USN | | | | | | | | | | |

15CS73

Seventh Semester B.E. Degree Examination, June/July 2024
Machine Learning

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. What do you mean by well-posed learning problem? Explain with example. **(04 Marks)**
   b. Explain the various stages involved in designing a learning system in brief. **(08 Marks)**
   c. Write Find_S algorithm and discuss the issues with the algorithm. **(04 Marks)**

OR

2 a. List the issues in machine learning. **(04 Marks)**
   b. Consider the given below training example which finds malignant tumors from MRI scans.

Example	Shape	Size	Color	Surface	Thickness	Target concept
1	Circular	Large	Light	Smooth	Thick	Malignant
2	Circular	Large	Light	Irregular	Thick	Malignant
3	Oval	Large	Dark	Smooth	Thin	Benign
4	Oval	Large	Light	Irregular	Thick	Malignant
5	Circular	Small	Light	Smooth	Thick	Benign

Show the specific and general boundaries of the version space after applying candidate elimination algorithm. (Note: Malignant is +ve, Benign is –ve). **(08 Marks)**
   c. Explain the concept of inductive bias in brief. **(04 Marks)**

Module-2

3 a. What is a decision tree and discuss the use of decision tree for classification purpose with an example. **(08 Marks)**
   b. Write and explain decision tree for the following transactions :

Tid	Refund	Martial status	Taxable Income	Cheat
1	Yes	Single	125 K	No
2	No	Married	100 K	No
3	No	Single	70 K	No
4	Yes	Married	120 K	No
5	No	Divorced	95 K	Yes
6	No	Married	60 K	No
7	Yes	Divorced	220 K	No
8	No	Single	85 K	Yes
9	No	Married	75 K	No
10	No	Single	90 K	Yes

(08 Marks)

OR

4 a. For the transaction shown in the table compute the following :
   (i) Entropy of the collection of transaction records of the table with respect to classification.
   (ii) What are the information gain of a_1 and a_2 relative to the transactions of the table? **(08 Marks)**

Instance	1	2	3	4	5	6	7	8	9
a_1	T	T	T	F	F	F	F	T	F
a_2	T	T	F	F	T	T	F	F	T
Target class	+	+	-	+	-	-	-	+	-

   b. Discuss the decision learning algorithm. **(04 Marks)**
   c. List the issues of decision tree learning. **(04 Marks)**

Module-3

5 a. Define perceptron. Explain the concept of single perceptron with neat diagram. **(06 Marks)**
   b. Explain the back propagation algorithm. Why is it not likely to be trapped in local minima? **(10 Marks)**

OR

6 a. List the appropriate problems for neural network learning. **(04 Marks)**
   b. Discuss the perceptron training rule and delta rule that solves the learning problem of perceptron. **(08 Marks)**
   c. Write a remark on representation of feed forward networks. **(04 Marks)**

Module-4

7 a. What is Bayes theorem and maximum posterior hypothesis? **(04 Marks)**
   b. Derive an for MAP hypothesis using Bayes theorem. **(04 Marks)**
   c. Consider a football game between two rival teams : Team 0 and Team 1. Suppose Team 0 wins 95% 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 teams 1's football field. On the otherhand, 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? **(08 Marks)**

OR

8 a. Describe Brute-force MAP learning algorithm. **(04 Marks)**

   b. Discuss the Naïve Bayees classifier. **(04 Marks)**
   c. The following table gives data set about stolen vehicles. Using Naïve bayes classifier classify the new data (Red, SUV, Domestic)

Table

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

(08 Marks)

Module-5

9 a. Explain locally weighted linear regression. (08 Marks)
   b. What do you mean by reinforcement learning? How reinforcement learning problem differs from other function approximation tasks. (05 Marks)
   c. Write down Q-learning algorithm. (03 Marks)

OR

10 a. What is instance based learning? Explain K-Nearest neighbour algorithm. (08 Marks)
    b. Explain sample error, true error, confidence intervals and Q-learning function. (08 Marks)

* * * * *