

EXPERIMENT 2

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

AIM:

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

CODE:

```
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)')
```

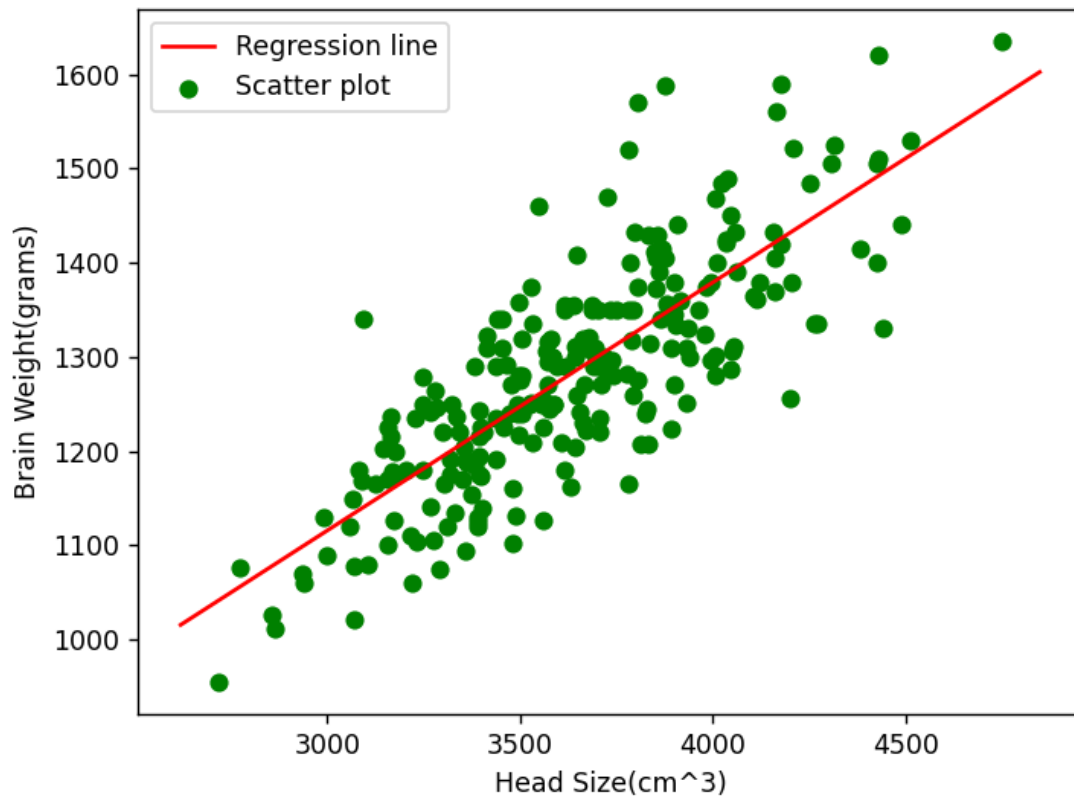
```
plt.legend()
plt.show()
```

```
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)
```

```
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:

Figure 1





The screenshot shows a terminal window titled "IDLE Shell 3.12.3". The window has a menu bar with "File", "Edit", "Shell", "Debug", "Options", "Window", and "Help". The terminal output shows the Python version and architecture: "Python 3.12.3 (tags/v3.12.3:f6650f9, Apr 9 2024, 14:05:25) [MSC v.1938 64 bit (AMD64)] on win32". It then prompts the user to type "help", "copyright", "credits", or "license()" for more information. The prompt ">>>" is followed by a restart message: "= RESTART: C:/Users/itzdi/AppData/Local/Programs/Python/Python312/ex2.py". The output then displays four lines of numerical data: "[4512 3738 4261 3777 4177] [1530 1297 1335 1282 1590]", "3633.9915611814345 1282.873417721519", "0.2634293394893993 325.5734210494428", and "0.639311719957". The prompt ">>>" is shown again. The status bar at the bottom right indicates "Ln: 9 Col: 0".

```
IDLE Shell 3.12.3
File Edit Shell Debug Options Window Help
Python 3.12.3 (tags/v3.12.3:f6650f9, Apr 9 2024, 14:05:25) [MSC v.1938 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/itzdi/AppData/Local/Programs/Python/Python312/ex2.py
[4512 3738 4261 3777 4177] [1530 1297 1335 1282 1590]
3633.9915611814345 1282.873417721519
0.2634293394893993 325.5734210494428
0.639311719957
>>>
```

Ln: 9 Col: 0

RESULT:

A PYTHON PROGRAM TO IMPLEMENT SIMPLE LINEAR REGRESSION USING LEAST SQUARE METHOD AS BEEN ANALYSED AND VERIFIED