53 (IT 819) FZLN

2018

FUZZY LOGIC AND NEURAL NETWORK

Paper : IT 819

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions out of **seven**.*

1. Answer ***all*** questions : 10×2=20

   (i) Define activation function.

   (ii) Compare weights and bias of neural network.

   (iii) List the applications of neural network.

   (iv) Name the different types of Defuzzification techniques.

   (v) State core support and boundary in membership function.

(vi) Discus about the energy function used in discrete Hopfield network.

(vii) What is the classification of training?

(viii) Write *four* advantages of genetic algorithm.

(ix) Define Fuzzy Cartesian product.

(x) Define Mutation.

2. (a) State the algorithm of Hebb Net with its architecture. 8

(b) Draw the architecture of ADALINE and MADALINE network. 6

(c) Using Venn diagram, sketch the relation among Neural networks, Genetic algorithm and fuzzy logic. 6

3. (a) Define classical set (crisp). Differentiate fuzzy set from classical set and write properties of classical (crisp) set. 2+8

(b) What is fuzzy complement? Check whether the function $x + y - x.y$ can be fuzzy union. 10

4. *(a)* Distinguish between feedforward and feedback neural network. Compare their input and output mapping. 10

(b) What are the various active building blocks of neural network? 10

5. *(a)* What is XOR problem? Draw and explain the architectural graph of network for solving XOR problem. 2+8=10

(b) What is Backpropagation? With a schematic two layer feed forward neural network, derive its learning algorithm. 2+8=10

6. *(a)* What is genetic algorithm? Explain different steps of genetic algorithm with a flowchart. 10

(b) A Hopfield Network made up of 5 neurons, which is required to store the following three fundamental memories

$$E1 = \{+1, +1, +1, +1, +1,\}T$$
$$E2 = \{+1, -1, -1, +1, -1,\}T$$
$$E3 = \{-1, +1, -1, +1, +1,\}T$$

Evaluate the 5-by-5 synaptic weight matrix of the network. 10

7. *(a)* A linguistic variable X which measures the academic excellence is taken from universe of discourse $U = \{1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 10\}$. The membership functions are defined as follows.

$$\mu(\text{Excellence}) = \{(8, 0.2)\,(9, 0.6)\,(10, 1)\},$$

$$\mu(\text{Good}) = \{(6, 0.1)\,(7, 0.5)\,(8, 0.9)(9, 1)\,(10, 1)\}$$

Construct the membership function of good but not excellent. 8

(b) Write notes on the following : 4×3=12

(i) ambiguity

(ii) Fuzziness

(iii) in exactness

(iv) Fuzzification interface

(v) Knowledge base in fuzzy logic controller

(vi) activation model.