**Logistic Regression**

Logistic regression as a special case of linear regression when the outcome variable is categorical. Logistic regression is used to find the probability of event\_ success and event failure. The dependent variable must be binary in nature (0 or 1).It is widely used for classification problems.

It predicts the probability of occurrence of an event by fitting data to a log it function.

Input Variable/ Target Variable can be following types,

1. **Binomial:** target variable can have only 2 possible types: ―0 or 1 which may represent ―win vs. loss, pass vs. fail, dead vs. alive, etc.

Ex :-

|  |  |
| --- | --- |
| Gender | Correct( 1 ) / Incorrect( 0 ) |
| Male | 1 |
| Female | 1 |
| Male | 0 |
| Male | 1 |
| Female | 0 |

1. **Multinomial:** target variable can have 3 or more possible types which are not ordered (i.e. types have no quantitative significance) like disease A vs. disease B vs. disease C.  
     
   Target Variable can have multiple unique values.
2. **Ordinal:** it deals with target variables with ordered categories. For example, a test score can be categorized as: very poor, poor, good, very good. Here, each category can be given a score like 0, 1, 2, 3.

Basically, Our of a data set we always consider all input as X and Output as Y.

Where Y can be 0 or 1.

0 is for No. And 1 is for Yes.

Y = { 0 then, Fail

1 then, Pass

}

In Linear Regression Y = mx + c

But, In Logistic Regression,

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Here, f(x) is nothing but y. f(x) is the output when, x is given as input.

Let’s Assume following different Cases.

Case 1 :- when x = 0

Y = 1/( 1 + 1 ) = 1/ 2 = 0.5

Case II : - When x = 1 then, y = 0.7310585786300049

Case II :- When x = -1 then, y = 0.2689414213699951

Basically, Sigmoidal Function Follows following graph,

