

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID :199351/  
199361

Roll No.

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B.TECH

(SEM. III) THEORY EXAMINATION, 2015-16

INTRODUCTION TO SOFT COMPUTING  
(NEURAL NETWORKS, FUZZY LOGIC AND  
GENETIC ALGORITHM)

[Time:3 hours]

[Maximum Marks:100]

SECTION-A

**Note :** Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)

1. (a) What are neurons?
- (b) Give the difference between supervised and unsupervised learning in artificial neural network?
- (c) What is difference between auto associative memory and hetero associative Memory?
- (d) Explain binary encoding in genetic algorithm.
- (e) Which neural network architecture is used for on line spell checking?

- (f) Consider an auto associative net with the bipolar step function as the activation function and weights set by Hebb rule (outer diagonal) where the main diagonal of the weight matrix is set to zero. Find the weight matrix to store the vector  $v_1 = (1 \ 1 \ 1 \ 1 \ -1 \ -1)$ .
- (g) What is inheritance in genetic algorithm?
- (h) If the net input to an output neuron is 0.64, calculate its output when the activation function is binary sigmoidal.
- (i) What is the difference between crisp set and fuzzy set?
- (j) Name any three commercial software used for soft computing techniques.

### SECTION-B

**Note:** Attempt any five questions from this section.

(10×5=50)

2. Consider three orthogonal vectors  $[1 \ -1 \ 1 \ -1]$   $[-1 \ 1 \ 1 \ -1]$   $[1 \ 1 \ -1 \ -1]$ . Find the weight matrix to store all the three orthogonal vectors and test the response of the net for each of the input vectors given.
3. Why mutation is done in genetic algorithm? Explain types of mutation.
4. Explain two point crossover and uniform crossover in genetic algorithm.

5. Explain McCulloch-Pitts Neuron model and write disadvantage of it.
6. Explain the topology and learning in Bidirectional Associative Memory.
7. For the given input vectors  $S=(S_1, S_2, S_3, S_4)$  and output vectors  $t=(t_1, t_2)$ , find the weight matrix using hetero-associative training algorithm.
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|--------------------------|----------------|
| $S=(S_1, S_2, S_3, S_4)$ | $t=(t_1, t_2)$ |
| I=(1 0 1 0)              | (1, 0)         |
| II=(1 1 0 0)             | (1, 0)         |
| III=(1 1 1 0)            | (0, 0)         |
| IV=(1 0 0 0)             | (0, 1)         |
8. Write benefits of genetic algorithm. Explain the back-propagation algorithm.
9. Explain Hebbian learning.

### SECTION-C

**Note:** Attempt any two questions from this section.

(15×2=30)

10. (a) Explain the structure of Boltzmann Machine. Why is it not proven useful for practical problems in machine learning or inference?
- (b) Draw and Explain the multiple perceptron with its learning algorithm.

- (c) (i) Use the Hebb rule of discrete BAM, find the weight matrix to store the following (binary) input output pattern pairs.
- $$S(1)=(1,1,0) \quad t(1)=(1 \ 0)$$
- $$S(2)=(0,1,0) \quad t(2)=(0,1)$$
- (ii) Using binary and bipolar step functions as the activation functions test the response of the?
11. (a) According to which rule each neuron updates its state in Hopfield network? What is the dynamic behavior of Hopfield network?
- (b) Write various steps of the back propagation algorithm.
- (c) For an air conditioner what will be the input and output in a Fuzzy controller?
12. (a) What is called supervised and unsupervised training?
- (b) Draw and Explain the multiple perceptron with its learning algorithm.
- (c) Write short note on Adaline and Madaline networks.

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