

Name: Sambhav Jain

Reg. No.:

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END TERM EXAMINATION – MAY 2022

SEMESTER –VI

B.Tech. / CSE 2018-19/2019-20

Subject Code: CS 3030

Subject: Neural Networks & Fuzzy Logic

Duration: 3 hours

Max. Marks: 100

Instructions

- All Questions are compulsory
- The Question paper consists of 2 sections - Part A contains 10 questions of 2 marks each. Part B consists of 5 questions of 16 marks each.
- There is no overall choice. Only Part B question include internal choice.

PART – A

(2 * 10 = 20 Marks)

1. State the following:
 - a. Idempotence property of Fuzzy Sets
 - b. Identity Property of Fuzzy Sets
2. What are the application of neural network.
3. Explain types of neuron activation functions.
4. Explain BAM in detail.
5. Explain Taxonomy of ANN.
6. Differentiate between a crisp set and fuzzy set.
7. State whether the following are true or false:
 - a) $\tilde{A} \cup \tilde{A}^c = X$, if \tilde{A} is defined over crisp set X.
 - b) $\tilde{A} \cap \tilde{A}^c = \phi$

8. Explain fuzzy proposition with suitable example.
9. Explain Bias with the help of suitable example.
10. Explain the dying ReLU problem.

PART – B

(16 * 5 = 80 Marks)

✓
11.a) What is biological network and artificial neural network.

Explain with the help of neat diagram and give differences between them.

OR

b.) What is meant by activation function in an artificial neuron model? Describe the various activation functions that are employed and compare their merits and demerits. Also Explain artificial Neural Network Architecture with its application.

✓
12.a) What do you mean by associative memory? Also, explain its paradigms in detail with the testing and training algorithm.

OR

b) Explain the architecture of Hopfield Network.

13.a) Explain perceptron network training with and without bias by taking suitable examples. Also explain unsupervised learning mechanism in contrast with a supervised learning mechanism.

OR

- ✓ b) Compare the similarities and difference between single layer and multilayer perceptrons and also discuss in what aspects multilayer perceptrons are advantageous over single layer perceptron's.

14.a) Explain defuzzification along with its methods. Discuss its applications.

OR

- ✓ b) Consider two fuzzy subsets of the set $X = \{a, b, c, d, e\}$ referred to as \tilde{A} and \tilde{B} such that

$\tilde{A} = \{(1, a), (0.4, b), (0.3, c), (0.9, d), (0, e)\}$ and $\tilde{B} = \{(0, a), (0.9, b), (0.5, c), (0.3, d), (0.2, e)\}$.

Compute the following:

- $\text{supp}(\tilde{A})$ and $\text{supp}(\tilde{B})$
- $\text{core}(\tilde{A})$ and $\text{core}(\tilde{B})$
- $n(\tilde{A})$ and $n(\tilde{B})$
- $\neg(\tilde{A})$ and $\neg(\tilde{B})$ (complement of fuzzy sets \tilde{A} and \tilde{B})
- $\tilde{A} \cup \tilde{B}$
- $\tilde{A} \cap \tilde{B}$
- $a\tilde{A}$ and $a\tilde{B}$ when $a = 0.5$
- α - cuts of \tilde{A} and \tilde{B} for $\alpha = 0.5$
- $h(\tilde{A})$ and $h(\tilde{B})$
- Which one is a normal fuzzy set?

OR

- ✓ 15.a) . Mr. Garg works in printing industry and lives at faridabad. He gets four different opportunities of job at a time as ANR Printers, SBM, Today and Hemank offset at Rai, Karnal, Rewari and Delhi respectively. These four alternatives are differing in salary, distance from its residency, and stability in job as well as his interest in job.

Job Name	Salary/Month	Interest in Job	Distance (in Miles)	Stability in Job
SBM	20,000 (0.5) ✓	LITTLE (0.4) ✓	380 (0.24) ✓	Permanent (1.0) ✓
ANR Printers	35,000 (0.87) ✓	MODERATE (0.8) ✓	290 (0.42) ✓	Contract (0.5) ✓
Today	15,000 (0.37) ✓	HIGH (1.0) ✓	135 (0.73) ✓	May be Permanent (0.7) ✓
Hemank Offset	30,000 (0.75) ✓	FEW (0.1) ✓	220 (0.56) ✓	Temporary (0.3) ✓

Now the goal of Mr. Garg is to choose better and beneficial job. What will he choose using max-min fuzzy composition?

OR

- b) Explain the step of Genetic Algorithm. Also Explain various types of crossover and mutation techniques