**HLTWK5Harpal**

**Machine Learning Algorithms**

**Linear Regression**

Linear Regression is a machine learning algorithm based on Supervised learning. Linear Regression is part of regression analysis which is a technique of predictive modelling that helps you to find out the relationship between Input and the target variable.

Regression analysis is used for three types of applications:

1. Finding out the effect of Input variables on Target variable.
2. Finding out the change in Target variable with respect to one or more input variable.
3. To find out upcoming trends.

Here are the types of regressions:

1. Linear Regression
2. Multiple Linear Regression
3. Logistic Regression
4. Polynomial Regression

Linear regression is a form of machine learning where we train a model to predict the behaviour of data based on some variables. In the case of linear regression, the two variables which are on the x-axis and y-axis should be linearly correlated.

Example for that can be running a sales promotion and expecting a certain number of count of customers to be increased. What you can do is look at the previous promotions and plot if over on the chart when you run it and then try to see whether there is an increment into the number of customers whenever you rate the promotions and with the help of the previous historical data you try to figure it out or you try to estimate what will be the count or what will be the estimated count for the current promotion. This will give you an idea to do the planning in a much better way about how many numbers of stalls maybe you need or how many increase number of employees you need to serve the customer. Here the idea is to estimate the future value based on the historical data by learning the behaviour or patterns from the historical data.

In some cases, the value will be linearly upward that means whenever X is increasing Y is also increasing or vice versa that means they have a correlation or there will be a linear downward relationship.

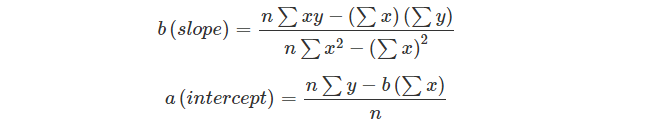
One example for that could be that the police department is running a campaign to reduce the number of robberies, in this case, the graph will be linearly downward.

Linear regression is used to predict a quantitative response Y from the predictor variable X.

Mathematically, we can write a linear regression equation as:

what-is-linear-regression-2


Where a and b given by the formulas:



Here, x and y are two variables on the regression line.

b = Slope of the line.

a = y-intercept of the line.

x = Independent variable from dataset

y = Dependent variable from dataset

Examples of where Linear Regression can be used:

1. Prediction of trends and Sales targets – To predict how industry is performing or how many sales targets industry may achieve in the future.
2. Price Prediction – Using regression to predict the change in price of stock or product.
3. Risk Management- Using regression to the analysis of Risk Management in the financial and insurance sector.