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

Autonomous Institute Affiliated to VTU

August 2024 Supplementary Examinations

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

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

UNIT - I

1 a) Consider the Japan Economy Car Concept and instance given below identify the hypothesis using Candidate-Elimination Learning Algorithm **10**

Origin	Manufacturer	Color	Decade	Type	Economy
Japan	Honda	Blue	1980	Economy	Positive
Japan	Toyoto	Green	1970	Sports	Negative
Japan	Toyoto	Blue	1990	Economy	Positive
USA	Chryler	Red	1980	Economy	Negative
Japan	Honda	White	1980	Economy	Positive

b) Define Machine Learning. Mention five applications of ML **5**

c) Discuss Tasks, Performance and Experience component of any concept of learning task with an example **5**

OR

2 a) Construct decision tree to represent the following Boolean function **9**

i. A && !B
ii A XOR B
iii A∨[B&&C]

b) Consider the Enjoy Sport Concept and instance given below, identify the specific hypothesis using FIND-S Algorithm **6**

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

c) Specify the learning task for 'A checkers learning problem' **5**

UNIT - II

3 a) Suppose we measure the sample errors for h1 and h2 using two independent samples S1 and S2 of size 100 and find that errors1(hl) = 0.40 and errors2(h2) =0.30, analyze this setting and answer the question "what is the probability that $error_D(h1) > error_D(h2)$?" **5**

b) Estimate the difference between the true errors of two hypothesis h1 and h2. Use the general approach for deriving the confidence interval for d. What is the probability distribution governing the random variables? Obtain the approximate variance of each distribution. **10**

c) Consider a learned hypothesis, h, for some boolean concept. When h is tested on a set of 200 examples, it classifies 83 correctly. What is the standard deviation and the 95% confidence interval for the true error rate for $Error_D(h)$? **5**

UNIT - III

4 a) Consider a medical diagnosis problem in which there are two alternative hypotheses: **10**

1. that the patient has a particular form of cancer (+) and
2. That the patient does not (-).

A patient takes 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 disease is actually present, and a correct negative result in only 97% of the cases in which the disease is not present. Furthermore, .008 of the entire population have this cancer. Determine whether the patient has Cancer or not using MAP hypothesis

b) Explain Bayesian belief network and conditional independence with example **10**

OR

5 a) The following table gives data set about stolen vehicles. Using Naive Bayes classifier classify the new data {Color: Red, Type: SUV, Origin: Domestic} **10**

COLOR	TYPE	ORIGIN	STOLEN
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Imported	Yes
Yellow	SUV	Imported	No
Yellow	SUV	Imported	Yes
Yellow	SUV	Domestic	No
Red	SUV	Imported	No
Red	Sports	Imported	Yes

b) Explain the concept of EM algorithm. Discuss what are Gaussian Mixtures **10**

UNIT - IV

6 a) Consider below dataset which describes **8**

Restaurant A sells burgers with optional flavors: Pepper, Ginger and Chilly. Every day this week you have tried a burger (A to E) and kept a record of which you liked.

Show how 3NN classifier with majority voting would classify a given new instance as given below

{pepper: false, ginger: true, chilly: true}

	Pepper	Ginger	Chilly	Liked
	True	True	True	False
	True	False	False	True
	False	True	True	False
	False	True	False	True
	True	False	False	True

b) Discuss the difference between lazy and eager learning algorithms. **5**

c) Discuss Radial basis function with an example. **7**

UNIT - V

7 a) Explain the sequential covering algorithm with example. **10**

b) Describe FOIL algorithm and mention the difference between Propositional Rule learning approach and FOIL. **10**

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