Code : **041775**

B.Tech 7th Semester Exam., 2019

SOFT COMPUTING TECHNIQUES

Time : 3 hours   Full Marks : 70

Instructions :

(i) *All questions carry equal marks.*

(ii) *There are NINE questions in this paper.*

(iii) *Attempt FIVE questions in all.*

(iv) *Question No. 1 is compulsory.*

1. Choose the correct answer from the following (any *seven*) :

(a) Fuzzy logic is a form of

   (i) two-valued logic

   (ii) crisp set logic

   (iii) many-valued logic

   (iv) binary set logic

(2)

(b) The room temperature is hot. Here the hot (linguistic variable is used) can be represented by

   (i) fuzzy set

   (ii) crisp set

   (iii) fuzzy and crisp set

   (iv) None of the above

(c) Fuzzy set theory defines fuzzy operators. Choose the fuzzy operators from the following :

   (i) AND

   (ii) OR

   (iii) NOT

   (iv) All of the above

(d) Back propagation method is used

   (i) to develop learning algorithm for multilayer feed forward neural network

   (ii) to develop learning algorithm for single layer feed forward neural network

   (iii) to develop learning algorithm for multilayer feed forward neural network, so that network can be trained to capture the mapping implicitly

   (iv) None of the above

(e) What is meant by generalized in the statement, "Back propagation is a generalized delta rule."?

  (i) Because delta rule can be extended to hidden layer units

  (ii) Because delta is applied to only input and output layers, thus making it more simple and generalized

  (iii) It has no significance

  (iv) None of the above

(f) Supervised learning is used for

  (i) classification problems

  (ii) clustering problems

  (iii) it has no significance in classification and clustering problems

  (iv) None of the above

(g) Unsupervised learning is used for

  (i) classification problems

  (ii) clustering problems

  (iii) it has no significance in classification and clustering problems

  (iv) None of the above

(h) Reinforcement learning requires

  (i) a teacher to decide the next move

  (ii) no teacher

  (iii) a reward to decide the direction of next move

  (iv) None of the above

(i) Simulated annealing is

  (i) a point-based method

  (ii) a population-based method

  (iii) used to solve optimization problems

  (iv) None of the above

(j) SVM is used in

  (i) classification problems

  (ii) clustering problems

  (iii) It has no significance in classification and clustering problems

  (iv) None of the above

2. *(a)* Explain with neat diagram supervised and unsupervised learning in NN.

  (b) Explain different activation functions in NN.

(Continued)

(c) Explain with example any two operators involved in simple GA.

(d) Explain different defuzzification techniques.

3. (a) Design Hebb learning to implement logical AND function. Use bipolar inputs and targets.

(b) Explain back propagation training algorithm with the help of flowchart.

4. (a) Explain the architecture of bidirectional associative memory (BAM). How are storage and retrieval performed in BAM?

(b) Explain the single layer neural network architecture using perceptron model with suitable activation function.

5. (a) Two fuzzy relations are given below :

R		b_1	b_2	b_3
	a_1	0·4	0·5	0
	a_2	0·2	0·8	0·2

S		c_1	c_2
	b_1	0·2	0·7
	b_2	0·3	0·8
	b_3	1·0	0·0

Find new relation T by using max-min composition and max-product composition between the fuzzy relations.

(b) Sketch five-layer ANFIS architecture mentioning the task of each layer.

6. (a) Using Mamdani fuzzy mode, design a fuzzy logic controller to determine the wash time of domestic washing machine. Assume that the inputs are dirt and grease on cloths. Use three descriptors for each input variables and five descriptors for output variables. Derive necessary membership function and required fuzzy rules for the application.

(b) Explain Mamdani's and Zadeh's interpretation of fuzzy rule.

7. (a) Show how soft computing methods can be used for printed character reorganization problem. Take an example and show all the steps. http://www.akubihar.com

(b) Discuss some applications of neuro fuzzy modeling.

8. (a) Explain simulated annealing method with an example. How is this method different from population-based methods?

(b) Explain the advantages of using derivation-free optimization methods. How is this method different from classical Newton's method?

(7)

9. Write short notes on the following :

   (a) Random search methods

   (b) Binary Hopfield network

   (c) Delta learning rule

   (d) McCulloch-Pitts neuron model

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