Total No. of Questions : 8] [Total No. of Printed Pages : 3

Roll No. 0122CS08MT01

MCSE–204(B)

M. E./M. Tech. (Second Semester) EXAMINATION, Oct., 2009

SOFT COMPUTING

(Elective – II)

[MCSE – 204(B)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks. Make suitable assumptions wherever necessary.

1. (a) Explain how simulated annealing can be used to reduce search complexity and constrast its operation with classic search techniques.

   (b) When will hill climbing searches fail ? Do steepest ascent hill climbing always find solutions ? How might some problems be overcome in the search ?

2. (a) Prove that the A* heuristic search algorithm is optimal when applied in conjunction with a monotonic heuristic. State the conditions under which the algorithm is also complete and explain why this is the case.

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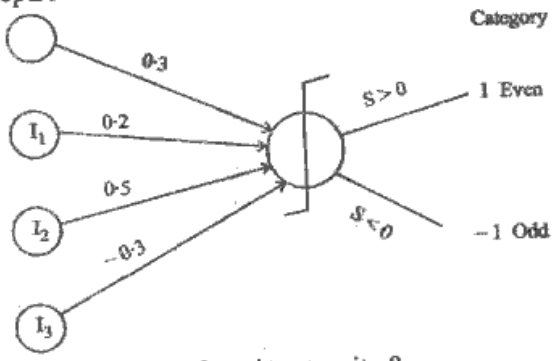
(b) What are the constituents of a constraint satisfaction problem (CSP) ? What is the formal definition of a constraint over a set of variables ?

3. A perceptron is being trained for a learning task. The task is to determine when the product of three integers is even and when it is odd. There is an input unit for each integer being multiplied and the input is + 1 if the integer is even, − 1 if the integer is odd. The current state of the perceptron is :



(i) Why are there four input units ?

(ii) Would the perceptron predict that product $2 * 3 * 4$ is even or odd ? (Let I_1 be 2, I_2 be 3 and I_3 be 4).

(iii) Using a learning rate of 0·1 and given the input triple (2, 3, 4), recalculate the weights using the perceptron training rule. Draw the perceptron after training. Does the trained perceptron correctly predict whether $2 * 3 * 4$ is odd or even ?

4. (a) Let $A = \{(x_1, 0{\cdot}2), (x_2, 0{\cdot}7), (x_3, 0{\cdot}4)\}$ and $B = \{(y_1, 0{\cdot}5), (y_2, 0{\cdot}6)\}$ be two Fuzzy sets defined on the universe of discourse $X = \{x_1, x_2, x_3\}$ and $Y = \{y_1, y_2, y_3\}$ respectively. Find the Cartesian product of the A and B and fuzzy relation R.

(b) Mention the need for the De-fuzzification. Explain the three types of De-fuzzification with its formulae.

5. (a) What is called De-fuzzification ? Mention its types.

(b) What are the parameters to be considered for the design of membership function ?

6. (a) Discuss about the neural controller with its applications.

(b) Describe briefly how a solution to the Travelling Salesman Problem might be obtained using a genetic algorithm, indicating how features of the problem map to the elements needed to use a genetic algorithm.

7. (a) Explain with examples different operators of genetic algorithms.

(b) Explain fitness computations with examples.

8. Write short notes on the following :

(a) Data clustering algorithms

(b) Cross over mutation