Terna Engineering College

Department of Artificial Intelligence and Data Science

Program : Sem VI

Course: Machine Learning Lab

Experiment No.03

PART A

(PART A: TO BE REFERRED BY STUDENTS)

A.1 Aim: To implement Linear Regression using Python/R.

A.2 Theory:

Regression:

Regression in Machine Learning is a supervised learning technique. There are various types of regression like linear, logistic, polynomial, stepwise, ridge, lasso, etc.

Linear Regression:

Linear regression helps us to predict the relationship between two variables by assuming a linear connection between the independent and dependent variables.

It is one of the very simple and easy algorithms that works on regression and shows the relationship between the continuous variables.

It shows the linear relationship between the independent variable (X-axis) and the dependent variable (Y-axis).

There are two types of linear regression- Simple and Multiple.

Simple Linear Regression:

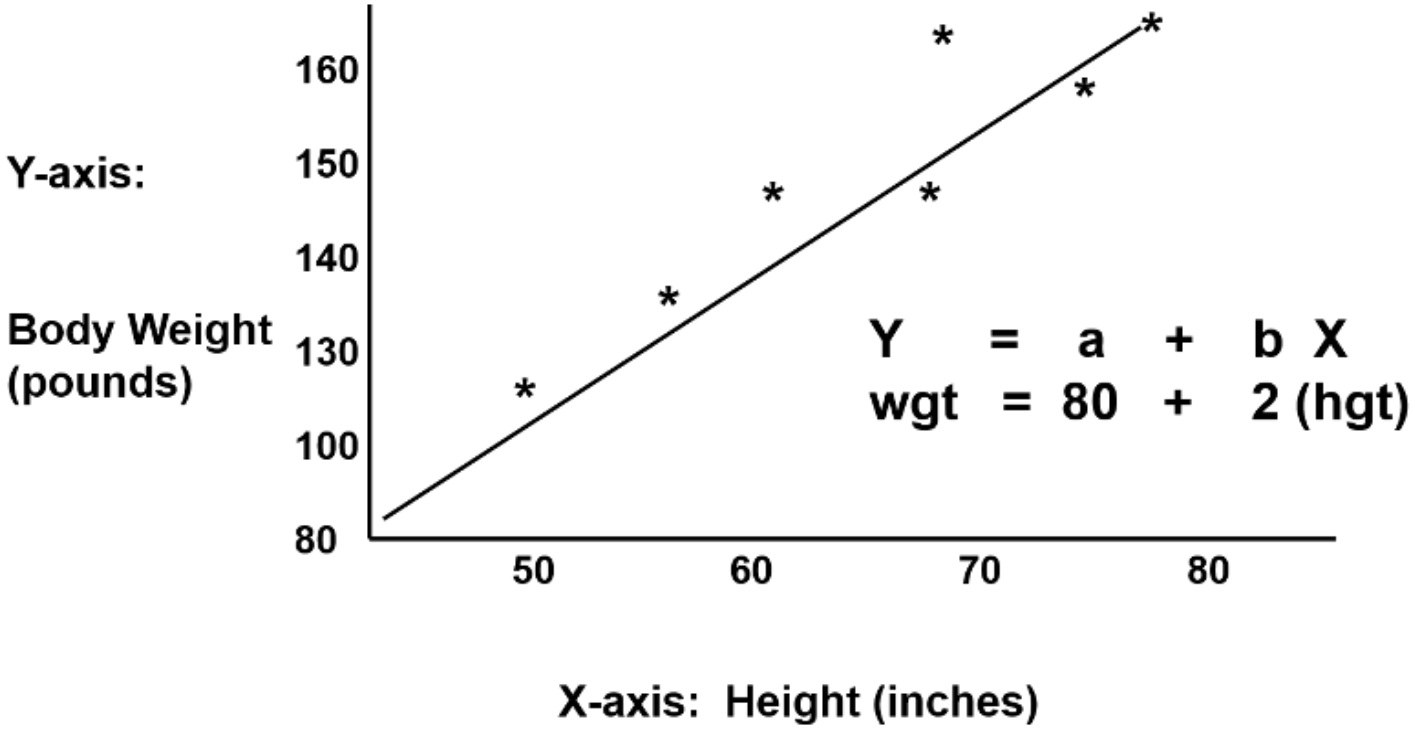
Simple linear regression is an approach for predicting a response using a single feature. It is one of the most basic machine learning models that a machine learning enthusiast gets to know about. In linear regression, we assume that the two variables i.e. dependent and independent variables are linearly related. Hence, we try to find a linear function that predicts the response value(y) as accurately as possible as a function of the feature or independent variable(x).

