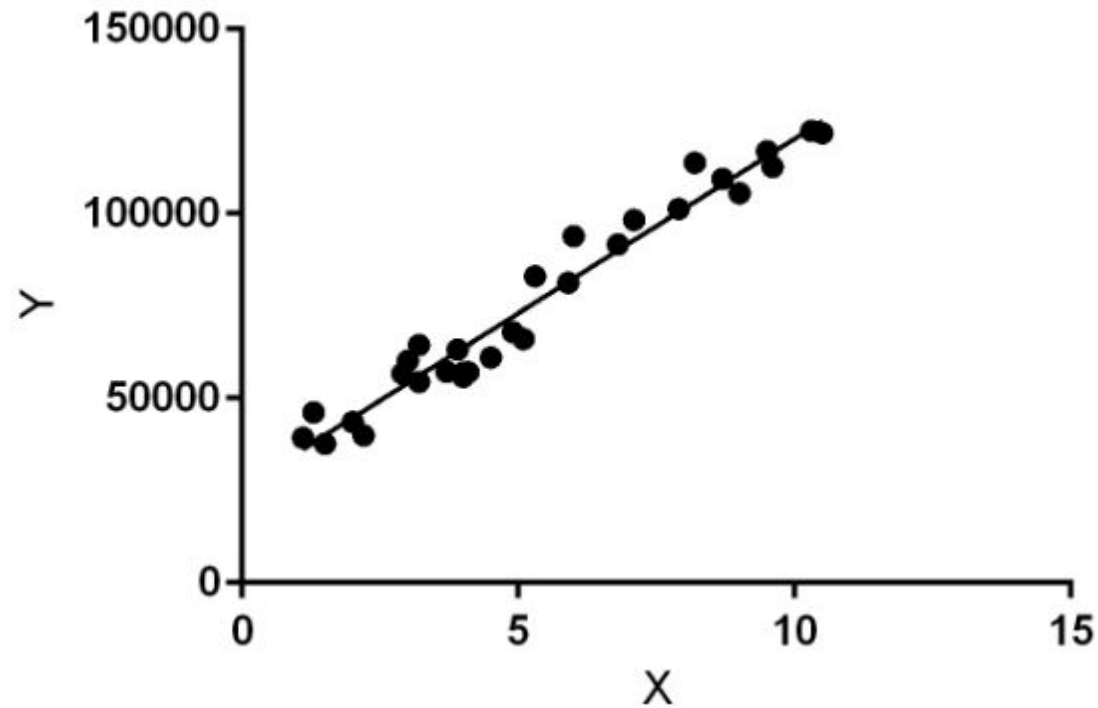


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ML | Linear Regression

Linear Regression is a machine learning algorithm based on **supervised learning**. It performs a **regression task**. Regression models a target prediction value based on independent variables. It is mostly used for finding out the relationship between variables and forecasting. Different regression models differ based on – the kind of relationship between dependent and independent variables, they are considering and the number of independent variables being used.





Linear regression performs the task to predict a dependent variable value (y) based on a given independent variable (x). So, this regression technique finds out a linear relationship between x (input) and y(output). Hence, the name is Linear Regression.

In the figure above, X (input) is the work experience and Y (output) is the salary of a person. The regression line is the best fit line for our model.

Hypothesis function for Linear Regression :

$$y = \theta_1 + \theta_2 \cdot x$$



While training the model we are given :

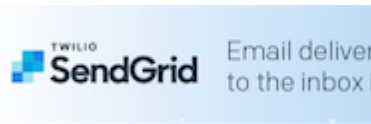
x: input training data (univariate – one input variable(parameter))

y: labels to data (supervised learning)

When training the model – it fits the best line to predict the value of y for a given value of x. The model gets the best regression fit line by finding the best θ_1 and θ_2 values.

θ_1 : intercept

θ_2 : coefficient of x



Once we find the best θ_1 and θ_2 values, we get the best fit line. So when we are finally using our model for prediction, it will predict the value of y for the input value of x.

How to update θ_1 and θ_2 values to get the best fit line ?

Cost Function (J):

By achieving the best-fit regression line, the model aims to predict y value such that the error difference between predicted value and true value is minimum. So, it is very important to update the θ_1 and θ_2 values, to reach the best value that minimize the error between predicted y value (pred) and true y value (y).

$$\text{minimize } \frac{1}{n} \sum_{i=1}^n (\text{pred}_i - y_i)^2$$

$$J = \frac{1}{n} \sum_{i=1}^n (\text{pred}_i - y_i)^2$$



Cost function(J) of Linear Regression is the **Root Mean Squared Error (RMSE)** between predicted y value (pred) and true y value (y).

Gradient Descent:

To update θ_1 and θ_2 values in order to reduce Cost function (minimizing RMSE value) and achieving the best fit line the model uses Gradient Descent. The idea is to start with random θ_1 and θ_2 values and then iteratively updating the values, reaching minimum cost.



Recommended Posts:

- Simple Linear-Regression using R
- Multiple Linear Regression using R
- Linear Regression Using Tensorflow
- Linear Regression using PyTorch
- ML | Locally weighted Linear Regression
- Linear Regression (Python Implementation)
- ML | Normal Equation in Linear Regression
- Gradient Descent in Linear Regression
- ML | Multiple Linear Regression using Python
- Python | Linear Regression using sklearn
- Mathematical explanation for Linear Regression working
- A Practical approach to Simple Linear Regression using R
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- ML | Classification vs Regression



Multivariate Regression

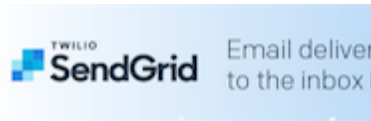


Mohit Gupta_OMG 😊

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