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MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

VII SEMESTER B.TECH. (COMPUTER SCIENCE AND ENGINEERING)
END SEMESTER EXAMINATIONS, NOV 2017
SUBJECT: SOFT COMPUTING PARADIGMS [CSE 4031]
REVISED CREDIT SYSTEM
(23/11/2017)

TIME : 3 HOUR **MAX.MARKS : 50**

Instructions to the Candidates
- Answer ANY FIVE full Questions.
- Missing data can be suitably assumed

1 A. With neat sketch, discuss the Structural organization of levels in the brain. 3M

1 B. What is neuron? Explain the basic elements of an artificial neural model. 3M

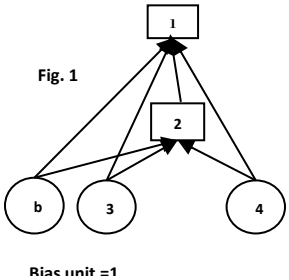
1 C. Briefly explain the Boltzmann learning? Find the winner unit at the output layer when η=0.3, the initial weight vectors W_j are given by $\mathbf{w}_1 = \begin{bmatrix} 0.27 \\ 0.81 \end{bmatrix}$ $\mathbf{w}_2 = \begin{bmatrix} 0.42 \\ 0.70 \end{bmatrix}$ $\mathbf{w}_3 = \begin{bmatrix} 0.43 \\ 0.21 \end{bmatrix}$ and the given input vector $\mathbf{x} = \begin{bmatrix} 0.52 \\ 0.12 \end{bmatrix}$ in a Kohonen network. 4M

2 A. What is Adaline and Madaline? To solve the exclusive-or problem, we build a backpropagation network as shown in figure 1. The network will be trained on the following instances.

Inputs	Output
(0,0)	0
(1,0)	1
(0,1)	1
(1,1)	0

The weights are initialized randomly as follows.
W_{13}= 0.02, W_{14}= 0.03, W_{12}= -0.02, W_{23}= 0.01, W_{24}= 0.02, W_{1b}= -0.01, W_{2b}= -0.01
i. Calculate the Activation function at O_1, O_2, O_3 and O_4 when input is (1,1)?
ii. Calculate the weight change in training (Assume that learning rate η = 0.5 and mean squared error of less than 0.01). At least show one iteration?

Fig. 1



4M

2 B. Explain in brief, the learning in radial basis function networks? Calculate the activation of hidden unit j, when input weight vector W_j = [0.9, 0.7, 0.3, 0] is associated with hidden unit j, the normalization factor σ_j=0.2 and the given input vector X = [1,1,0,0]. 3M

2 C. Compute the weight matrix by considering the following input vectors. Check whether the network is capable of recognizing familiar patterns by considering one of following input vector as probe vector. Assume threshold is zero.

$X_1 = [1 \quad -1 \quad -1]$

$X_2 = [-1 \quad 1 \quad -1]$

$X_3 = [-1 \quad -1 \quad 1]$

3M

3 A. With neat sketch, explain the Recurrent Multilayer Perceptron. 3M

3 B. Given |E| = 100. Where E indicates a set of students who have chosen subjects from different streams in the Computer Science and Engineering discipline. It is found that 32 study subjects from intelligent systems (IS) stream, 20 from the Computer Graphics and Visualization (CG&V) stream, and 45 from the Software Engineering (SE) stream. Also 15 study subjects from both IS and SE streams, 7 from both CG&V and SE streams, and 30 do not study any subjects chosen from either of these streams. Draw the Venn diagram and find the number of students who study subjects belonging to all three streams. 3M

3 C. i. Consider the following fuzzy sets and perform the difference and disjunctive sum operations.
$\tilde{A}$={(x_1,0.4) (x_2,0.8) (x_3,0.6)} and $\tilde{B}$={(x_1,0.2) (x_2,0.6) (x_3,0.9)}
ii.Given R={ (x,y)| y = x+2} and S= (x,y)| x ≤ y} be defined on the sets {1, 3, 5} x {1, 3, 5}.
Using max-min composition, find R_oS ? 4M

4 A. Given (i) All men are mortal. (ii) Confucius is a man. Prove that Confucius is mortal. 3M

4 B. Given, x = {a, b, c, d} and y={1, 2, 3, 4} Determine the implications relations (i) IF x is $\tilde{A}$ THEN y is $\tilde{B}$ (ii) IF x is $\tilde{A}$ THEN y is $\tilde{B}$ ELSE y is $\tilde{C}$ when $\tilde{A}$={(a,0) (b,0.8) (c,0.6) (d,1)}, $\tilde{B}$= {(1,0.2) (2,1) (3,0.8) (4,0)} and $\tilde{C}$= {(1,0) (2,0.4) (3,1) (4,0.8)}. 3M

4 C. What is Defuzzification? List and discuss the Defuzzification methods? 4M

5 A. What is Genetic Algorithm? Briefly explain the outline of the basic Genetic Algorithm. 3M

5 B. What is encoding? Discuss the following with an example.
i. Permutation encoding
ii. Value encoding
iii. Tree encoding 4M

5 C. What are hybrid systems? Discuss the Neuro-Fuzzy hybrids and Neuro-Genetic hybrids. 3M

-ALL THE BEST-