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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

INFORMATION TECHNOLOGY

Eight Semester

IT9035 & Soft Computing

(Regulation 2008)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What is the necessity of activation functions?
2. Distinguish between Madaline and Adaline.
3. What is the cardinality of a fuzzy set? Whether a power set can be formed for a fuzzy set?
4. How is fuzzy relation converted into a crisp relation using lamda-cut process?
5. List the various applications of fuzzy logic controller.
6. Give an example on extension principle.
7. State the importance of genetic algorithm.
8. Define the cut and splice operation.
9. State the taxonomy of the crossover operator.
10. What are the syntactic message passing features in Bayesian belief networks?

Part – B (5 x 16 = 80 marks)

11. a) Compare feed-forward and feedback network. (8)
b) Construct and test a heteroassociative memory net to store the given vector pairs: (8)
S(1)=(0 0 0 1), t(1)=(0 1)
S(2)=(0 0 1 1), t(2)=(0 1)
S(3)=(0 1 0 0), t(3)=(1 0)
S(4)=(1 1 0 0), t(4)=(1 0)
Also test the network with "noisy" input patterns
12. a) i) State fuzzy set operations and properties of fuzzy sets. Why the excluded middle law does not get satisfied in fuzzy logic. (8)
ii) The discretized membership functions for a transistor and a resistor are given below: (8)
 $\mu_T = \{ 0/0 + 0.2/1 + 0.7/2 + 0.8/3 + 0.9/4 + 1/5 \}$
 $\mu_R = \{ 0/0 + 0.1/1 + 0.3/2 + 0.2/3 + 0.4/4 + 0.5/5 \}$
Find the following (a) Algebraic sum (b) Algebraic product (c) bounded sum (d) Bounded difference.

(OR)

- b) i) With a suitable examples, explain how membership assignment is performed.(8)
ii) State the necessity of defuzzification process. Calculate the λ -cut for the

following fuzzy sets in Zadeh Notation (8)

$$A = 0/0.2 + 0.8/0.4 + 1/0.6$$

$$\text{And } B = 0.9/0.2 + 0.7/0.4 + 0.3/0.6$$

Express the fuzzy sets into $\lambda = 0.7$ for the following operations.

- i) \bar{A} ii) \bar{B} iii) $A \cup B$ iv) $A \cap B$ v) $A \cap \bar{B}$ vi) $\bar{A} \cup B$

13. a) Explain the architecture of a fuzzy logic controller and the steps involved in designing a fuzzy controller with suitable example. (16)

(OR)

- b) i) How are necessity and possibility measures obtained from belief and plausibility measure? Explain it. (6)
ii) Consider the two triangular-shape fuzzy number A and B. (10)

$$A(x) = \begin{cases} 0 & \text{for } x \leq -1 \text{ and } x > 3 \\ (x+1)/2 & \text{for } -1 < x \leq 1 \\ (3-x)/2 & \text{for } 1 < x \leq 3 \end{cases}$$
$$B(x) = \begin{cases} 0 & \text{for } x \leq 1 \text{ and } x > 5 \\ (x-1)/2 & \text{for } 1 < x \leq 3 \\ (5-x)/2 & \text{for } 3 < x \leq 5 \end{cases}$$

Calculate the fuzzy numbers $A+B$, $A-B$, $A \cdot B$ and A/B

14. a) i) Explain in detail the various operators involved in genetic algorithm (8)
ii) Show the first 2 cycles of genetic evolution for optimizing the function $y=x^3$ in the interval of $0 \leq x \leq 12$. Use set $P = \{1100, 1010, 1011, 0011\}$ as initial population. (8)

(OR)

- b) i) State and explain the classifications of the parallel genetic algorithm (8)
ii) Explain the bucket brigade algorithm with example. (8)

15. a) i) Explain the issues when designing a genetic algorithm for intelligent internet search. (8)
ii) Implement OR function with bipolar inputs and targets with a MADALINE neural network in Matlab. (8)

(OR)

- b) i) Write a C++ program to apply back propagation network for a pattern recognition problem. (8)
ii) Describe the optimization of travelling salesman problem using genetic algorithm approach. (8)