CBCS SCHEME

Fifth Semester MCA Degree Examination, Feb./Mar. 2022
Machine Learning

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. What do you mean by a well – posed learning problem? Explain the important features that are required to well – define a learning problem. **(10 Marks)**

   b. Elaborate the design choices of choosing the training experience and choosing the target function while designing a learning system. **(10 Marks)**

OR

2 a. Illustrate find – S algorithm over Enjoy Sport Concept Training instances are given below :

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

(10 Marks)

   b. Define Concept and Concept learning. Explain how the concept learning task determines the Hypothesis for given target concept. **(10 Marks)**

Module-2

3 a. List the advantages of Decision Tree Representation. Which problems are appropriate for Decision Tree Learning? **(10 Marks)**

   b. Present the ID_3 algorithm for Decision Tree Learning. **(10 Marks)**

OR

4 a. Consider the following set of training examples :
   i) What is the entropy of this collection of training examples with respect to the target function classification?
   ii) What is the Information gain of a 2 relative to these training example? **(10 Marks)**

Instance	Classification	a_1	a_2
1	+	T	T
2	+	T	T
3	-	T	F
4	+	F	F
5	-	F	T
6	-	F	T

   b. Define Overfitting. How to avoid overfitting? **(10 Marks)**

Module-3

5 a. Explain in detail about the problems appropriate for neural network learning and why? **(10 Marks)**

   b. Define Perceptron. Explain the concept of Single perceptron, with neat diagram. **(10 Marks)**

OR

6 a. Present the Back propagation algorithm for feed forward networks containing two layers of sigmoid units. **(10 Marks)**

   b. Discuss the Perceptron training rule and Delta rule that solves the learning problem of perceptron. **(10 Marks)**

Module-4

7 a. What is Bayes theorem and Maximum posterior hypothesis? **(04 Marks)**

   b. Derive an equation for MAP hypothesis using Bayes theorem. **(06 Marks)**

   c. Consider a football game between two rival team : Team 0 and Team1. Suppose Team 0 wins 65% of the time and Team 1 wins the remaining matches. Among the games won by Team 0, only 30% of them come from playing on Team 1's football field. On the other hand, 75% of the victories for Team 1 are obtained while playing at home. If team 1 is to host the next match between the two teams, which team will most likely emerge as the winner? **(10 Marks)**

OR

8 a. Describe Brute – Force MAP learning algorithm. **(06 Marks)**

   b. Discuss the Naïve Bayes classifier. **(04 Marks)**

   c. The following table gives data set about stolen vehicles. Using Naïve Bayes classifier classify the new data (Red , SUV , Domestic).

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

(10 Marks)

Module-5

9 a. Write short notes on the following :
   i) Estimating Hypothesis accuracy   ii) Binomial distribution. **(10 Marks)**

   b. Discuss the method of comparing two algorithms. Justify with Paired to – tests method. **(10 Marks)**

OR

10 a. Write in detail about the K – Nearest Neighbor algorithm and its approach to perform classification. **(10 Marks)**

   b. Discuss the learning tasks and Q – learning in the context of reinforcement learning. **(10 Marks)**

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