

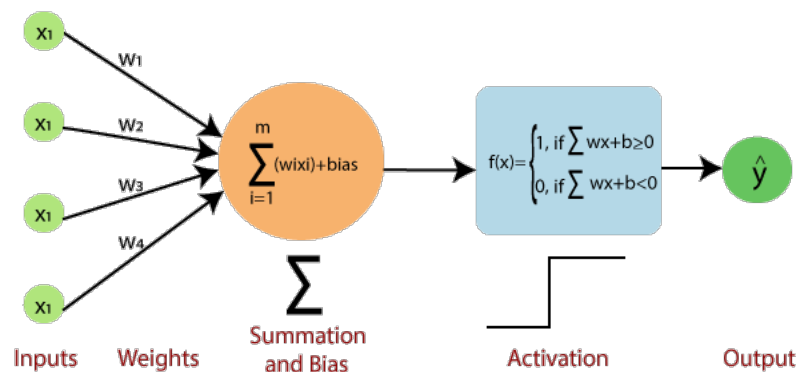
## WEEK-4 REPORT P-4

DASARI SRINITH (CS21BTECH11015)

### Intro to Neural Network:

#### Theory:

- Deep Learning uses Artificial Neural Networks (ANN). ANNs imitates the human brain's behavior to solve complex data problems.
- Neural Networks are complex systems with Perceptrons.
- Perceptron consists of:
  1. Input
  2. Weight
  3. Summation and Bias
  4. Activation Function
  5. Output



- The most simple activation function is the “step function,” used by the Perceptron algorithm.
- Data is passed through the input layer, the hidden layer, and the output layer. Each layer is made of neurons, i.e. perceptrons.
- There are many classes of neural networks ,

1. **Feedforward Neural Network** : In this network, the information moves in only one direction, forward, from the input nodes, through the hidden nodes (if any) and to the output nodes.
  2. **Recurrent neural networks** : In recurrent neural network (RNN), connections between units form a directed cycle (they propagate data forward, but also backwards, from later processing stages to earlier stages).
- Commonly used activation functions are
    1. Sigmoid
    2. Tanh
    3. ReLU
    4. Leaky ReLU

1. Why is the sigmoid function a better choice for learning than the simple step function?

**Solution:**

Because ,

- (a) It is continuous and differentiable everywhere.
  - (b) It is symmetric around the y-axis.
  - (c) Asymptotically approaches its saturation values.
2. What is the idea of introducing an activation function in ANN's?

**Solution:**

It is to introduce **non linearity** into the neural network so that it can learn more complex functions.

3. Why is zero initialization of weight, not a good initialization technique?

**Solution:**

If we initialize the set of weights in the neural network as zero, then all the neurons at each layer will start producing the same output and the same gradients during backpropagation. Therefore, we add randomness while initializing the weight in neural networks.

4. What is Back-propagation?

**Solution:**

It is used for multi-layer perceptrons. It propagates the error information from the end of the network to all the weights inside the network. It updates the weights and repeats until the cost function is minimized.

5. What is Boltzmann machine ?

**Solution:** It resembles the simplified version of multi-layer perceptron. This model

features a visible input layer and a hidden layer — just a two-layer neural network that makes stochastic decisions as to whether a neuron should be activated or not.