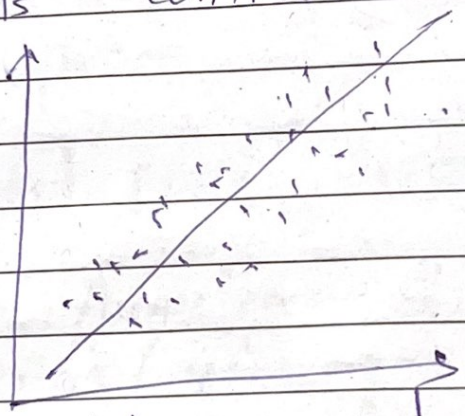
Supervised learning

Type of ML where an algorithm learns from labelled data to make predictions.

Linear Regression

Dependent or predicted variable is continuos. The output is continuous in nature



Regression analysis to find the relation betwee dependent & independant variable

Simple linear Reg.

$y = \alpha_0 + \alpha_1 x_1$

$y = mx + c$

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Multilinear regression

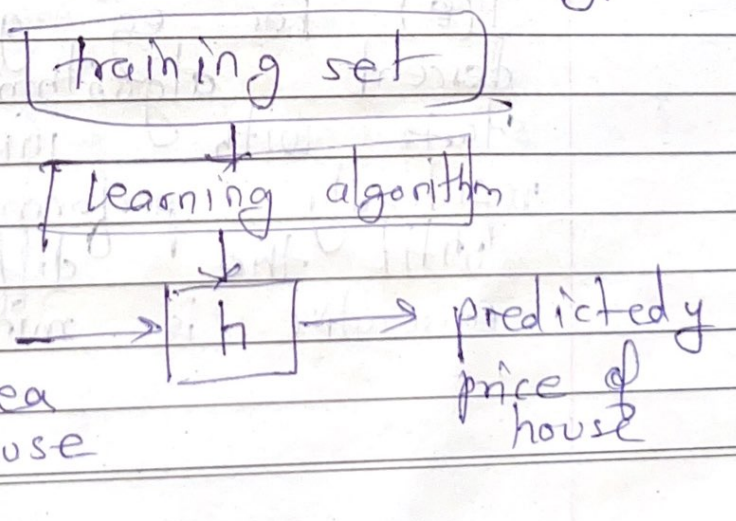
$y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \ldots \alpha_m x_m$

$\alpha \rightarrow$ Regression coefficient
$x_1 \rightarrow$ Independent var
$y \rightarrow$ Dependent variable

$x \rightarrow$ input feature
$y \rightarrow$ target variable

Supervised learning →
Goal is, given a training set to learn a function $h: X \rightarrow Y$ so that $h(x)$ is a good predictor for the corresponding value of y.

$h \rightarrow$ is called a hypothesis



When the predicted variable is continuous we use regression

When the predicted variable y can take only a small number of discrete values ie. classification problem

LMS (Leeast mean square)

The LMS algorithm iteratively updates a set of coefficients to minimize the mean squared error between the predicted output & target output

Choose θ so as to minimize $J(\theta)$ For eg gradient descent algorithm which starts with initial θ & repeatedly performs update until the difference betn consecutive is minimum

$$\theta_j = \theta_j - \alpha \frac{\partial J(\theta)}{\partial \theta_j}$$

$\alpha \rightarrow$ learning rate

$$\theta_j = \theta_j + \alpha (y^{(i)} - h_\theta(x^{(i)})) x_j^{(i)}$$

Batch gradient descent

It is an optimization algorithm used to minimize the cost function of ml. It updates the parameters based on the gradient of the cost fun^n using the entire training dataset at each iteration

~~Mini batch processing~~ →

$$\theta = \theta - \nabla J(\theta)$$

$\theta \rightarrow$ model parameters

$J(\theta) \rightarrow$ cost function

$\nabla(J(\theta)) \rightarrow$ Gradient of cost function