Assignment -6

Title: Artificial Neural Network training process of Forward Propagation, Back Propagation.

Aim: Implement Artificial Neural Network training process in Python by using Forward Propagation, Back Propagation.

Objective: To learn about Forward Propagation and Back propagation in ANN

Theory:

Forward propagation:

Forward propagation is where input data is fed through a network, in a forward direction, to generate an output. The data is accepted by hidden layers and processed, as per the activation function, and moves to the successive layer. The forward flow of data is designed to avoid data moving in a circular motion, which does not generate an output.

Back propagation:

Backward Propagation is the process of moving from right (output layer) to left (input layer).Forward propagation is the way data moves from left (input layer) to right (output layer) in the neural network. A neural network can be understood by a collection of connected input/output nodes. The accuracy of a node is expressed as a loss function or error rate. Back propagation calculates the slope of a loss function of other weights in the neural network.

Algorithm:

Inputs:
X: a training example input vector
w: the weight matrix for the network
b: the bias vector for the network

Outputs:
a_L: the output of the final layer of the network

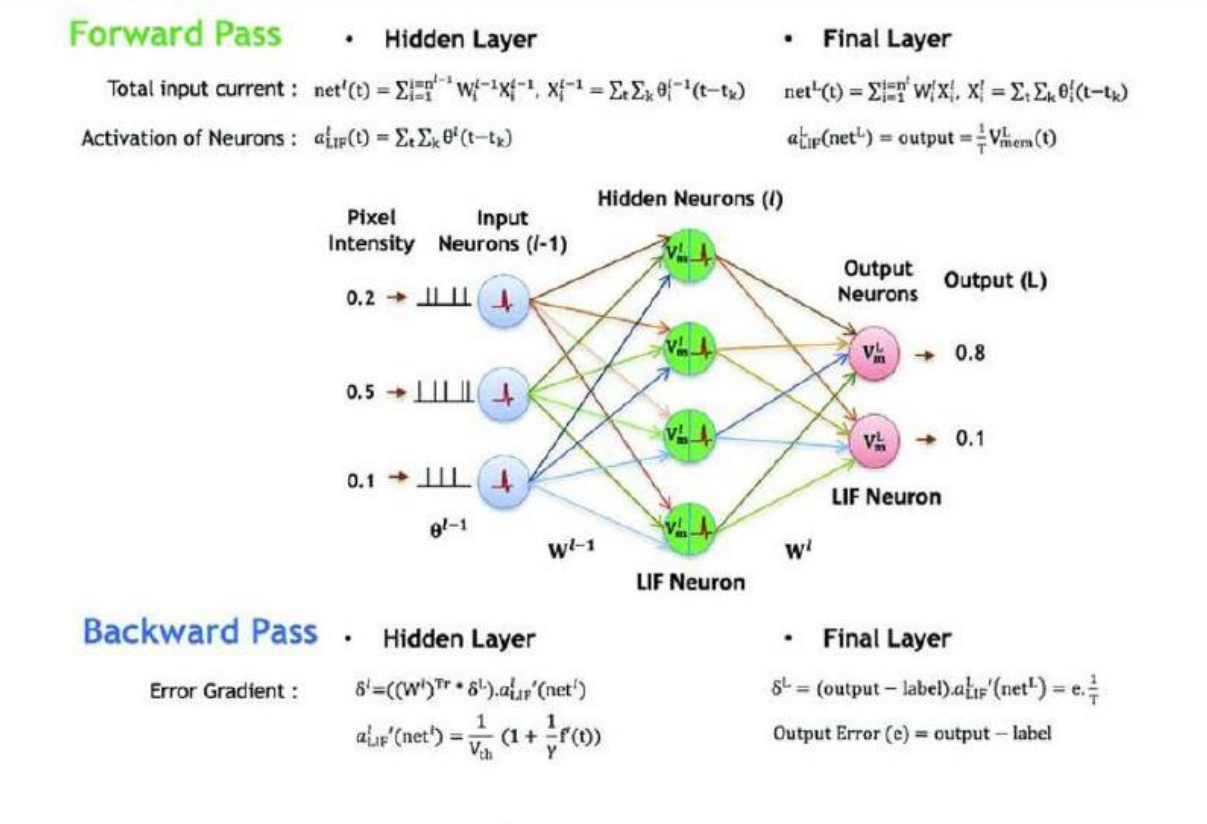
Steps*:*
Set a_0 = X, the input vector for the network.

For each layer 1in the network, compute the weighted input z_l for that layer:
z = w * a-1 + b

Apply the activation function g to the weighted input for each layer to compute the activation a_l:

a= g(z)

Repeat steps 2 and 3 for all layers in the network, up to the final layer L.
Return a_L as the output of the network for input X.



Conclusion:

We have successfully implemented Artificial Neural Network training process in Python by using Forward Propagation, Back Propagation.

Questions:

1. Explain Competitive Learning with example.
2. Explain Pattern clustering with example.
3. Explain Feature Mapping in detail.
4. Explain ART Network in detail.
5. Explain ART features in detail.