EXP 2

A PYTHON PROGRAM TO IMPLEMENT SIMPLE LINEAR REGRESSION USING THE LEAST SQUARE METHOD

Aim:
To implement a Python program for constructing a simple linear regression using the least square method.

PROGRAM:

```python
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
data = pd.read_csv('/content/headbrain.csv')
x, y = np.array(list(data['Head Size(cm^3)'])), np.array(list(data['Brain Weight(grams)']))
print(x[:5], y[:5])

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)
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()

def 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) C./
```
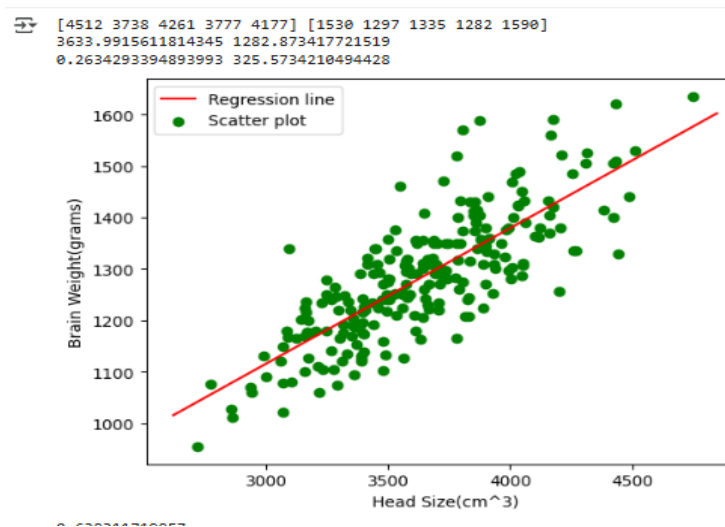
```
from sklearn.linear_model import LinearRegression
x = x.reshape((len(x),1))
reg=LinearRegression()
reg=reg.fit(x, y)
print(reg.score(x, y))
```

OUTPUT:

```
[4512 3738 4261 3777 4177] [1530 1297 1335 1282 1590]
3633.9915611814345 1282.873417721519
0.2634293394893993 325.5734210494428
```


RESULT:
Thus, the Python program to implement simple linear regression using the least square method for the given head brain dataset is analyzed, and the linear regression line is constructed successfully.