B.E. (EXTC) (Sem-VII) (CBSGS) (R-2012)

Paper / Subject Code: 42407 / 3)Neural Network & Fuzzy Logic

Date - 26/11/1

(Time: 3 hrs) (Max. Marks: 80)

N. B. Q.1 is compulsory.

1. Answer any **three** out of the remaining five questions.
2. Figures to the right indicate full marks.
3. Answer to the questions should be grouped and written together.

Q1 Solve **any four**

a Plot fuzzy membership function for the age 'A' in years of people. The linguistic variables are defined as follows: **05**

Very Young (VY): $A < 12$

Young (Y): $10 \leq A \leq 22$

Middle Age (M): $20 \leq A \leq 42$

Old (O): $40 \leq A \leq 72$

Very Old (VO): $70 < A$

b Draw XOR gate using Neural Network and explain its operation **05**

c Find λ cut set of $A=\{\frac{0.1}{20}+\frac{0.15}{30}+\frac{0.33}{40}+\frac{0.4}{50}\}$ for i) $\lambda = 0$ and ii) $\lambda = 0.3$ **05**

d Draw the flow chart for Error Back-Propagation training algorithm **05**

e Explain Perceptron Learning rule with flow chart. **05**

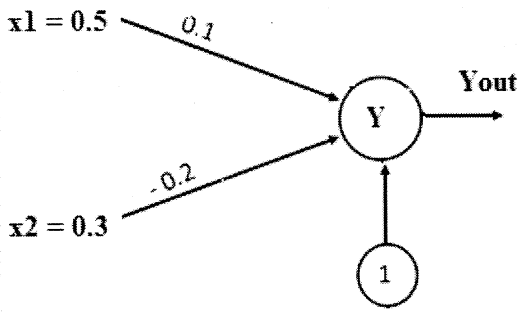
2a Describe application of neural network in numeric character recognition **10**

2b Define mathematically the following activation functions with the diagrams of their transfer functions: **10**

i) Linear activation function

ii) Logsigmoidal activation function

Use these in node Y to calculate output **Yout** of the network shown as follows:



3a Draw diagram of Hopefield neural network. Write the properties of Hopefield matrix and also explain its testing algorithm. **10**

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3b Two fuzzy sets are defined as follows: **10**

$$A=\{\frac{0.1}{3}+\frac{0.25}{6}+\frac{0.3}{9}+\frac{0.4}{12}\}$$

$$B=\{\frac{1}{3}+\frac{0.2}{6}+\frac{0.5}{9}+\frac{0.7}{12}\}$$

Find the following:
(i) A U B (ii) A ∩ B (iii) Complement of A
Also show that (iv) A U B = B U A (v) A ∩ B = B ∩ A

4a Define membership function and their types. Also, state their importance in fuzzy system. **10**

4b Explain with neat diagram the Radial Basis Function neural network for classification of data. **10**

5a Explain with diagram Supervised and Unsupervised learning methods. List two supervised learning rules and two unsupervised learning rules **10**

5b Using perceptron model of Neural Network design an OR gate. Consider inputs and output as unipolar. Assume initial weights and bias value equal to zero. Consider learning rate equal to one. **10**

6a What is Self-Organizing Map (SOM)? Describe Kohonan SOM with learning algorithm. **10**

6b With at least two input membership functions implement fuzzy wash cycle controller in washing machine. **10**

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