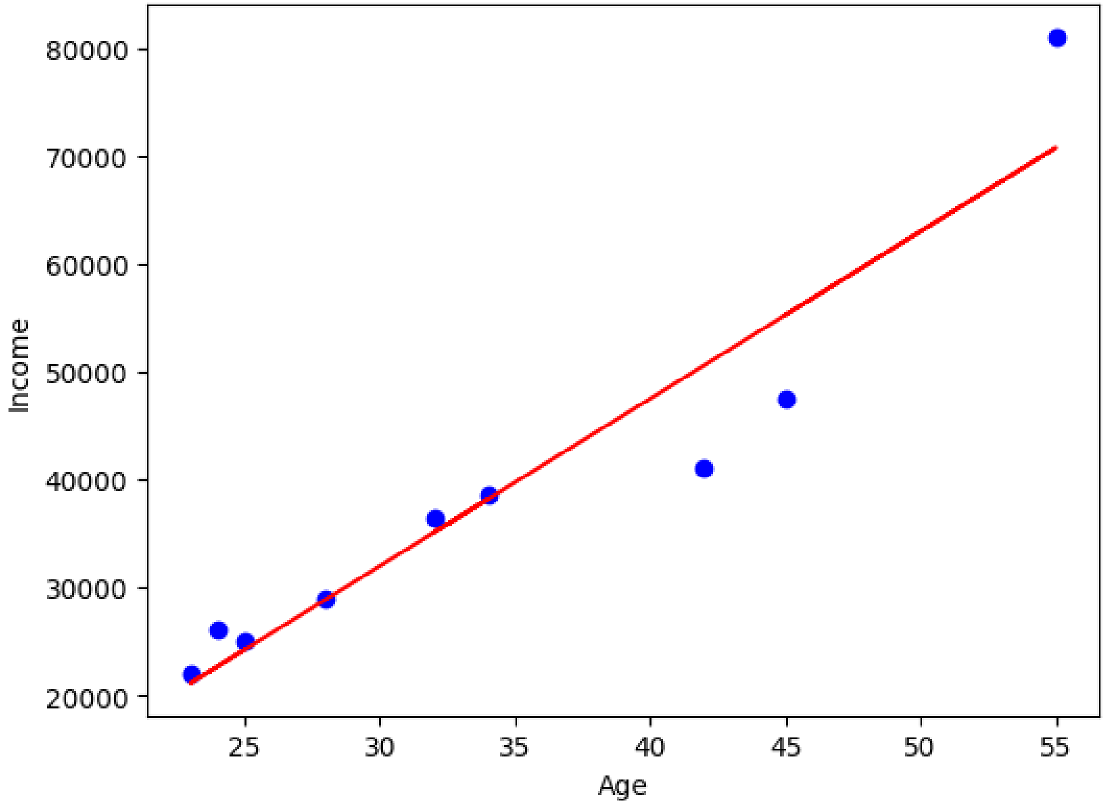
```
Age,Income
25,25000
23,22000
24,26000
28,29000
34,38600
32,36500
42,41000
55,81000
45,47500
```



```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
# To read data from Age_Income.csv file
dataFrame = pd.read_csv('Age_Income.csv')
# To place data in to age and income vectors
age = dataFrame['Age']
income = dataFrame['Income']

# number of points
num = np.size(age)
# To find the mean of age and income vector
mean_age = np.mean(age)
mean_income = np.mean(income)

# calculating cross-deviation and deviation about age
CD_ageincome = np.sum(income*age) - num*mean_income*mean_age
CD_ageage = np.sum(age*age) - num*mean_age*mean_age

# calculating regression coefficients
b1 = CD_ageincome / CD_ageage
b0 = mean_income - b1*mean_age
# to display coefficients
print("Estimated Coefficients :")
print("b0 = ",b0,"\nb1 = ",b1)
# To plot the actual points as scatter plot
plt.scatter(age, income, color = "b",marker = "o")
# TO predict response vector
response_Vec = b0 + b1*age
# To plot the regression line
plt.plot(age, response_Vec, color = "r")
# Placing labels
plt.xlabel('Age')
plt.ylabel('Income')
# To display plot
plt.show()
```

OUTPUT:

```
Estimated Coefficients :
b0 =  -14560.45016077166
b1 =  1550.7923748277433
```



7. Implement naive baye's theorem to classify the English text

AIM:

