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B. Tech. (CSE) VIIIth Semester Examination, 2024

MACHINE LEARNING

Paper : CS–8015

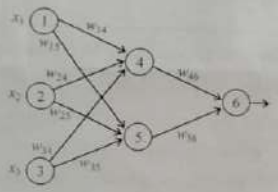
Time : 3 Hours] [*M.M. : 70*

Note :– Answer any *five* questions. All questions carry equal marks.

1. Demonstrate the steps involved in design a learning system with suitable example and neat sketches. How you represent a well-posed learning using the experience E, Task T and Performance P ? [14]

2. How you represent concept learning task ? Demonstrate the concept learning task using the positive and negative training examples for the target concept Enjoy Sport. [14]

3. Figure shows a multilayer feed-forward neural network. Let the learning rate be 0.9. The initial weight and bias values of the network are given in Table, along with the first training tuple, X = (1, 0, 1) with a class label of 1. Given the first training tuple, X. The tuple is fed into the network, and the net input and output of each unit.



Example of a multilayer feed-forward neural network.

Initial input, weight and bias values

x_1	x_2	x_3	w_{14}	w_{15}	w_{24}	w_{25}	w_{34}	w_{35}	w_{46}	w_{56}	θ_4	θ_5	θ_6
1	0	1	0.2	-0.3	0.4	0.1	-0.5	0.2	-0.3	-0.2	-0.4	0.2	0.1

Perform the calculations for backpropagation, net input and output calculations, calculation of the error at each node and calculations for weight and bias updating. [14]

4. Demonstrate decision tree learning algorithm by taking training example for the concept PlayTennis or Buys_Computer using the attribute selection measures of entropy and information and information gain with neat and clean diagram. [14]

5. Explain Bayesian Belief Networks with suitable example and neat sketches. Write down some applications, advantages and disadvantages of the Bayesian belief network. [14]

6. Explain EM algorithm by locating the involved steps and depicting the suitable diagram. Report the applications, merits and demerits of the EM algorithm. [14]

7. Describe Radial Basis Function Network using suitable example and clear diagram. Present steps and functions used for expansion and compression. [14]

8. Identify the three key properties of Instance-Based Learning method. Locate the three components and 4R steps cycle in Case Based Reasoning algorithm by considering the prototypical examples of Help Desk and Mechanical system CADET using the suitable diagrams. [14]

9. Design a simple GA (Genetic Algorithm) for taking any example. Implement with varying population size p, the function r of the population replaced at each generation, and the mutation rate m. [14]

10. Show the program discovered by the GP (Genetic Programming) as a tree. Demonstrate the operation of the GP crossover operator by applying it using two copies of your tree as the two parents. [14]