15CS73

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Machine Learning

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. Specify the learning task for 'A checkers learning problem'.   **(03 Marks)**
   b. Discuss the following with respect to the above,
      (i)   Choosing the training experience.
      (ii)   Choosing the target function and
      (iii) Choosing a function approximation algorithm.   **(09 Marks)**
   c. Comment on the issues in machine learning.   **(04 Marks)**

OR

2 a. Write candidate elimination algorithm. Apply the algorithm to obtain the final version space
      for the training example.   **(10 Marks)**

Sl. No.	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

   b. Discuss about an unbiased Learner.   **(06 Marks)**

Module-2

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

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

OR

4 a. For the transactions 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)**

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Module-3

5 a. Draw the perceptron network with the notation. Derive an equation of gradient descent rule to minimize the error. **(08 Marks)**

   b. Explain the importance of the terms : (i) Hidden layer (ii) Generalization (iii) Overfitting (iv) Stopping criterion **(08 Marks)**

OR

6 a. Discuss the application of Neural network which is used for learning to steer an autonomous vehicle. **(06 Marks)**

   b. Write an algorithm for back propagation algorithm which uses stochastic gradient descent method. Comment on the effect of adding momentum to the network. **(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. **(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) **(08 Marks)**

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

Module-5

9 a. Write short notes on the following:
   (i) Estimating Hypothesis accuracy.
   (ii) Binomial distribution. **(08 Marks)**

   b. Discuss the method of comparing two algorithms. Justify with paired to tests method. **(08 Marks)**

OR

10 a. Discuss the K-nearest neighbor language. **(04 Marks)**

   b. Discuss locally weighted Regression. **(04 Marks)**

   c. Discuss the learning tasks and Q learning in the context of reinforcement learning. **(08 Marks)**