Implementation of Univariate Linear Regression

AIM:

To implement univariate Linear Regression to fit a straight line using least squares.

Equipments Required:

1. Hardware – PCs
2. Anaconda – Python 3.7 Installation / Jupyter notebook

Algorithm

1. Get the independent variable X and dependent variable Y.
2. Calculate the mean of the X -values and the mean of the Y -values.
3. Find the slope m of the line of best fit using the formula.

$$m = \frac{\sum_{i=1}^{n}(x_i-\overline{X})(y_i-\overline{Y})}{\sum_{i=1}^{n}(x_i-\overline{X})^2}$$

4. Compute the y -intercept of the line by using the formula:

$$b = \overline{Y} - m\overline{X}$$

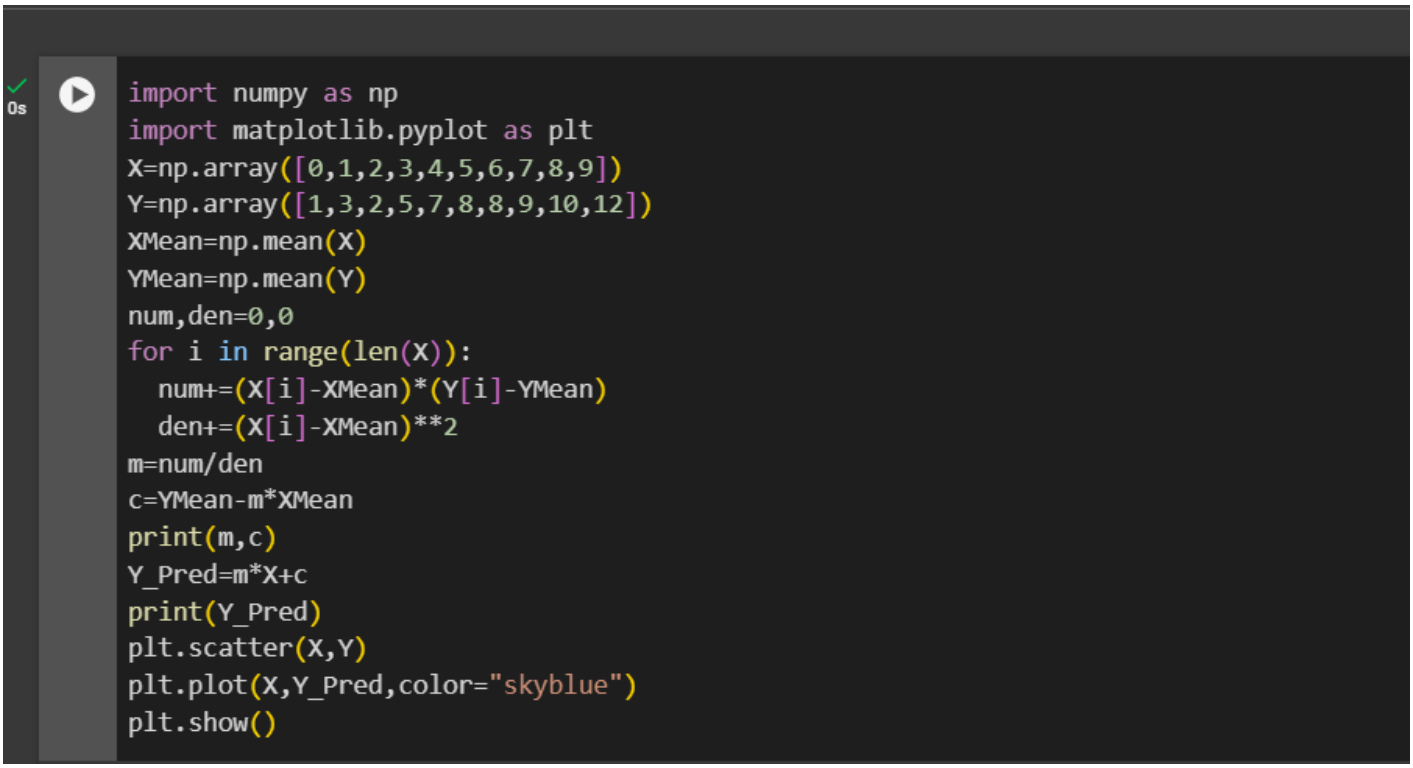
5. Use the slope m and the y -intercept to form the equation of the line. 6. Obtain the straight line equation Y=mX+b and plot the scatterplot.

