



SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING

CONTINUOUS ASSIGNMENT TEST - II - WINTER SEMESTER 2019-2020

Programme Name & Branch: B.Tech

Class Number(s): VI 2019205004417/VI 2019205004419

Course Name Code: ITE1015

Course Name: Soft Computing

Faculty Name(s): Prof. Balakrushna Tripathy & Prof. Senthil Kumar P

Exam Mode: Closed book

Exam Duration: 90 mins

Maximum Marks: 50

Answer ALL Questions (5 x 10=50)

1. Consider the BAM network (with bipolar vector) to map two sample letters (given by 5 x 3 patterns) to the following target codes:

• • • • • •
• • • • • •
• • • • • •
• • • • • •
• • • • • •

pattern E

pattern H

(-1,1)

(1,1)

- a. Find the weight matrix with input pattern E and H.
b. Obtain the response of the net with E and H as input.
2. Construct a Kohonen self-organizing map to cluster the four given vectors, [1100], [0001], [1000], [0011]. The maximum number of cluster to be formed is two. Suppose the learning rate (geometric decrease) is 0.6. Perform one epochs of training.

Note : Initial weight vector $\begin{bmatrix} 0.2 & 0.8 \\ 0.6 & 0.4 \\ 0.5 & 0.7 \\ 0.9 & 0.3 \end{bmatrix}$, $R=0$

3. Consider an ART1 neural net with four F1 units and three F2 units. After some training the weights are as follows:

$$b_{ij} = \begin{bmatrix} 0.57 & 0 & 0.2 \\ 0 & 0 & 0.2 \\ 0 & 0.37 & 0.2 \\ 0 & 0.37 & 0.2 \end{bmatrix} \quad t_{\mu} = \begin{bmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

Determine the new weight matrices after the vector [0, 0, 1, 1] is presented if $\alpha = 2$

(a) The vigilance parameter is 0.4

(b) The vigilance parameter is 0.8

4. An athletic race was conducted in VIT university. The following membership functions are defined based on the speed of the athletes

$$Low = \left\{ \frac{0.1}{100} + \frac{0.2}{200} + \frac{0.3}{300} \right\}$$

$$Medium = \left\{ \frac{0.5}{100} + \frac{0.6}{200} + \frac{0.7}{300} \right\}$$

$$High = \left\{ \frac{0.8}{100} + \frac{0.9}{200} + \frac{1.0}{300} \right\}$$

Find the following

- Find $R = Low \times medium$
- Find $S = Medium \times High$
- Find $T = R \circ S$ using max-min composition.
- Find $T = R \bullet S$ using max-product composition

5. a. Discuss in detail centroid and centre of sum defuzzification methods used for the converting fuzzy values to crisp values with suitable example. [6 Marks]
- b. Consider A be a fuzzy set that tells about a student performance as shown in the figure and the elements with corresponding maximum membership values are also given.
 $A = \{(P, 0.6), (F, 0.4), (G, 0.2), (VG, 0.2), (E, 0)\}$. The linguistic variable P represents a Pass student, F stands for a Fair student, G represents a Good student, VG represents a Very Good student and E for an Excellent student. Find the defuzzified value and represents for the fuzzy set A with weighted average method. [4 Marks]

