

(b) Explain the working of a fuzzy Controller. Design a system that models the tip value to be given for a Lunch depending on the quality of food served and service offered. Consider the rating of food and service on a scale of 1 to 10. (10)

7. Implement logical OR function with bipolar inputs and target using ADALINE network. (15)

Roll No.

Total Pages : 4

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MCA-111 SEMESTER

Soft Computing (MCA-20-205)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) Define the terms Soma, Axon. (1)
- (b) State the importance of Genetic Algorithms. (1)
- (c) What is the importance of activation function in ANN? (1)
- (d) Define Artificial Neural Network. (1)
- (e) List Similarities and Differences between Fuzzy Logic and Boolean logic. (1)
- (f) Compare Biological Neuron and Artificial Neuron on the criteria of size and complexity. (1)

(g) Highlight the differences between crossover and mutation operation performed in Genetic algorithms. (1)

(h) What is the building block of a perception? (1)

(i) List down few applications of Fuzzy Logic. (1)

(j) What is meant by Core and support of a Fuzzy set? (1)

PART-B

2. (a) Briefly discuss the application areas of Genetic Algorithm. (5)

(b) Compare and Contrast Genetic Algorithms and traditional Algorithms. (5)

(c) Consider $P = \{a, b, c, d\}$, $Q = \{1, 2, 3, 4\}$ and (5)

$U = \{(a, 0.0), (b, 0.8), (c, 0.6), (d, 1.0)\}$

$V = \{(1, 0.2), (2, 1.0), (3, 0.8), (4, 0.0)\}$

$W = \{(1, 0), (2, 0.4), (3, 1.0), (4, 0.8)\}$

Determine the implication relation :

If p is U then q is V else q is W .

3. (a) What is Reinforcement learning? How is it different from the other two ways of learning in a neural network? (5)

(b) Compare Feed-forward and Feedback networks. (5)

(c) Obtain the output of the neuron with inputs given as $[x_1 \ x_2 \ x_3] = [0.8 \ 0.6 \ 0.4]$ and weights as $[w_1 \ w_2 \ w_3] = [0.1 \ 0.3 \ -0.2]$ and bias = 0.35. (5)

Find Output for following Activation Functions:

(i) Binary Sigmoidal.

(ii) Bipolar Sigmoidal.

4. (a) What do you understand by "Hard Computing"? (5)

(b) What are the different types of hybrid Systems that can be designed using the Principal Constituents of Soft Computing? Explain each in brief. (10)

5. (a) Explain different methods used for selecting individuals for reproduction. Justify the statement; GA are used to solve optimization problems. (10)

(b) Maximize $f(x) = x^2$ for one generation where x can have binary values in the range $[0, 31]$. (10)

6. (a) Consider two fuzzy sets as : (5)

for fuzzy set $\sim A$: $\mu_A = \{|(60-x) | / 8\} + 1$

For fuzzy set $\sim B$: $\mu_B = \{|(40-x) | / 8\} + 1$

Perform

(i) Union.

(ii) square of fuzzy set $\sim B$.

(iii) Algebraic Difference ($A-B$).

(iv) Complement of fuzzy set $\sim A$.

(v) Bounded sum of the two fuzzy sets.