**EXPT NO : 2 A python program to implement Simple linear**

**Regression using Least Square Method**

**DATE: 30.8.2024**

**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.

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 = 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.

x,y=np.array(list(data['Head Size(cm^3)'])),np.array(list(data['Brain

Weight(grams)']))

print(x[:5],y[:5])

**OUTPUT :**



**Step 4 :Compute the Least Squares Solution**

Apply the least squares formula to find the regression coefficients.

|  |
| --- |
| 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 :**



**Step 5 : Make Predictions**

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

|  |
| --- |
| **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 :**



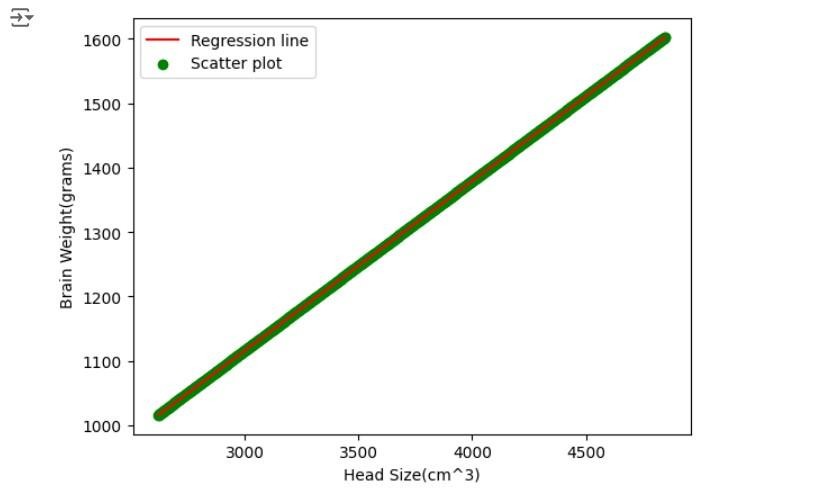


**Step 6 :Visualize the Results**

Plot the original data points and the fitted regression line.

|  |
| --- |
| 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.