May 2023
B.Tech. (EIC) Re-Appear - VI SEMESTER
Soft Computing (OE-603)

Time: 3 Hours

Max. Marks: 75

Instructions:
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
2. Answer any four questions from Part -B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

PART –A

Q1 (a) What is the difference between Soft Computing and Conventional Artificial (1.5) Intelligence (AI) techniques?

(b) Why are linearly separable problems of interest of neural network (1.5) researchers?

(c) Define Normal and sub-normal fuzzy sets (1.5)

(d) Given that x is sweet with S(x)=0.8 and y is sweet with S(y)=0.6. Find the fuzzy (1.5) value of "If x is Sweet then y is sweet".

(e) What is meant by "fuzziness of Information" ? (1.5)

(f) Suppose a genetic algorithm uses chromosomes of the form x = abcdefgh (1.5) with a fixed length. How many genes will be used in a chromosome of each individual

(g) How are the states of the units in a Hopfield model updated? (1.5)

(h) Consider a 2-input Sigmoidal unit with a bias. Find the weights so that it (1.5) functions as AND gate.

(i) For an image recognition problem (such as recognizing a human in a photo), (1.5) which architecture of neural network has been found to be better suited for the tasks?

(j) Give name of some popular optimization problems that can be solved using (1.5) Genetic algorithms.

PART –B

Q2 (a) Find the result of following interval arithmetic operations: (5)
[1,3].[2,4]
[0,1]-[0,1]

(b) What is meant by partial membership of an element in a fuzzy set ? (5)

(c) What is a Fuzzy lattice? Take a suitable example to show the operations. (5)

Q3 (a) A 3-input neuron is trained to output a zero when the input is 110 and a one (5) when the input is 111. After generalization, the output will be zero when and only when the input is?

(b) A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with (5) the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. What will be the output?

(c) Elaborate on the different Paradigms of Learning (5)

Q4   Write short notes on :   (7)
        Applications of Neural Networks.
        Genetic Algorithms vs Traditional algorithms   (8)

Q5 (a) What are the capabilities of a Single layer associative neural networks?   (7)
        Discuss with few example applications.
   (b) Discuss the analogy between biological and artificial neural network.   (8)

Q6   Consider A(x)={(x1,0.1),(x2,0.2),(x3,0.3),(x4,0.4)}
                  B(x)= {(x1,0.2),(x2,0.3),(x3,0.4),(x4,0.5)} .
   (a) Justify Law of excluded Middle and De-Morgan's law on the above sets.   (7)
   (b) perform the following operations on the above sets.   (8)
   (i) Union, Intersection , A^2 and complement of A(x)
   (ii) The Algebraic sum and the bounded sum of A(x) and B(x)

Q7   Explain the architecture and training algorithm of Back Propagation network.   (15)
                                    OR
        Describe the main feature of Genetic Algorithms (GA) and explain the various
        operators defined for using GA using suitable examples.

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