

FIFTH SEMESTER B.TECH DEGREE EXAMINATION

13.506.3 ARTIFICIAL NEURAL NETWORKS (AT)

Time: 3 Hours

Max.

Marks : 100

PART - A

(Answer all questions. Each question carries 2 marks.)

1. What is the number of binary patterns that can stored and recalled in a net?
2. What are the typical architectures used for neural network.
3. What is an activation function. Define one of the commonly used activation functions.
4. Explain how a perceptron can be used to classify letters of different fonts
5. Distinguish between ADALINE & MADALINE?
6. What is the difference between auto associative and hetero associative neural networks?
7. What is a Boltzmann machine?
8. Define Euclidean distance between two vectors.
9. What is LVQ? Also mention what is a codebook vector?
10. Distinguish between supervised and unsupervised learning?

PART - B

(Answer any one question from each Module.)

Module - I

11.
 - a. Using the Hebb rule find the weights required to perform the following classifications. Given that the Vectors $(1, 1, 1, 1)$ & $(-1, 1, -1, -1)$ are the members of the same class (target 1) and vectors $(1, 1, 1, -1)$ & $(1, -1, -1, 1)$ are the members of another class (target -1).
(12 Marks)
 - b. Design a NAND gate with Mc Culloch- Pitts neuron (8 Marks)
12.
 - a. Explain Adaline architecture and algorithm used for pattern classification
(12 Marks)
 - b. Derive the decision line of AND gate using Perceptron rule (8 Marks)

Module - II

13.
 - a. Store the bipolar input vectors below in hetero associative net.
 - i. $S(1) = (1, -1, -1, -1)$ $t(1) = (1, -1)$
 - ii. $S(2) = (1, 1, -1, -1)$ $t(2) = (1, -1)$
 - iii. $S(3) = (-1, -1, -1, 1)$ $t(3) = (-1, 1)$
 - iv. $S(4) = (-1, -1, 1, 1)$ $t(4) = (-1, 1)$Test the net by the training using the input vectors and input vectors with one mistake
(12 Marks)

14. b. Compare Hopfield structure with BAM (8 Marks)
- a. Store (1,1,1,0) in a Hopfield net. Describe the form of weight matrix. Test the Hopfield net with mistakes in the first and second component of the stored vector. (12 mark)
- b. Compare auto associative net and Hopfield net (8 Marks)

Module - III

15. a. What are the stages involved in training a neural net using Back propagation algorithm. Explain (12 Marks)
- b. Distinguish between binary sigmoid function and bipolar sigmoid functions (8 marks)
16. a. Explain how back propagation can be used to solve Ex-OR problem which is not linearly separable (12 Marks)
- b. What is the need for multiple hidden layers in back prop net? What is the change in algorithm for this when compared to single layer. (8 Marks)

Module - IV

17. a. With neat sketches, explain ART2 architecture. (10 Marks)
- b. ART1 algorithm is used to cluster four vectors with 4 components ($n=4$) in each. If maximum number of clusters is 3, find bottom - up and top- down matrices corresponding to input vector (1,1,0,0). Select vigilance parameter as 0.4 and up-date parameter as 2 in update of bottom -up weights. Given initial top-down weight is 1 and initial bottom -up weights as $1/(1+n)$ (one half the maximum value allowed. (10 Marks)
18. a. Discuss about ART1 architecture using sketches. (10 Marks)
- b. Consider an ART2 net with two input units ($n=2$). Show that using noise suppression factor $=0.7$ will force the input patterns (0.71, 0.69) and (0.69 & 0.71) to different clusters. What role does the vigilance parameter play in this situation (10 Marks)