Implement linear regression using python

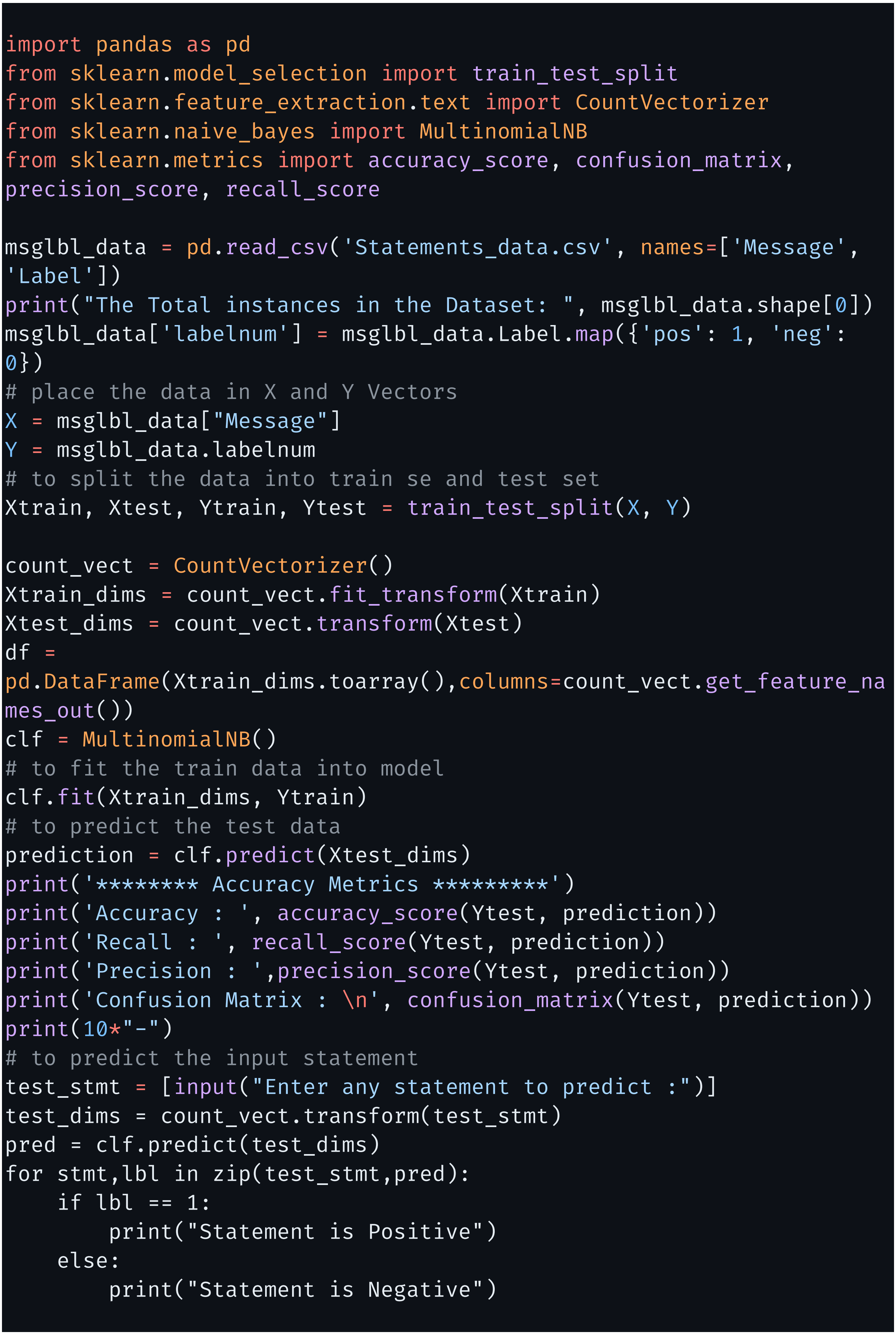
EXPLANATION:

===> To run this program you need to install the pandas Module
---> pandas Module is used to read csv files
===> To install, Open Command propmt and then execute the following command
---> pip install pandas
And, then you need to install the sklearn Module
===> Open Command propmt and then execute the following command to install sklearn Module
---> pip install scikit-learn
Finally, you need to create dataset called "Statements_data.csv" file.

SOURCE CODE:

