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(2124)

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M. Tech 3rd Semester Examination

Neural Networks & Fuzzy Logic

EC-311

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt any five questions. All the questions carry equal marks.

1. (a) List the main components of the biological neuron. Compare and contrast the biological neuron and artificial neuron. (10)
- (b) Discuss in detail the historical development of artificial neural network. (10)
2. (a) Explain perception learning rule in detail. What are its limitations? (10)
- (b) Draw the architecture and flowchart of back error propagation algorithm and explain it. (10)
3. (a) What is a Hopfield net? Mention the application of Hopfield network. (10)
- (b) Construct and test a heteroassociative memory network using outer product rule to store the given input output target pairs
 $S(1) = (1, 0, 1), t(1) = (1, 0)$
 $S(2) = (0, 1, 1), t(2) = (0, 1)$ (10)

[P.T.O.]

4. Write short notes on:
- (i) Application of ANN in function approximation. (10)
 - (ii) Application of ANN in time series and forecasting. (10)
5. (a) With architecture describe how LVQ nets are trained. (10)
- (b) Define competitive learning. State the merits and demerits of Kohonen self-organising feature maps. (10)
6. (a) Define classical sets and fuzzy sets. List all of their operations and properties. (10)
- (b) Justify the following statement "Partial membership is not allowed in fuzzy set." Consider two fuzzy sets

$$A = \left\{ \frac{1}{2.0} + \frac{0.65}{4.0} + \frac{0.5}{6.0} + \frac{0.35}{8.0} + \frac{0}{10.0} \right\}$$

$$B = \left\{ \frac{0}{2.0} + \frac{0.35}{4.0} + \frac{0.5}{6.0} + \frac{0.65}{8.0} + \frac{1}{10.0} \right\}$$

Find (i) $A \cup B$ (ii) $\overline{A \cap B}$ (10)

7. (a) Define the terms: Linguistic variable, Membership function, Cardinality, α -cut in a fuzzy set. (10)
- (b) Write a short note on the applications of fuzzy controllers in industries. (10)
8. (a) What is meant by local minima and global minima. Derive the generalized delta rule. (10)
- (b) Implement AND fn. using McCulloch Pitt's neuron. Why M-P neuron is widely used in logic gates. (10)
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