**MY UNDERSTANDING OF NEURAL NETWORKS**

In an attempt to make computers intelligent like humans, Dr. Emily was inspired by nature and thought to imitate it thus developing Neural Networks / Artificial Neural Networks (ANNs) / Simulated Neural Networks (SNNs). The working of human brain and biological neural network served as a basis for Neural Networks. Neural Networks as the name suggests contains network of neurons. Basic Neural Networks use Perceptron algorithm which makes neurons learn from given information and produce a single binary input. There are 2 types of perceptron: Single-Layer Perceptron, Multi-Layer Perceptron.  
Single-Layer Perceptron has two layer: input layer and output layer; it is the simplest type of neural network. Multi-Layer Perceptron has one or more hidden layers in addition to input and output layer; it can process and learn complex patterns.

Neural networks contain several components: namely neurons, weights, bias, activation function.

A neuron is a basic computational unit that receives input signals and sends a single output signal.

Weights are present in between neuron layers. They give weight or importance to the incoming input signals to a neuron. Generally, a dot product of input signals and weights is taken.

Bias is an extra parameter in addition to weights that helps adjust the output of a neuron. It is generally used to account for variations and skewedness of input.

Activation function is one of the most crucial aspects of neural network that enables non-linear behaviour of neural networks. It is a function as the name suggests that determines whether a neuron should be activated or not based on the inputs. There are 4 main types of Activation functions.

1. *Threshold functions:* These are activated when the input values reach a certain threshold else, they do not activate. Therefore, these are binary (which in some cases can be disadvantageous).
2. *Sigmoid functions:* These unlike threshold functions give values ranging between 0 and 1; making it ideal for dealing in probabilities, also derivatives can be calculated since it is continuous and smooth, thereby allowing gradient-based techniques like gradient descent.
3. *Rectifier functions:* These also known as Rectified Liner Unit (ReLU) functions output the input value itself if it is non-zero else outputs zero; thus, giving it a linear nature. These are simple yet powerful functions used in deep learning.
4. *Hyperbolic Tangent functions:* These also denoted as , resemble sigmoid functions, having smooth continuous values, however the outputs range between and .

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