EXPT NO : 2   **A python program to implement simple**

DATE:30/08/2024   **Regression using Least Square Method**

AIM:

To write a python program to implement Simple linear regression using Least Square Method.

PROCEDURE:

Implementing Simple linear regression using Least Square method using the headbrain dataset involve the following steps:

Step 1: Import Necessary Libraries

First, import the libraries that are essential for data manipulation, visualization, and model building.

```python
import pandas as pd import
matplotlib.pyplot as plt import
numpy as np
```

Step 2: Load the Iris Dataset The HeadBrain

dataset can be loaded. `data =`

```python
pd.read_csv('/content/headbrain.csv')
```

Step 3: Data Preprocessing

Ensure the data is clean and ready for modeling. Since the Iris dataset is clean, minimal preprocessing is needed.

```python
x,y=np.array(list(data['Head Size(cm^3)'])),np.array(list(data['Brain
Weight(grams)'])) print(x[:5],y[:5])
```

OUTPUT :

```
[4512 3738 4261 3777 4177] [1530 1297 1335 1282 1590]
```

Step 4 :Compute the Least Squares Solution

Apply the least squares formula to find the regression coefficients.

```python
def get_line(x,y):  x_m,y_m  =  np.mean(x),  np.mean(y)

print(x_m,y_m)        x_d,y_d=x-x_m,y-y_m        m        =

np.sum(x_d*y_d)/np.sum(x_d**2) c = y_m - (m*x_m) print(m, c)

return lambda x : m*x+c

lin=get_line(x,y)
```

OUTPUT :

```
3633.9915611814345 1282.873417721519
0.2634293394893993 325.5734210494428
```

Step 5 : Make Predictions

Use the model to make predictions based on the independent variable. `def`

```python
get_error(line_fuc, x, y):

 y_m = np.mean(y) y_pred =

 np.array([line_fuc(_) for _ in x])

 ss_t = np.sum((y-y_m)**2)
 ss_r = np.sum((y-y_pred)**2)
 return 1-(ss_r/ss_t)
 get_error(lin, x, y)
```

```python
from sklearn.linear_model import LinearRegression

x = x.reshape((len(x),1))

reg=LinearRegression()

reg=reg.fit(x, y)

print(reg.score(x, y))
```

OUTPUT :

1.0

1.0

Step 6 :Visualize the Results

Plot the original data points and the fitted regression line.

```python
x=np.linspace(np.min(x)-100,np.max(x)+100,1000)

y=np.array([lin(x)for x in x]) plt.plot(x, y,

color='red', label='Regression line') plt.scatter(x,

y, color='green', label='Scatter plot')

plt.xlabel('Head Size(cm^3)')

plt.ylabel('Brain

Weight(grams)') plt.legend()

plt.show()
```
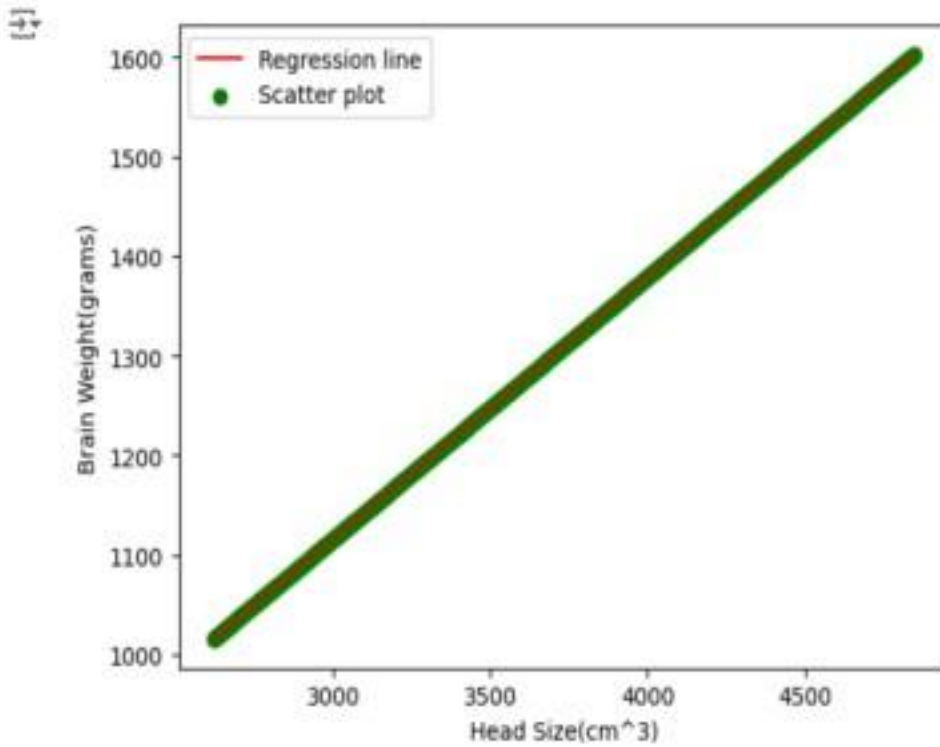
OUTPUT :

RESULT:

This step-by-step process will help us to implement least square regression models using the HeadBrain dataset and analyze their performance.