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: Mechanical Engineering   **Duration: 3 hrs.**
Course Code: 20ME6DEMCL   **Max Marks: 100**
Course: Machine Learning   **Date: 19.07.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
3. Draw relevant diagrams/graphs and give equations wherever necessary.

			UNIT - I	**CO**	**PO**	**Marks**
1	a)		Discuss any two applications and two issues in machine learning.	CO1	PO1	**04**
	b)		How you choose training experience and target function in designing a learning system. Give the representation of target function with checkers example.	CO1	PO1	**10**
	c)		Explain, what is final design in designing a learning system.	CO1	PO1	**06**
			OR			
2	a)		Consider the following data set having the data of cars manufacturing and identify the final hypothesis using Find-S algorithm.	CO1	PO2	**06**
	b)		Explain Candidate Elimination algorithm with example given below:	CO1	PO2	**08**
	c)		Explain in detail the Inductive Bias of Candidate Elimination algorithm.	CO2	PO1	**06**

Question 2 a) table:

Origin	Manufacturer	Color	Decade	Design	Type
Japan	Honda	Blue	1980	Economy	Positive
Japan	Toyota	Green	1970	Sports	Negative
Japan	Toyota	Blue	1990	Economy	Positive
USA	Chrysler	Red	1980	Economy	Negative
Japan	Honda	White	1980	Economy	Positive
Japan	Toyota	Green	1980	Economy	Positive
Japan	Honda	Red	1990	Economy	Negative

Question 2 b) table:

Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

			UNIT - II			
3	a)	Consider the training examples shown below for a binary classification problem.

Instance	a_1	a_2	a_3	**Target Class**
1	T	T	1	+
2	T	T	6	+
3	T	F	5	−
4	F	F	4	+
5	F	T	7	−
6	F	T	3	−
7	F	F	8	−
8	T	F	7	+
9	F	T	5	−

(i) What is the entropy of this collection of training examples with respect to the positive class?

(ii) What are the information gains of a_1 and a_2 relative to these training examples?

(iii) For a_3, which is a continuous attribute, compute the information gain for every possible split. | CO3 | PO2 | **12** |
	b)	What is perceptron? Derive the Gradient Descent Rule.	CO2	PO1	**08**
			UNIT - III			
4	a)	Define Bayesian theorem? Mention any two features of Bayesian Learning?	CO2	PO1	**04**
	b)	Discuss Maximum Likelihood and Least Square Error Hypothesis.	CO2	PO1	**08**
	c)	Consider a mechanical diagnosis problem in which there are two alternative hypotheses: (i) that the part has a particular form of defect (+) and (ii) that the part does not (-). A part is taken for a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the defect is actually present, and a correct negative result in only 97% of the cases in which the defect is not present. Furthermore, 0.8% of the entire parts manufactured have this defect. Determine whether the part has defect or not using MAP hypothesis.	CO3	PO2	**08**
			OR			
5	a)	Explain the concept of Naïve Bayes Classifier.	CO2	PO1	**04**
	b)	Explain Bayesian belief network and conditional independence with example.	CO2	PO1	**08**
	c)	Explain the concept of Expectation-Maximization (EM) Algorithm with help of Gaussian Mixtures.	CO2	PO1	**08**

			UNIT - IV			
	6	a)	List two advantages and two disadvantages of instance-based learning.	*CO1*	*PO1*	**04**
		b)	Explain the k-nearest neighbour algorithm for approximating a discrete-valued function, $f: \mathbb{R}^n \to V$.	*CO4*	*PO1*	**08**
		c)	With an example explain the working of CADET System.	*CO4*	*PO1*	**08**
			UNIT - V			
	7	a)	Describe the different types of crossovers and mutation in Genetic algorithm with examples.	*CO5*	*PO1*	**08**
		b)	Explain, different types of selection in Genetic algorithm.	*CO5*	*PO1*	**04**
		c)	Write a note on following: (i) Lamarckian Evolution (ii) Baldwin Effect in Genetic algorithm.	*CO5*	*PO1*	**08**

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