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Assignment - 3

Q1] What is multilayer feed forward network?

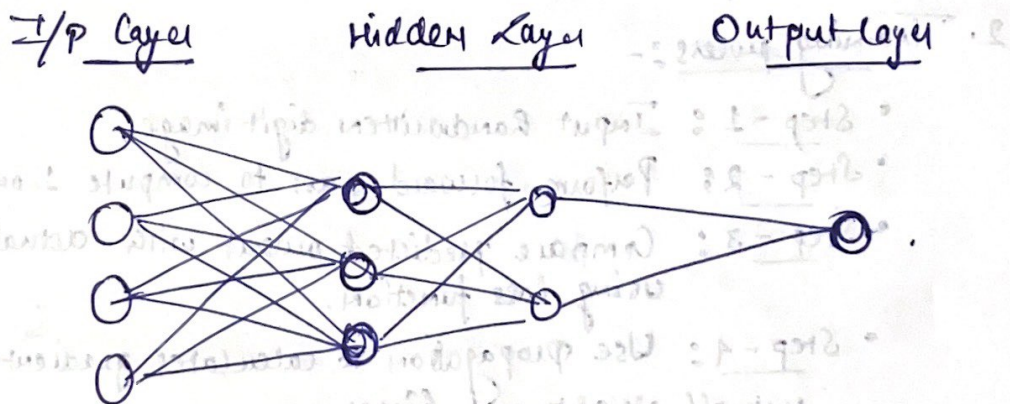
A \Rightarrow (i) An entrance point into sophisticated neural networks, where incoming data is routed through several layers of Artificial neurons.

(ii) Every node is linked to every other neuron in following layers resulting in fully connected neural network.

(iii) There are input and output layers as well as several hidden levels. for a total of atleast three or more layers.

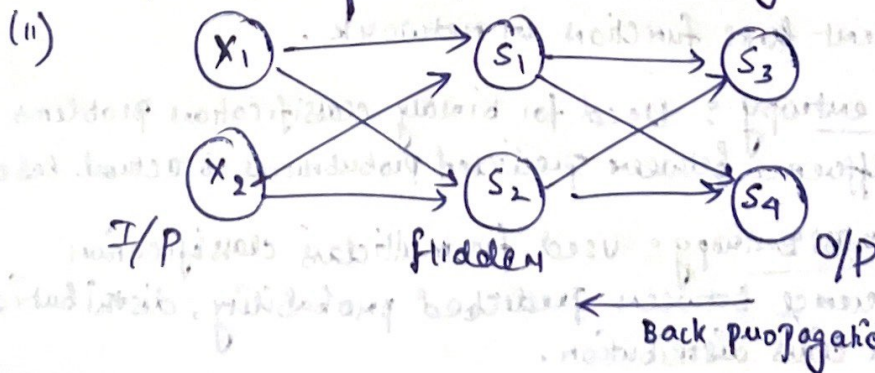
(iv) It processes bidirectional propagation which means it can propagate both forward & backward.

Diagram:-



Q2] Explain Back Propagation. Algorithm 3 layer network.

A \Rightarrow (i) Back Propagation Algorithm is used to train network. It updates weight in network to minimize loss by calculating gradient of loss function wrt weight.



(iii) Input layer : Input data is fed into network.

Hidden layer : I/P data is processed by HL neuron which is applying weight, bias and AF of each input.

Output layer : Processed data from hidden layer is passed to output data layer which produces N/w prediction.

Q3) Explain any one application of back propagation Algorithm.

A \Rightarrow Recognise hand written digits from images.

1. Model :- A simple 3 layer neural network. I/P layer has 784 neurons. Hidden layer = 128 neurons (with ReLU activation function), output layer has 10 neurons (softmax activation one of each digit).

2. Training process :-

- Step - 1 : Input handwritten digit image.
- Step - 2 : Perform forward pass to compute 1 output.
- Step - 3 : Compare predicted output with actual label using loss function.
- Step - 4 : Use propagation to calculate gradient of loss w.r.t all weight and biases.
- Step - 5 : Update weight using gradient descent.

3. After training, network can predict digit accuracy just from raw pixel data.

Q4) Explain different loss function in network.

A \Rightarrow 1. Binary cross entropy : Used for binary classification problems measuring difference between predicted probabilities & actual labels.

2. Categorical cross entropy : Used for multiclass classification measuring difference between predicted probability distribution and actual class distribution.

3. Hinge loss - Used in support vector machines for classification penalizing misclassification.

4. focal loss - Addresses issue of imbalanced data sets in classification focusing on misclassified samples.

5. Mean Squared error - Calculates average of squared difference between predicted & actual values, penalizing larger errors heavily.

6. Mean absolute error - Calculate averages of absolute difference predicted and actual values, less sensitive to outliers than MSB.