Statements_data.csv

```
This is very good place,pos
I like this biryani,pos
I feel very happy,pos
This is my best work,pos
I do not like this restaurant,neg
I am tired of this stuff,neg
I can't deal with this,neg
What an idea it is,pos
My place is horrible,neg
This is an awesome place,pos
I do not like the taste of this juice,neg
I love to sing,pos
I am sick and tired,neg
I love to dance,pos
What a great holiday,pos
That is a bad locality to stay,neg
We will have good fun tomorrow,pos
I hate this food,neg
```



```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.naive_bayes import MultinomialNB
from sklearn.metrics import accuracy_score, confusion_matrix,
precision_score, recall_score

msglbl_data = pd.read_csv('Statements_data.csv', names=['Message',
'Label'])
print("The Total instances in the Dataset: ", msglbl_data.shape[0])
msglbl_data['labelnum'] = msglbl_data.Label.map({'pos': 1, 'neg':
0})
# place the data in X and Y Vectors
X = msglbl_data["Message"]
Y = msglbl_data.labelnum
# to split the data into train se and test set
Xtrain, Xtest, Ytrain, Ytest = train_test_split(X, Y)

count_vect = CountVectorizer()
Xtrain_dims = count_vect.fit_transform(Xtrain)
Xtest_dims = count_vect.transform(Xtest)
df =
pd.DataFrame(Xtrain_dims.toarray(),columns=count_vect.get_feature_na
mes_out())
clf = MultinomialNB()
# to fit the train data into model
clf.fit(Xtrain_dims, Ytrain)
# to predict the test data
prediction = clf.predict(Xtest_dims)
print('******** Accuracy Metrics *********')
print('Accuracy : ', accuracy_score(Ytest, prediction))
print('Recall : ', recall_score(Ytest, prediction))
print('Precision : ',precision_score(Ytest, prediction))
print('Confusion Matrix : \n', confusion_matrix(Ytest, prediction))
print(10*"-")
# to predict the input statement
test_stmt = [input("Enter any statement to predict :")]
test_dims = count_vect.transform(test_stmt)
pred = clf.predict(test_dims)
for stmt,lbl in zip(test_stmt,pred):
    if lbl == 1:
        print("Statement is Positive")
    else:
        print("Statement is Negative")
```

OUTPUT:

```
The Total instances in the Dataset:  18
******** Accuracy Metrics *********
Accuracy :  0.6
Recall :  1.0
Precision :  0.6
Confusion Matrix :
 [[0 2]
 [0 3]]
----------
Enter any statement to predict :I hate juice
Statement is Negative
```

8. Implement the finite words classification system using Back-propagation algorithm

AIM:

Implement the finite words classification system using Back-propagation algorithm

EXPLANATION:

===> To run this program you need to install the pandas Module

---> pandas Module is used to read csv files

===> To install, Open Command propmt and then execute the following command

---> pip install pandas

And, then you need to install the sklearn Module

===> Open Command propmt and then execute the following command to install sklearn Module

---> pip install scikit-learn

===> Open Command propmt and then execute the following command to install sklearn-neuralnetwork Module

