

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

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```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
df = pd.read_csv('../input/headbrain.csv')
df.head()
```

	Gender	Age Range	Head Size(cm^3)	Brain Weight(grams)
0	1	1	4512	1530
1	1	1	3738	1297
2	1	1	4261	1335
3	1	1	3777	1282
4	1	1	4177	1590

```
df.shape
```

```
(237, 4)
```

```
# Taking x and y variables
X = df['Head Size(cm^3)'].values
Y = df['Brain Weight(grams)'].values
X.shape
```

```
(237,)
```

```
Y.shape
```

```
(237,)
```

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```
mean_X = np.mean(X)
mean_Y = np.mean(Y)

n = len(X)

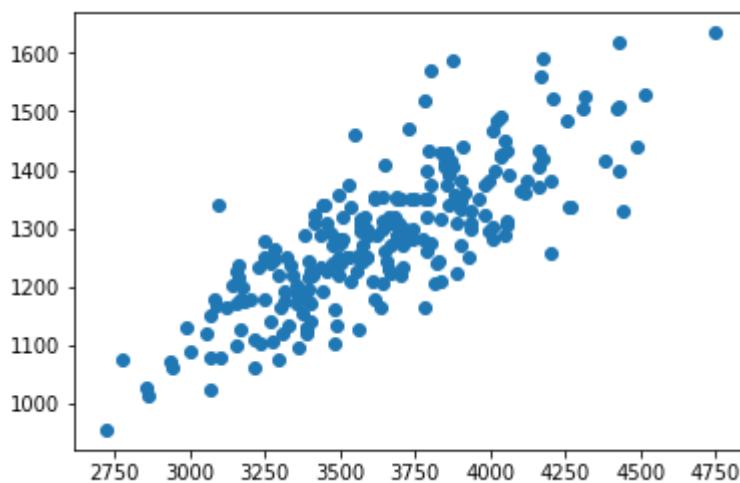
num = 0
denom = 0

for i in range(n):
    num += (X[i]-mean_X)* (Y[i]-mean_Y)
    denom +=(X[i]-mean_X)**2
m = num/denom
c = mean_Y - (m*mean_X)

print(m, ' , ', c)
```

0.26342933948939945 , 325.57342104944223

```
plt.scatter(X,Y)
```

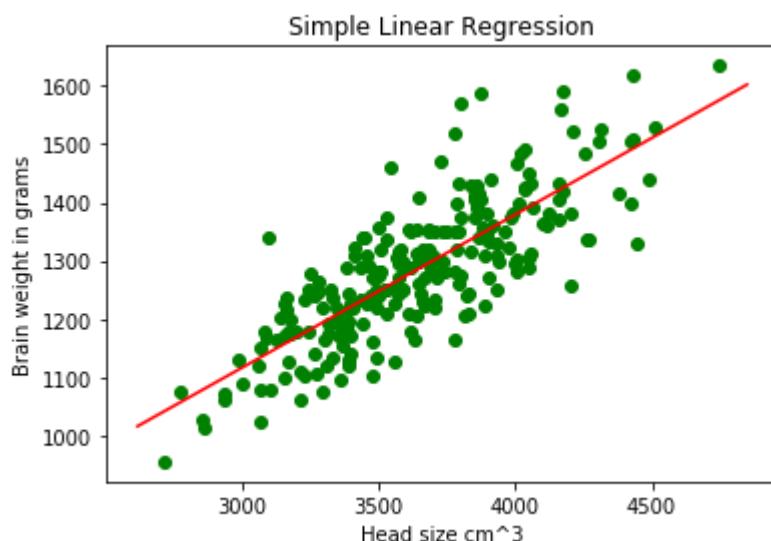


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```
min_x = np.min(X)-100
max_x = np.max(X)+100
x = np.linspace(min_x,max_x,1000)
y = m*x+c
plt.scatter(X,Y,color='g')
plt.plot(x,y,color='r')
plt.title('Simple Linear Regression')
plt.xlabel('Head size cm^3')
plt.ylabel('Brain weight in grams')
```



Calculating the error

```
sum_pred = 0
sum_act = 0

for i in range(n):
    y_pred = (m*X[i]+c)
    sum_pred += (Y[i]-y_pred)**2
    sum_act +=(Y[i]-mean_Y)**2

r2 = 1-(sum_pred/sum_act)
print(r2)
```

0.6393117199570003