The formula for a simple linear regression is:

$$y = b_0 + b_1 x$$

- **y** is the predicted value of the dependent variable (**y**) for any given value of the independent variable (**x**).
- B_0 is the **intercept**, the predicted value of **y** when the **x** is 0.
- B_1 is the regression coefficient – how much we expect **y** to change as **x** increases.
- **x** is the independent variable (the variable we expect is influencing **y**).

e.g. In the given graph, we can see that height is the independent variable (x) and body weight is the dependent variable(y).



We could describe this relationship with the equation for a line, Y = a + bx, where 'a' is the Y-intercept and 'b' is the slope of the line. We could use the equation to predict weight if we knew an individual's height. In this example, if an individual was 70 inches tall, we would predict his weight to be:

Weight = 80 + 2 x (70) = 220 lbs.

PART B

(PART B: TO BE COMPLETED BY STUDENTS)

(Students must submit the soft copy as per following segments within two hours of the practical. The soft copy must be uploaded on the Blackboard or emailed to the concerned lab in charge faculties at the end of the practical in case the there is no Black board access available)

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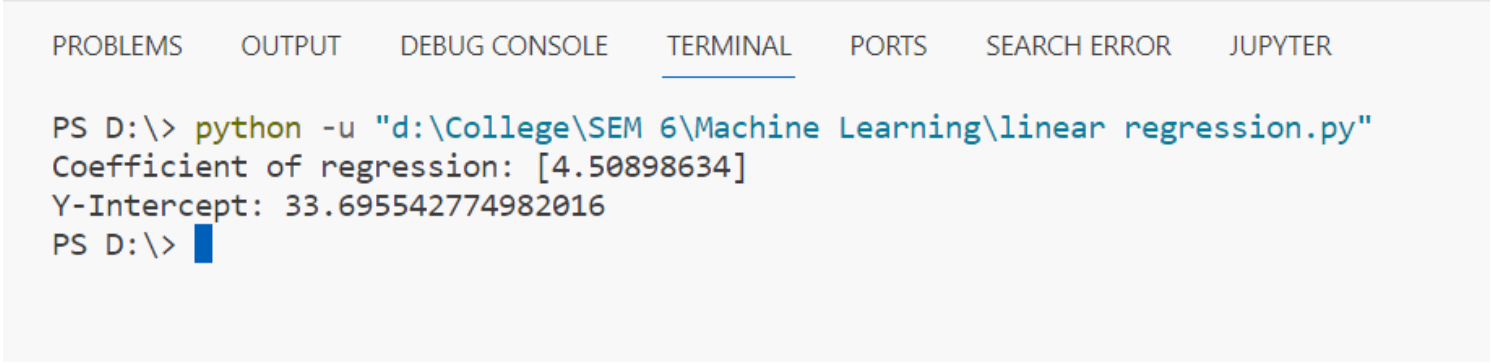
Date of Experiment: 30/01/24	Date of Submission: 16/02/24
Grade:	

B.1 Input and Output:

Code :

```
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression

x = np.array([1,3,10,16,26,36]).reshape((-1,1))
y = np.array([42,50,75,100,150,200])

model = LinearRegression()

model.fit(x,y)

print(f'Coefficient of regression: {model.coef_}')
print(f'Y-Intercept: {model.intercept_}')
```

Output:



B.2 Conclusion:

Thus, we have successfully implemented linear regression in Python and understood how the model is fitted to the given data.