What is a Perceptron?

A Perceptron is an algorithm used for supervised learning of binary classifiers. Binary classifiers decide whether an input, usually represented by a series of vectors, belongs to a specific class.
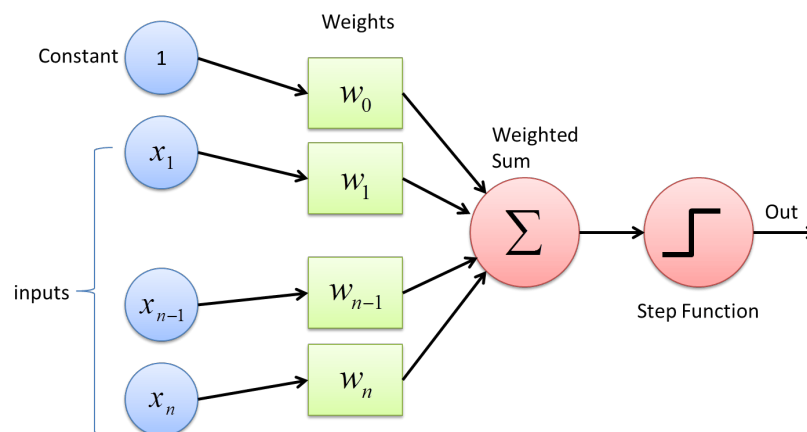
In short, a perceptron is a single-layer neural network. They consist of four main parts including input values, weights and bias, net sum, and an activation function.

Where do we use Perceptron?

Perceptron is usually used to classify the data into two parts. Therefore, it is also known as a Linear Binary Classifier.

How does a Perceptron work?

The process begins by taking all the input values and multiplying them by their weights. Then, all of these multiplied values are added together to create the weighted sum. The weighted sum is then applied to the activation function, producing the perceptron's output. The activation function plays the integral role of ensuring the output is mapped between required values such as (0,1) or (-1,1). It is important to note that the weight of an input is indicative of the strength of a node. Similarly, an input's bias value gives the ability to shift the activation function curve up or down.


Perceptrons and Machine Learning

As a simplified form of a neural network, specifically a single-layer neural network, perceptrons play an important role in binary classification. This means the perceptron is used to classify data into two parts, hence binary. Sometimes, perceptrons are also referred to as linear binary classifiers for this reason.

But how does it work?

The perceptron works on these simple steps

a. All the inputs x are multiplied with their weights w. Let's call it k.

b. *Add* all the multiplied values and call them *Weighted Sum.*

c. *Apply* that weighted sum to the correct

Inputs
$$x_1 \cdot w_1$$
$$x_2 \cdot w_2$$
$$x_3 \cdot w_3$$
$$x_4 \cdot w_4$$
$$x_5 \cdot w_5$$

Output

y (0 or 1)
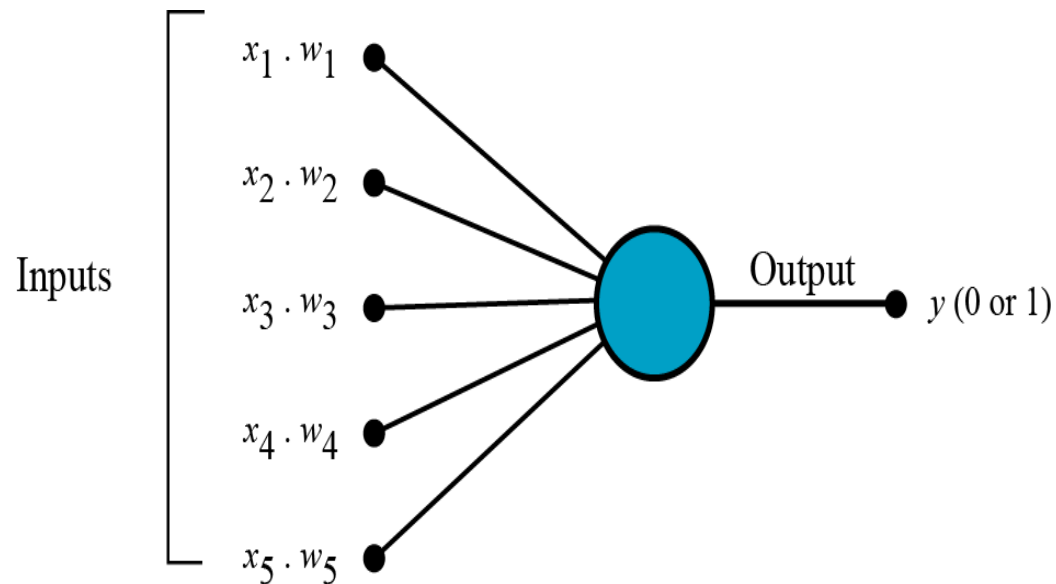
Why do we need Weights and Bias?

Weights show the strength of the particular node.

A bias value allows you to shift the activation function curve up or down.

Why do we need Activation Function?

In short, the activation functions are used to map the input between the required values like (0, 1) or (-1, 1).