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B TECH

(SEM-VI) THEORY EXAMINATION SESSION 2017-18  
ARTIFICIAL NEURAL NETWORK

Time : 3 Hours

Max. Marks: 100

Note: Be precise in your answer. In case of numerical problem assume data wherever not provided.

SECTION - A

1 Attempt all of the following questions:

10 x 2 = 20

- (a) Why use Artificial Neural Networks? What are its advantages?
- (b) How are Artificial Neural Networks different from Normal Computers?
- (c) How the artificial neural network is related with biological network?
- (d) What is simple Artificial Neuron?
- (e) List some commercial practical applications of Artificial Neural Networks.
- (f) Explain the ART models.
- (g) What are the components of CL network pattern clustering and feature?
- (h) Explain the pattern association.
- (i) What is feature mapping?
- (j) Define delta learning rule.

SECTION – B

Attempt any five of the following questions:

5 x 10 = 50

2. Explain learning algorithm with respect to ANN. What are the requirements of learning laws for effective implementation?
3. Draw the structure of McCulloch Pitts model of neural network and explain its basic components. Also implement AND gate using McCulloch Pitts model.
4. Explain the Backpropagation algorithm with suitable example.
5. What kinds of features are effective in hand-written optical character recognition systems?
6. Explain briefly the terms Cell body, Axon, Synapse, dendrite and neuron with respect to a biological neural network.
7. Draw the XOR gate using RBF networks or any other neural networks, justify its truth table.

8. Below is a diagram of a single artificial neuron (unit):

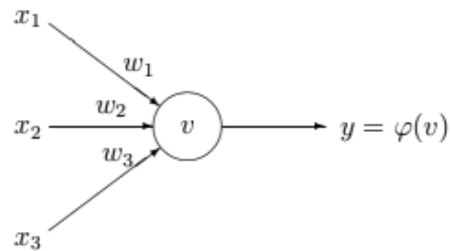


Figure: Single unit with three inputs.

The node has three inputs  $x = (x_1, x_2, x_3)$  that receive only binary signals (either 0 or 1). How many different input patterns this node can receive? What if the node had four inputs? Five? Can you give a formula that computes the number of binary input patterns for a given number of inputs?

9. Derive the training algorithm of Kohonen network. Also explain how SOMs can be used for data compression.

### SECTION – C

Attempt any two of the following questions:

2 x 15 = 30

10. What is feature extraction? Explain any two feature extraction technique in detail.

11. Explain the distinction between:

- Pattern association and pattern classification task.
- Feed-forward and Feed-back neural networks.
- Auto-associative and hetero- associative problem.

12. Explain the following with suitable diagram:

- Principal Component Analysis.
- Gradient descent rule.
- Mapping Networks.