

End Semester Examinations - 2015-16 Even Semester - May 2016

14EC3003 Computational Intelligence and Optimization Techniques

Set A

Time : 3 hrs
Total Marks: 100

1. (a) Discuss the application areas of artificial neural networks (14)
(b) Brief single layer, multilayer and competitive layer neural networks. Give an example for each (6)

OR

2. (a) Describe the common activation functions of neural networks (8)
(b) With necessary diagram discuss the important sections of biological neuron and the mechanism related to communication in the brain (12)
3. (a) Brief the various approaches for alleviating the dilemma between interpretability and precision (6)
(b) Compare ANFIS, CANFIS and MANFIS in terms of architecture (6)
(c) Discuss about various 1-D membership functions (8)

OR

4. (a) Consider the following fuzzy relation,

$$\mu_R(x, y) = \begin{cases} \frac{y-x}{x+y+2}, & \text{if } y > x \\ 0, & \text{if } y \leq x \end{cases}$$

If $X = \{3, 4, 5\}$ and $Y = \{3, 4, 5, 6, 7\}$, express the fuzzy relation R as a relation matrix (7)

- (b) What is Defuzzification? Briefly explain different defuzzification strategies (10)
(c) Discuss Fuzzy If-Then rules (3)

5. (a) Explain Subtractive clustering algorithm in detail (10)
(b) Compare mountain and subtractive clustering techniques (10)

OR

6. (a) Describe the steps to determine cluster centers and membership matrix using fuzzy c-means algorithm (10)
(b) Discuss the performance and application of the above algorithm (10)

7. (a) Describe the architecture and training algorithm of Kohonen's Self-organizing map (12)
(b) Given a Kohonen net with two cluster units and five input units, the weight vectors for the units are $w_1 = (1.0, 0.8, 0.6, 0.4, 0.2)$
and $w_2 = (0.2, 0.4, 0.6, 0.8, 1.0)$. Find the winning cluster unit for the input pattern $x = (0.5, 1.0, 0.5, 0.0, 0.0)$. Use a learning rate of 0.2
and find the new weights for the winning unit (8)

OR

8. (a) Discuss the architecture and application algorithm of discrete Hopfield network (12)
(b) Given weight matrix to store pattern in discrete Hopfield network is $W = [0 \ 1 \ 1 \ -1; 1 \ 0 \ 1 \ -1; 1 \ 1 \ 0 \ -1; -1 \ -1 \ -1 \ 0]$. Find the stored pattern

for the input vector $(0, 0, 1, 0)$ (8)

9. (a) Describe the step wise procedure of genetic algorithm in solving optimization problems (12)
- (b) Discuss the application of genetic algorithm (8)

Wishing you All the Best