Program:

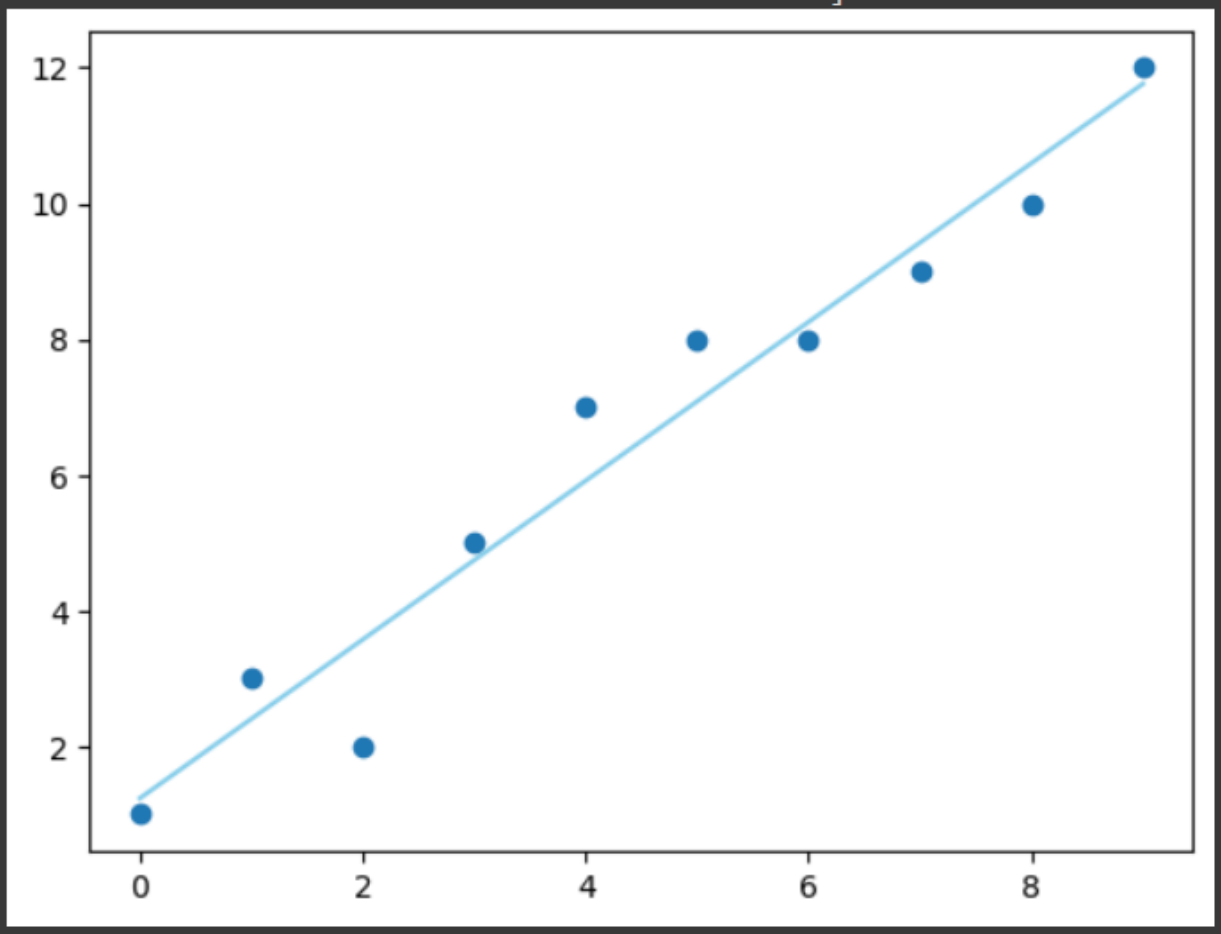
```
/*
Program to implement univariate Linear Regression to fit a straight line using least s
Developed by:
RegisterNumber:
*/
```

```
import numpy as np
import matplotlib.pyplot as plt
X=np.array([0,1,2,3,4,5,6,7,8,9])
Y=np.array([1,3,2,5,7,8,8,9,10,12])
XMean=np.mean(X)
YMean=np.mean(Y)
num,den=0,0
for i in range(len(X)):
  num+=(X[i]-XMean)*(Y[i]-YMean)
  den+=(X[i]-XMean)**2
m=num/den
c=YMean-m*XMean
print(m,c)
Y_Pred=m*X+c
print(Y_Pred)
plt.scatter(X,Y)
plt.plot(X,Y_Pred,color="skyblue")
plt.show()
```

Output:



```
1.1696969696969697 1.2363636363636363
[ 1.23636364  2.40606061  3.57575758  4.74545455  5.91515152  7.08484848
  8.25454545  9.42424242 10.59393939 11.76363636]
```



Result:

Thus the univariate Linear Regression was implemented to fit a straight line using least squares using python programming.