

Logistic Regression

- There are Two perspective to learn Logistic Regression is Geometric and probability
- Requirement for that is **Data is Linearly separable or almost linearly separable.**
- Perceptron Trick:-

- **Introduction**

- **The perceptron trick is a technique used for classifying linearly separable data by finding an optimal decision boundary. It involves starting with small initial weights and an intercept of zero, then adjusting these weights iteratively until either the maximum number of iterations is reached or the data is classified well.**
 - A line that separates data has the equation: $(W_1X + W_2Y + C = 0)$.
 - $W_{new} = W_{old} + \eta(Y_i - Y_i')X_i$ where , W_{new} = weight of new line , Y_i and Y_i' = original output and predicted output .
 - **Misclassified point pull the decision line and Classified point not make any effect on that line.**
 - **So it not find optimal decision boundary.**
- **Sigmoid Function:-**
 - $\sigma(z) = 1/1 + e(-z)$
 - It overcome the problem of perceptron and finds the optimal decision boundary.
 - **As we know for calculating Y_i' value we are using step function which gives >0 are 1 and <0 are 0 So , if classified datapoints come it $W_{new} = W_{old}$ occur so line doesn't changes.**
 - Sigmoid Function not gives value as step function it gives probabilistic value of output.
 - **Here we pushes decision line when it comes to classified point and pull when misclassified point come.**
 - Loss Function :-
 - Sum of all i from 1 to n $-Y_i \log(Y_i') - (1 - Y_i) \log(1 - Y_i')$
 - Log loss error or binary cross entropy