B.Tech. DEGREE EXAMINATION, JUNE 2023

Fifth / Seventh Semester

18ECE242J - PATTERN RECOGNITION AND NEURAL NETWORKS

(For the candidates admitted during the academic year 2018-2019 to 2021-2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40 minutes.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

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

Part - A (20 × 1 Marks = 20 Marks)
Answer All Questions

		Marks	BL	CO

1. The Euclidean distance between two a set of numerical attributes is called as?   1   2   1
   - (A) Closeness
   - (B) Validation data
   - (C) Error Rate
   - (D) Accuracy

2. Which classifier is not a nonlinear approach in classification?   1   2   1
   - (A) Bayes classifier
   - (B) Neural network
   - (C) Decision tree
   - (D) SVM

3. Which define Type-I error in classification of healthy and patient.   1   2   1
   - (A) The person is healthy but identified as patient
   - (B) The person is healthy and identified as healthy
   - (C) The person is patient and identified as patient
   - (D) The person is patient but identified as healthy

4. The Neyman Pearson classification is a _____ classification that aims to address _____ errors   1   2   1
   - (A) binary, symmetric
   - (B) multi class, symmetric
   - (C) multi class, asymmetric
   - (D) binary, asymmetric

5. Which is correct for Maximum likelihood estimation of parameters   1   2   2
   - (A) Maximum likelihood finds optimum values for the parameters by maximizing a likelihood function derived from the training data
   - (B) Final expression for the desired probability density of the input variable is given by integral over all possible values of the parameters, weighted by their posterior distribution
   - (C) It finds optimum values for the the parameters by maximizing a likelihood function assumed by user
   - (D) Maximum likelihood approach does not involve in setting the parameter to specific value

6. The minimum number of variables / features required to perform clustering is _____.   1   1   2
   - (A) 0
   - (B) 1
   - (C) 2
   - (D) 3

7. Computing the radius and standard deviation of the cluster is used   1   1   2
   - (A) to make the cluster more accurate
   - (B) to merge the clusters
   - (C) to determine its spread in each dimension
   - (D) to find centroid

8. The one-dimensional dataset is X = [12 14 9 1 8 6 3 2 7]. Find the mean using maximum likelihood estimation   1   2   2
   - (A) 6.88
   - (B) 8.66
   - (C) 5.29
   - (D) 9.12

9. Find the algorithm which is used for updating the weight using error in the multilayer perceptron algorithm.   1   1   3
   - (A) Least Mean Square error algorithm
   - (B) Gradient descent method
   - (C) Bayesian algorithm
   - (D) Normalized mean square algorithm

10. Which of the following function is linearly inseparable?   1   1   3
    - (A) AND
    - (B) OR
    - (C) NOR
    - (D) XOR

11. Target is provided, but the desired output is absent. This type of learning method is known as _____   1   1   3
    - (A) Both Unsupervised and Reinforcement learning
    - (B) Reinforcement learning
    - (C) Unsupervised learning
    - (D) Supervised learning

12. The process of adjusting the weight is known as _____.   1   1   3
    - (A) Activation
    - (B) Synchronisation
    - (C) Learning
    - (D) Synapses

13. Identify the architecture in which input training vector and output target vector are not same.   1   2   4
    - (A) Auto associative memory network
    - (B) Hetero associative memory network
    - (C) Hopfield network
    - (D) Both Auto associative memory network and Hopfield network

14. The number of layers present in the forward only counter propagation network are ____.   1   1   4
    - (A) 2
    - (B) 3
    - (C) 4
    - (D) 5

15. Identify the network in which weights of output layers are updated by backpropagation algorithm   1   2   4
    - (A) Multi-adaptive linear neural network
    - (B) Adaptive linear neural network
    - (C) Multilayer neural network
    - (D) Single layer neural network

16. For which other task can boltzman machine be used?   1   2   4
    - (A) Pattern mapping
    - (B) Feature mapping
    - (C) Classification
    - (D) Pattern association

17. What does ART stand for?   1   1   5
    - (A) Automatic Resonance Theory
    - (B) Artificial Resonance Theory
    - (C) Adaptive Resonance Theory
    - (D) Automatic Regression Theory

18. Find the number of output layers needed for recognition digits 0 to 5   1   2   5
    - (A) 9
    - (B) 8
    - (C) 7
    - (D) 6

19. Find the number of nodes in the distance-2 grid of rectangular grid topology.   1   2   5
    - (A) 8
    - (B) 12
    - (C) 16
    - (D) 24

20. Identify the wrong statement for reset module of ART1   1   1   5
    - (A) Fixed connection weights
    - (B) Implements the vigilance test
    - (C) Inhibitory connection from input layer
    - (D) Inhibitory connection from interface layer

Part - B (5 × 4 Marks = 20 Marks)
Answer any 5 Questions

                                                      Marks   BL   CO

21. Define binary Bayes classifier. Write how you will identify class 0 and class 1 using posterior probability.   4   4   1

22. What is the work of loss function? Define zero-one loss function.   4   2   1

23. Present the approaches to estimate the conditional density function.   4   2   2

24. Appraise the sigmoid activation function with necessry diagram.   4   2   3

25. Articulate the training algorithm of auto associative memory.   4   3   4

26. Mind map the Recurrent Neural Network algorithm with necessary diagram.   4   4   4

27. Summarize the reasons and methods of feature selection.   4   2   5

Part - C (5 × 12 Marks = 60 Marks)
Answer All Questions

                                                        Marks   BL   CO

28. a. Explain the minimax criteria by using equation with probability that minimize the maximum possible overall risk.   12   4   1
    (OR)
    b. i. Appraise the possible viewpoints for non-linear classifier. [6 Marks]
    ii. Elaborate overall risk for a two category classification example. [6 Marks]

29. a. i. Construct the algorithm for the multilayer perceptron architecture. [6 Marks]   12   1   2
    ii. Explain 4 different techniques to measure the distance between 2 clusters. [6 Marks]
    (OR)
    b. Assume, we have a text collection D of 900 documents from 3 topics science, sports and politics. Each class has 300 documents. Each document in D is labeled with one of the topics. We use this collection to perform clustering to find 3 groups. Note that class labels are not used in clustering. Calculate entropy, purity for each and overall clusters to measure the effectiveness of the clustering algorithm.

Cluster	Science	Sports	Politics
1	250	20	10
2	20	180	80
3	30	100	210
Total	300	300	300

30. a. Evaluate the updated weights using Hebb rule with target created by AND gate and AND NOT gate.   12   4   3
    (OR)
    b. i. Explain error correction learning and memory-based learning [6 Marks]
    ii. Explain McCullon Pitt Neuron OR function with neat diagram [6 Marks]

31. a. Calculate the weight 'M' for bidirectional associative memory, if we wish to store 2 association A1: B1 and A2: B2.   12   5   4
    A1=(1,1,1,0,1,0) B1=(1,1,0,1) A2=(1,1,1,0,1,0) B2=(1,0,1,1)
    (OR)
    b. i. For an auto associative memory network if input is [1 1 -1 -1], Calculate the weights and output. [6 Marks]
    ii. Illustrate the architecture of Boltzmann machine. [6 Marks]

32. a. Summarize Linear Vector Quantization architecture with necessary diagrams and flow chart. Write the LVQ algorithm.   12   2   5
    (OR)
    b. Demonstrate the character recognition by using neural network with neat diagrams. Explain how digit '1' and '2' can be recognized using neural network.

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