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15CS73

Seventh Semester B.E. Degree Examination, June/July 2019
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. Define machine learning. Describe the steps in designing learning system. **(08 Marks)**

b. Write Find-S algorithm and explain with example. **(04 Marks)**

c. Explain List-Then-Eliminate algorithm. **(04 Marks)**

OR

2 a. List out any 5 applications of machine learning. **(05 Marks)**

b. What do you mean by hypothesis space, instance space and version space? **(03 Marks)**

c. Find the maximally general hypothesis and maximally specific hypothesis for the training examples given in the table using candidate elimination algorithm. **(08 Marks)**

Day	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

Module-2

3 Construct decision tree for the following data using ID3 algorithm.

Day	A1	A2	A3	Classification
1	True	Hot	High	No
2	True	Hot	High	No
3	False	Hot	High	Yes
4	False	Cool	Normal	Yes
5	False	Cool	Normal	Yes
6	True	Cool	High	No
7	True	Hot	High	No
8	True	Hot	Normal	Yes
9	False	Cool	Normal	Yes
10	False	Cool	High	No

(16 Marks)

OR

4 a. Explain the concept of decision tree learning. Discuss the necessary measure required to select the attributes for building a decision tree using ID3 algorithm. **(08 Marks)**

b. Discuss the issues of avoiding over fitting the data, handling continuous data and missing values in decision trees. **(08 Marks)**

Module-3

5 a. Explain artificial neural network based on perception concept with diagram. **(06 Marks)**

b. What is gradient descent and delta rule? Why stochastic approximation to gradient descent is needed? **(04 Marks)**

c. Describe the multilayer neural network. Explain why back propagation algorithm is required. **(06 Marks)**

OR

6 a. Derive the back propagation rule considering the output layer and training rule for output unit weights. **(08 Marks)**

b. What is squashing function 3 why is it needed? **(04 Marks)**

c. List out and explain in briefly representation power of feed forward networks. **(04 Marks)**

Module-4

7 a. Explain maximum a posteriori (MAP) hypothesis using Bayes theorem. **(06 Marks)**

b. Estimate conditional probabilities of each attributes {colour, legs, height, smelly} for the species classes: {M, H} using the data given in the table. Using these probabilities estimate the probability values for the new instance – (Colour = Green, Legs = 2, Height = Tall and Smelly = No) **(10 Marks)**

No	Colour	Legs	Height	Smelly	Species
1	White	3	Short	Yes	M
2	Green	2	Tall	No	M
3	Green	3	Short	Yes	M
4	White	3	Short	Yes	M
5	Green	2	Short	No	H
6	White	2	Tall	No	H
7	White	2	Tall	No	H
8	White	2	Short	Yes	H

OR

8 a. Explain Naive Bayes classifier and Bayseian belief networks. **(10 Marks)**

b. Prove that how maximum likelihood (Bayesian learning) can be used in any learning algorithms that are used to minimize the squared error between actual output hypothesis and predicted output hypothesis. **(06 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)**

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