LOGISTIC REGRESSION

Logistic Regression is a tool used for binary classification. Logistic regression predicts the probability that a given input belongs to a particular class (usually 0 or 1). It uses the sigmoid function to map predicted values to probabilities between 0 and 1.

Logistic regression is used when the target variable is binary (yes and no or 0 and 1). You need a quick to interpret model. You have assumed a linear relationship between the input variables and the odds of the output.

Logistic regression is used usually if we want:

1. Probability-Based Output: It gives a probability of predictions, which helps in understanding the accuracy of the model.
2. Efficiency: It is efficient, simple to implement, and works well with linearly separable data.
3. Interpretability: The weights are interpretable and show the influence of each input variable.

The way to use logistic regression is as follows. The data should be initialized such that the input features are numerical and relevant to the required binary result. The model learns by using the sigmoid function, which compresses values to a range between 0 and 1, to determine the most suitable weights and bias which relate the input variables to the probability of a particular outcome. During training, the model continuously updates the weights by gradient descent to reduce the error between its predictions and actual results using a loss function which is usually binary cross-entropy. After training, the model predicts probabilities for additional inputs, which are then transformed into classes (0 or 1) depending on a threshold, usually 0.5.