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Question Paper Code : 60401

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Instrumentation and Control Engineering

CS 2461/CS 812/10133 IC 704 — APPLIED SOFT COMPUTING

(Common to Eighth Semester Electronics and Instrumentation Engineering)

(Regulations 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw a neuron model with output and input function.
2. Compare biological neuron and artificial neuron.
3. Name the different crossover operators used in GA.
4. What are genetic algorithms?
5. What do you mean by supervised learning?
6. Define core of a membership function.
7. List the various configurations of neuron-fuzzy systems.
8. Identify the main components in a fuzzy logic based control system.
9. What are the various factors on which GA differs from conventional optimization techniques?
10. State the limitations of genetic algorithms.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Compare the performance of a computer and that of a biological neural network in terms of speed of processing, size and complexity storage, fault tolerance and control mechanism. (8)
- (ii) A 2 input neurons with the following parameter is given : $\beta = 1.2$
 $W = [3, 2]$ and $I = [-5, 6]$. Calculate the neuron output for the following transfer function. (8)
- (1) Symmetrical hard limit function
- (2) Saturating linear function.

Or

- (b) (i) Compare LMS, perceptron and delta learning laws. (8)
- (ii) Explain the training of multilayer feed forward networks by BPN algorithm. (8)
12. (a) (i) Write note on continuous time network. (6)
- (ii) Discuss the usage of neuro controller for inverted pendulum with it's characteristics. (10)

Or

- (b) Explain in detail the working principle of Hopfield networks. Mention the merits and it's characteristics.
13. (a) (i) Given $X = \{0.1/8 + 0.5/9 + 1/10 + 0.3/11 + 0.1/12\}$,
 $Y = \{0.3/5 + 1/6 + 0.9/7 + 0.2/8\}$ and
 $Z = \{0.5/8 + 1/9 + 0.9/10 + 0.4/11 + 0/12\}$ compute $R = X \times Y$ and
 $P = Y \times Z$ and $S = P \circ R$ by max-product composition. (10)
- (ii) Illustrate triangular and trapezoidal membership functions. (6)

Or

- (b) (i) A fuzzy tolerance relation R is reflexive and symmetric. Find the equivalence relation R_e and classify it according to the alpha-cut levels = $\{0.9, 0.8, 0.5\}$. (8)

$$R = \begin{matrix} & 1 & 0.8 & 0 & 0.2 & 0.1 \\ & 0.8 & 1 & 0.9 & 0 & 0.4 \\ & 0 & 0.9 & 1 & 0 & 0.3 \\ & 0.2 & 0 & 0 & 1 & 0.5 \\ & 0.1 & 0.4 & 0.3 & 0.5 & 1 \end{matrix}$$

- (ii) Describe various de-fuzzification methods. (8)

14. (a) Explain about the optimization of membership function using the concept of neural networks in detail. (16)

Or

- (b) Discuss about the knowledge base used for fuzzy logic control with suitable illustration. (16)
15. (a) Discuss the following search techniques :
- (i) Gradient-based local optimization method. (12)
 - (ii) Stochastic Hill Climbing. (4)

Or

- (b) What do you mean by crossover operator in genetic algorithms? Discuss about the various crossover techniques in genetic algorithm. (16)
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