LOGISTIC REGRESSION

The logistic regression model transforms the linear regression function continuous value output into categorical value output using a sigmoid function, which maps any real-valued set of independent variables input into a value between 0 and 1. This function is known as the logistic function.

- The independent inputs are X, a matrix of dimension n x m.
- Weights of each variable xi are represented in the matrix W of dimension n x 1.
- B is known as the bias term.
- Sigmoid function or **σ** , **σ**(x)=$1/(1+e^{-x})$, This ensures that the output lies between 0 and 1.
  And the equation for logistic regression could be represented as :

$$y=\sigma(w^T X + b)$$

Logistic function is a simple strategy to map the linear combination ***"z",*** lying in the (-inf,inf) range to the probability interval of [0,1] .

logit(p)=log(p/1-p)

Linear regression uses mean squared error as its cost function. If this is used for logistic regression, then it will be a non-convex function of parameters (theta). Gradient descent will converge into global minimum only if the function is convex

Cost function :

$$cost = -\frac{1}{m}\sum_{i=1}^{m}[y * log(a) + (1-y) * log(1-a)]$$

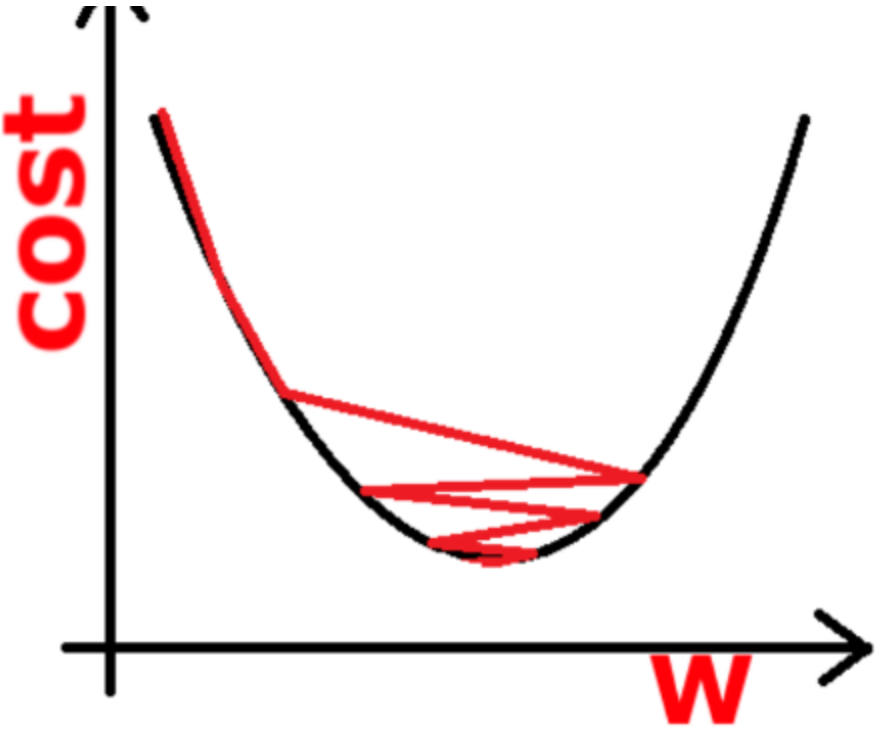
Gradient Descent

$$dW = \frac{\partial COST}{\partial W} = (A-Y) * X^T \text{ ..... shape (1 x n)}$$

$$dB = \frac{\partial COST}{\partial B} = (A-Y)$$

$$W = W - \alpha * dW^T$$

$$B = B - \alpha * dB$$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