Question Paper

Exam Date & Time: 31-Dec-2022 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

VII SEMESTER B.TECH MAKEUP EXAMINATIONS, DEC JAN 2023

Pattern Recognition [BME 4068]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)		State the Bayesian Theorem for a K-class problem with d-features when the features are continuous type. Discuss how to design a rule based on likelihood ratio.	(3)
	A)		
	B)	The fasting blood sugar level measured in mg/dL for the group of patients (referred as G1) are given as : 104, 108, 111,117,119, 121, 122,123125,125,126,129. The other group (G2) had sugar measurement as: 88, 89,91, 93,95,95,96, 96,97,99,100,103. Draw histogram with a step size of five. Find an optimal decision boundary between classes and test the following sample 102.	(4)
	C)	The feature " x" is normally distributed for class A, with a mean of 72 and a standard deviation of 3. The class-2 is also normally distributed with a mean of 100 standard deviation of 5. Test the given sample with x=95, by estimating P(A|x=95). Given P(A)=P(B).	(3)
2)		The feature "x" is normally distributed for class-A and class-B. Their prior probabilities are P (A) and P (B) respectively 0.5. If the classes are described as:	(4)
	A)	class-A : Mean value of x is 10, and standard deviation of 3. class-B: Mean value of x is 20, and standard deviation of 2. Find the equation of the optimal decision boundary between the two classes for test sample " x=17".	
	B)	Design an complete linkage algorithm for discovering 3 for the given N samples	(3)
	C)	Given: Cluster C1= {(5,25), (7, 22)} ; Cluster C2= {(9,20), (10,21)}. Calculate following cluster distances between clusters: a. Single linkage distance; b. complete linkage diatnce Note: For the estimation of the sample distance use city block distance	(3)
3)		Compare the artificial neuron and biological neuron	(3)
	A)		
	B)	Realise as OR gate function using a basic McCulloch-Pitts Neuron model. Draw the neuron diagram and test it with an input vector X= [1 1]T	(3)
	C)	Explain the training algorithm of a Back propagation network with appropriate weight updating rules.	(4)
4)		Develop K-Means algorithm with the following samples: (7,20), (8,22), (9,24) ,(9,25) the discover of the clusters	(4)
	A)		
	B)	Given input vector (X) = [1 1 1]T, weight (W) = [w1 w2 w3] = [0.4 -0.2 0.7]. The threshold is 0.5. Find the artificial neuron response.	(3)
	C)	Explain a various important stages need to be emphasised during the design of a classifier for automating healthcare system	(3)
5)		Explain arrhythmia classification system using ECG pattern as input.	(4)

A)

B) How performance of classifier are evaluated ?.Explain. (3)

C) Given the classifier designed for screening patients is tested with a group of 500 samples. Among true positive samples and true negative sample s are respectively 230 and 240. False positive and False negative are respectively 18 and 12. Calculate the Accuracy, sensitivity, and specificity. (3)

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