

## DL assignment-2

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1) An artificial neuron typically consists of three main components:

- Inputs: These are numerical values representing the signals or data from other neurons or external sources. These inputs are weighted to give them different levels of importance.
- Weighted Sum: The inputs are multiplied by their respective weights and then summed together. This weighted sum is often passed through an activation function.
- Activation Function: The activation function determines the output of the neuron based on the weighted sum. Common activation functions include the sigmoid, ReLU, and tanh functions.

The output of the artificial neuron is the result of applying the activation function to the weighted sum of its inputs. This output is then sent to other neurons or used in further processing within an artificial neural network.

Artificial neurons are inspired by biological neurons and share some key similarities:

- Input Reception: Both artificial and biological neurons receive inputs, which can be thought of as signals in the case of biological neurons and as numerical values in the case of artificial neurons.
- Weighted Sum: Biological neurons integrate the incoming signals with varying strengths, akin to the weighted sum in artificial neurons. In biological neurons, the strength of connections (synapses) plays a role similar to the weights in artificial neurons.
- Activation: Just as artificial neurons apply an activation function to the weighted sum to determine their output, biological neurons have a threshold or activation level that, when reached, triggers the neuron to fire and transmit a signal.

2) The different types of activation functions popularly used are step unit function, ReLu function, sigmoid function, softmax function, Tanh function.

ReLu function: Normally ReLu is used in hidden layer. The range is (0,max). It can handle vanishing gradient problem. For negative values, it converts to zero.

Sigmoid function: It is used for binary classification in out put layer. It is squeezed function. It causes vanishing gradient problem. As it is non-zero centric.

Softmax function: It is used for multi class classification.

Tanh function: It is used in hidden layer. It is a zero centric function.

3) Rosenblatt Perceptron:

It is a binary single neuron model. It has fixed weight. This model implements the functioning of a single neuron that can solve linear classification problem. It is the first process of NN. It can process non-boolean inputs and it can assign different weights to each i/p automatically.

Data trained by Simple perceptron: A simple perceptron classifies data into two classes using weighted inputs and a bias term. It learns from labeled training examples, adjusting weights and bias to minimize errors. It can only handle linearly separable data with a single decision boundary. For more complex tasks, more advanced neural network architectures are needed.

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