

**EXPERIMENT NO.**

Aim of the experiment: - To implement Linear Regression.

Course Outcome: - To implement an appropriate machine learning model for

Date of Conduction: - 12/08/2022

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01

the given application.

Implementation

(05)

Understanding

(05)

Punctuality and Discipline

(05)

Total Marks (15)

Practical In charge

**Experiment: 01**

**Aim:** To implement Linear Regression

**Theory:** Regression analysis is a statistical method to model the relationship between a dependent (target) and independent (predictor) variables with one or more independent variables. More specifically, Regression analysis helps us to understand how the value of the dependent variable is changing corresponding to an independent variable when other independent variables are held fixed. It predicts continuous/real values such as temperature, age, salary, price, etc.

## Types of Regression

## There are various types of regressions which are used in data science and machine learning. Each type has its own importance on different scenarios, but at the core, all the regression methods analyze the effect of the independent variable on dependent variables. Here we are discussing some important types of regression which are given below:

* Linear Regression
* Logistic Regression
* Polynomial Regression
* Support Vector Regression
* Decision Tree Regression
* Random Forest Regression
* Ridge Regression
* **Lasso Regression:**

### Linear Regression:

* Linear regression is a statistical regression method which is used for predictive analysis.
* It is one of the very simple and easy algorithms which works on regression and shows the relationship between the continuous variables.
* It is used for solving the regression problem in machine learning.
* Linear regression shows the linear relationship between the independent variable (X-axis) and the dependent variable (Y-axis), hence called linear regression.
* If there is only one input variable (x), then such linear regression is called **simple linear regression**. And if there is more than one input variable, then such linear regression is called **multiple linear regression**. Below is the mathematical equation for Linear regression:

Y= aX+b

Here, Y = dependent variables (target variables),  
 X= Independent variables (predictor variables),a and b are the linear coefficients

Some popular applications of linear regression are:

* Analyzing trends and sales estimates
* Salary forecasting
* Real estate prediction
* Arriving at ETAs in traffic.

**Algorithm:**

1. Start

2. Read Number of Data (n)

3. For i=1 to n:

Read Xi and Yi

Next i

4. Initialize:

sumX = 0

sumX2 = 0

sumY = 0

sumXY = 0

5. Calculate Required Sum

For i=1 to n:

sumX = sumX + Xi

sumX2 = sumX2 + Xi \* Xi

sumY = sumY + Yi

sumXY = sumXY + Xi \* Yi

Next i

6. Calculate Required Constant a and b of y = a + bx:

b = (n \* sumXY - sumX \* sumY)/(n\*sumX2 - sumX \* sumX)

a = (sumY - b\*sumX)/n

7. Display value of a and b

8. Stop

**Program:**

import numpy as np

import matplotlib.pyplot as plt

from sklearn import datasets, linear\_model

from sklearn.metrics import mean\_squared\_error

diabetes = datasets.load\_diabetes()

diabetes\_X =diabetes.data[:, np.newaxis, 3]

diabetes\_Y =diabetes.data[:, np.newaxis, 4]

diabetes\_X\_train = diabetes\_X[:-70]

diabetes\_X\_test = diabetes\_X[-30:]

diabetes\_Y\_train = diabetes\_Y[:-70]

diabetes\_Y\_test = diabetes\_Y[-30:]

model = linear\_model.LinearRegression()

model.fit(diabetes\_X\_train, diabetes\_Y\_train)

diabetes\_Y\_preicted = model.predict(diabetes\_X\_test)

print("weights :", model.coef\_)

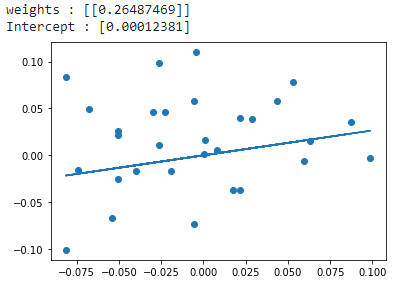
print("Intercept :", model.intercept\_)

plt.scatter(diabetes\_X\_test, diabetes\_Y\_test)

plt.plot(diabetes\_X\_test, diabetes\_Y\_preicted)

plt.show()

**Output:**



**Conclusion:**

Thus, we have successfully implemented linear regression on diabetes dataset.

**Notebook Link:**

<https://colab.research.google.com/drive/1it-boCtgvMk6Xa503lzQ-N3uR9ArsXBl>