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FIFTH/ SEMESTER B.Tech. (ALL)

MID SEMESTER EXAMINATION September-2023

IT-323 MACHINE LEARNING

Time: 1:30 Hours *Max. Marks: 20*

Note: Attempt all questions.
Assume suitable missing data, if any.

Question No. 1 [CO1]

[a] What is the definition of machine learning given by Tom Mitchel? With suitable example.

[b] Describe the various steps involved in machine leaning system, and differentiate between supervised, unsupervised and reinforcement learning in one line answer.

Question No. 2 [CO2]

[a] Consider a case where 70% of Machine Learning (ML) students pass the End Term Examination (ETE) and 50% of ML students pass both the ETE and Mid Term Examination (MTE). Find the % of students who passed in ETE and also passed in MTE. [2]

[b] The data set given as $X_1=[1,2]^T$, $X_2=[2,2]^T$, $X_3=[3,2]^T$, $X_4=[3,1]^T$, Compute the mean and covariance of data vector X. [2]

Question No. 3 [CO2]

Consider a machine learning model that uses a gradient descent optimization to the optimized weight, where the cost function is $J(\theta) = \theta^2 - 1$, the initial value of the parameter is 4 and the learning rate is 0.1. Find the value of the parameter at 5^{th} iteration and also the value of the cost function.

Question No. 4 [CO3]

Consider a dataset that represents the relationship between the number of hours spent on studying and the exam score obtained for a class on machine learning in a

day. You need to build a simple linear regression model to predict exam score based on the number of hours studied.

Hours Studied	Exam Score
2	70
3	75
4	80
5	85
6	90
7	95

[a] Find the simple linear regression model for the above dataset. [2]
[b] Predict the score of a student who used to study 8 hours a day. [1]
[c] Comment on the quality of the model using coefficient of determination. [1]

Question No. 5 [CO4]

A machine learning classifier classifies the four animals (CAT, DOG, DEER and RABBIT) is as given in below in confusion matrix.

		Predicted Values			
		CAT	DOG	DEER	RABBIT
Actual Values	CAT	150	15	10	25
	DOG	15	160	12	13
	DEER	6	8	180	6
	RABBIT	30	15	5	150

Determine the followings: [1x4=4]

[a] Over all accuracy
[b] Precision for Class CAT
[c] Recall for Class DOG
[d] F1-Score for Class DEER