Roll No. ....

24489

B.Tech. 7th Sem. (Computer Science Engineering) Examination–May, 2013

NEURAL NETWORKS

Paper CSE-407-F

Time : 3 hours ***Max. Marks : 100***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note : Question No. 1 is compulsory. Attempt **five** questions in total selecting **one** question from each Section.

1. (a) Differentiate supervised and unsupervised learning. 5 × 4

   (b) Explain the learning factors.

   (c) What are the separability limitations ?

   (d) Compare perception, delta and winner take II learning rules.

SECTION - A

2. Explain in detail the structure of biological neurons relevant to ANN. 20

3. (a) Use Mc Culloch-Pitts neuron to design logic networks of AND and OR logic function. 8

(b) Implement the perceptron rule training of the network using f(net)=sgn(net), c=1 and the following data specifying the initial weights w' and two training pairs. 12

$$W' = \begin{matrix} 0 \\ 1 \\ 0 \end{matrix}, = \left(x1 = \begin{matrix} 2 \\ 1 \\ -1 \end{matrix}, d1 = -1 \right), \left(x2 = - \begin{matrix} 0 \\ 1 \\ -1 \end{matrix}, d2 = 1 \right)$$

Repeat the training sequence (x1, d1), (x2, d2) until two correct responses in a row are achieved. List the net^k values obtained during training.

SECTION - B

4 (a) Explain the single layer continuous perception training algorithm for the linearly separable classification. 10

(b) Implement the single discrete perception training alogrithm for c = 1 that provide the following classification to four patterns.

X1 = [1 1], x3 = [3 1], d1= d3=1 : class 1

X2 = [0.5, 1] x4 = [-2 1], d2=d4 = -1: class2

Perform the training task starting with initial weight vector w = [-2.5 175]^1. 10

5 (a) Explain error back propagation training algorithm. 6

(b) For the n/w shown below analyse a single feedforward and back propogation step for the initialized n/w by doing the following :

(i) Find weight matrices w and v

(ii) Calculate net_j, y, net_k, 0

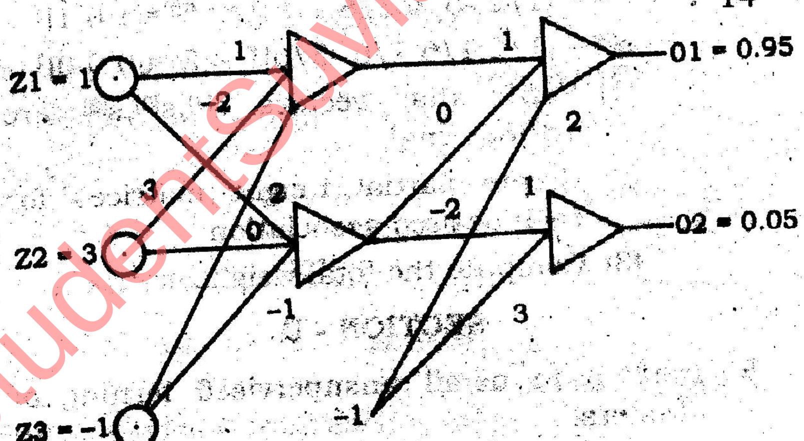
(iii) Calculate slopes f' (netj) and f'(net_k)

(iv) Compute error signals $\delta 0$ and δj

(v) Compute Δv and Δw

(vi) Find undated weights

Assume $f(net) = [1 + \exp(-net)]^{-1}$ and $\eta = 1$ 14



SECTION - C

6 The weight matrix W for a n/w with bipolar discrete binary neurons is given as 20

0	1	−1	−1	−3
1	0	1	1	1
−1	1	0	3	1
−1	1	3	0	1
3	−1	1	1	0

Assume threshold and external i/p of neurons are zero. Compare the values of energy for $v = [-1\ 1\ 1\ 1\ 1]^1$ and $v = [-1 -1\ 1 -1 -1]^1$

7 (a) Explain the association encoding and decoding and stability consideration for bidirectional associative memory. 10

(b) The linear associator has to associate the following pair of vectors : 10

$s^{(1)} = [1/2\ ½\ ½\ ½]^1 \rightarrow f^{(1)} = [0\ 1\ 0]^1$

$s^{(2)} = [1/2\ -5/6\ 1/6\ 1/6]^1 \rightarrow f^{(2)} = [1\ 0\ 1]^1$

$s^{(3)} = [1/2\ 1/6\ 1/6\ -5/6]^1 \rightarrow f^{(3)} = [0\ 0\ 0]^1$

(1) Verify that vectors $s^{(1)}, s^{(2)}, s^{(3)}$ are orthonormal.

(2) Create partial weight matrices for each desired association.

(3) Compute the total weight matrix.

SECTION - D

8 Explain in detail unsupervised larning of clusters. 20

9 Perform the first learning cycle using the following normalized pattern set : 20

$\{x1, x2, x3, x4\} = \{1 < 45°, 1 < 135°, 1 < 90°, 1 < 180°\}$ and $\alpha = 0.5$

Using the winner take all training rule for two cluster neurons. Draw the resulting separating hyperplanes. Initial weights are to be assumed $w1° = [1\ 0]^1$ and $w2° = [0 - 1]^1$.