U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Programme: B.E. **Semester: VI**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 20CS6PCMAL **Max Marks: 100**
Course: Machine Learning **Date: 05.07.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			CO	PO	Marks
		UNIT - I			
1	a)	Analyze the following learning problem and write task T, Performance measure P and Training experience E. a. Face Recognition Problem b. Handwriting Recognition	CO2	PO2	**5**
	b)	List and explain the perspectives in Machine Learning.	CO1	PO1	**5**
	c)	Write Find-S algorithm for finding a maximally specific hypothesis by taking enjoy sport concept and training instances given below. Explain the same.	CO1	PO1	**10**

sky	airtemp	humidity	wind	water	forcast	Enjoy sport
sunny	warm	normal	strong	warm	same	yes
sunny	warm	high	strong	warm	same	yes
rainy	cold	high	strong	warm	change	no
sunny	warm	high	strong	cool	change	yes

		OR			
2	a)	List and explain the issues in Machine Learning.	CO1	PO1	**5**
	b)	Write algorithm for decision tree learning.	CO1	PO1	**5**
	c)	List and explain the steps involved in designing a learning system.	CO1	PO1	**10**
		UNIT - II			
3	a)	Suppose you test a hypothesis h and find that it commits r = 30 errors on a sample S of n = 300 randomly drawn test examples. What is the standard deviation in error s (h)?	CO1	PO1	**5**
	b)	Analyze the differentiate between True error and Sample error.	CO2	PO2	**5**
	c)	Consider a learned hypothesis, h, for some Boolean concept. When h is tested on a set of 1000 examples, it classifies 85 correctly. What is the standard deviation and the 95% confidence interval for the true error rate for Error D (h)?	CO1	PO1	**10**

			UNIT - III			
	4	a)	Critically assess the limitations of the Expectation-Maximization (EM) algorithm in machine learning.	*CO2*	*PO2*	**5**
		b)	How does the maximum likelihood estimation approach work in machine learning?	*CO1*	*PO2*	**5**
		c)	Mention a classifier applied to learning tasks where each instance x is described by a conjunction of attribute values and where the target function f (x) can take on any value from some finite set. Explain the same with an example.	*CO2*	*PO2*	**10**
			OR			
	5	a)	Describe the following probability rules: i. Sum rule ii. Product rule iii. Baye's Theorem iv. Total Probablity Theorem	*CO2*	*PO2*	**5**
		b)	Prove that $\mathbf{h_{MAP}=h_{MDL}}$	*CO1*	*PO1*	**10**
		c)	Why Gibbs algorithm is better over Bayesian Optimal Classifier?	*CO2*	*PO2*	**5**
			UNIT - IV			
	6	a)	Compare Locally Weighted Regression with Linear Regression in machine learning.	*CO2*	*PO2*	**5**
		b)	List out the limitations of Radial Basis Functions in machine learning.	*CO1*	*PO1*	**5**
		c)	Apply K-nearest neighbor algorithm for the following dataset to classify the new example into one of the given target label species with K=6	*CO1*	*PO1*	**10**

New example is:

Sepal Length	Sepal Width	Species
7.3	3.1	**?**

Dataset is:

Sepal Length	Sepal Width	Species
5.3	3.7	Setosa
5.1	3.8	Setosa
7.2	3.0	Virginica
5.4	3.4	Setosa
5.1	3.3	Setosa
5.4	3.9	Setosa
7.4	2.8	Virginica
6.1	2.8	Vercicolor
7.3	2.9	Virginica
6.0	2.7	Vercicolor
5.8	2.8	Virginica
6.3	2.3	Vercicolor
5.1	2.5	Vercicolor
6.3	2.5	Vercicolor
5.5	2.4	Vercicolor

			UNIT - V			
	7	a)	Write sequential covering algorithm for learning disjunctive set of rules.	*CO1*	*PO1*	**6**
		b)	Summarise the Learning Rule Sets.	*CO1*	*PO1*	**6**
		c)	Write the basic FOIL algorithm.	*CO1*	*PO1*	**8**

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