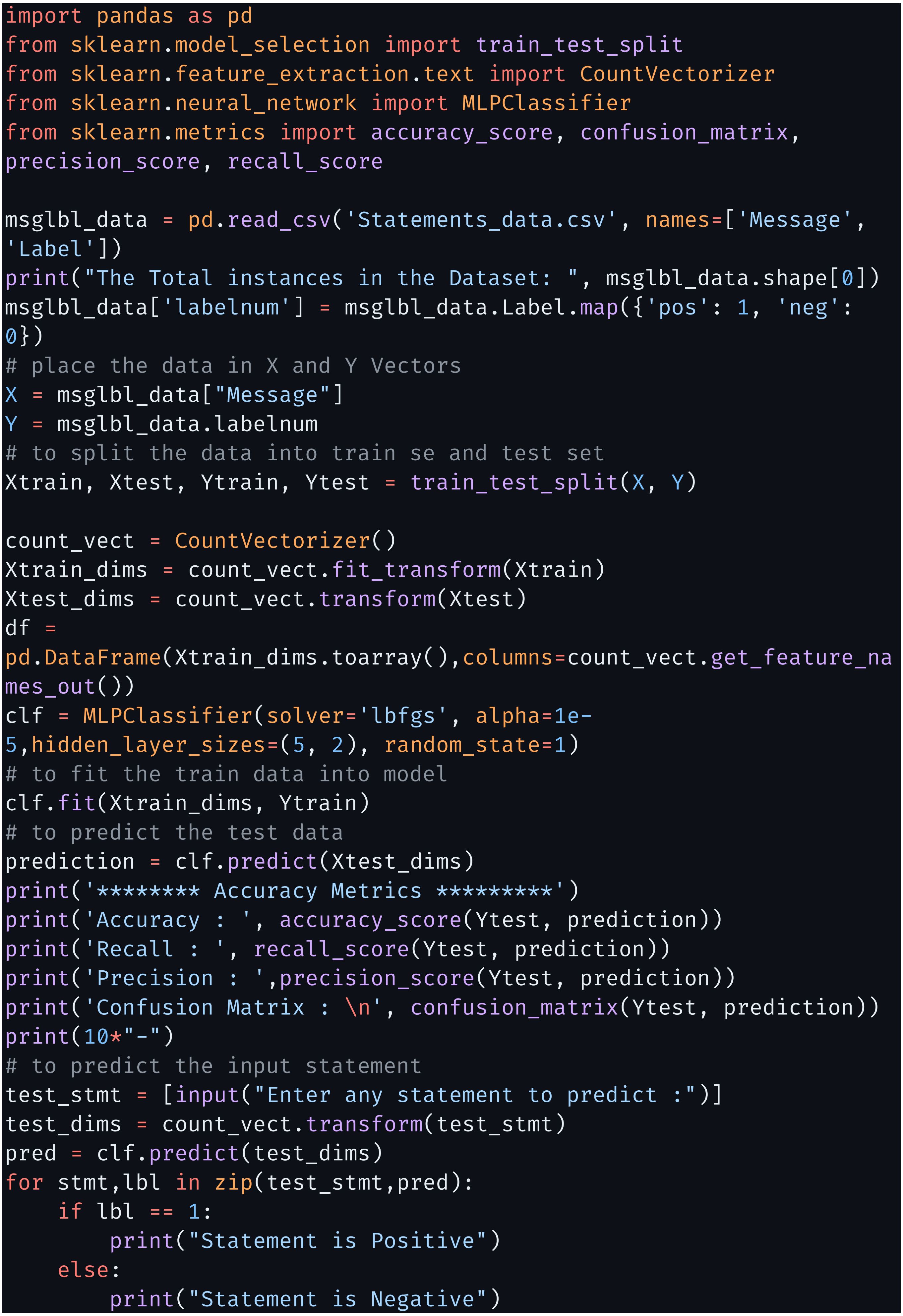
---> pip install scikit-neuralnetwork

Finally, you need to create dataset called "Statements_data.csv" file.

SOURCE CODE:

Statements_data.csv

```
This is very good place,pos
I like this biryani,pos
I feel very happy,pos
This is my best work,pos
I do not like this restaurant,neg
I am tired of this stuff,neg
I can't deal with this,neg
What an idea it is,pos
My place is horrible,neg
This is an awesome place,pos
I do not like the taste of this juice,neg
I love to sing,pos
I am sick and tired,neg
I love to dance,pos
What a great holiday,pos
That is a bad locality to stay,neg
We will have good fun tomorrow,pos
I hate this food,neg
```



```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.neural_network import MLPClassifier
from sklearn.metrics import accuracy_score, confusion_matrix,
precision_score, recall_score

msglbl_data = pd.read_csv('Statements_data.csv', names=['Message',
'Label'])
print("The Total instances in the Dataset: ", msglbl_data.shape[0])
msglbl_data['labelnum'] = msglbl_data.Label.map({'pos': 1, 'neg':
0})
# place the data in X and Y Vectors
X = msglbl_data["Message"]
Y = msglbl_data.labelnum
# to split the data into train se and test set
Xtrain, Xtest, Ytrain, Ytest = train_test_split(X, Y)

count_vect = CountVectorizer()
Xtrain_dims = count_vect.fit_transform(Xtrain)
Xtest_dims = count_vect.transform(Xtest)
df =
pd.DataFrame(Xtrain_dims.toarray(),columns=count_vect.get_feature_na
mes_out())
clf = MLPClassifier(solver='lbfgs', alpha=1e-
5,hidden_layer_sizes=(5, 2), random_state=1)
# to fit the train data into model
clf.fit(Xtrain_dims, Ytrain)
# to predict the test data
prediction = clf.predict(Xtest_dims)
print('******** Accuracy Metrics *********')
print('Accuracy : ', accuracy_score(Ytest, prediction))
print('Recall : ', recall_score(Ytest, prediction))
print('Precision : ',precision_score(Ytest, prediction))
print('Confusion Matrix : \n', confusion_matrix(Ytest, prediction))
print(10*"-")
# to predict the input statement
test_stmt = [input("Enter any statement to predict :")]
test_dims = count_vect.transform(test_stmt)
pred = clf.predict(test_dims)
for stmt,lbl in zip(test_stmt,pred):
    if lbl == 1:
        print("Statement is Positive")
    else:
        print("Statement is Negative")
```

OUTPUT:

```
The Total instances in the Dataset:  18
******** Accuracy Metrics *********
Accuracy :  0.6
Recall :  1.0
Precision :  0.6
Confusion Matrix :
 [[0 2]
 [0 3]]
----------
Enter any statement to predict :I love biryani
Statement is Positive
```

```
The Total instances in the Dataset:  18
******** Accuracy Metrics *********
Accuracy :  0.6
Recall :  0.6666666666666666
Precision :  0.6666666666666666
Confusion Matrix :
 [[1 1]
 [1 2]]
----------
Enter any statement to predict :i do not like summer
Statement is Negative
```