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Fifth Semester MCA Degree Examination, July/August 2021 Machine Learning

Max. Marks: 100

Note: Answer any FIVE full questions.

- 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. Define learning program for a given problem. Describe the following problems with respect to Tasks, performance and Experience.
 - i) Checkers learning problems
 - ii) Handwritten recognition problem
 - iii) Robot driving learning problem. (10 Marks)

- 2 a. Define concept and concept learning. With example explain how the concept learning task determines the Hypothesis for given target concept. (10 Marks)
- b. Illustrate find S algorithm over EnjoySport concept. Training instances 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)

- 3 a. Explain the concept of decision tree learning. Discuss the necessary measure required to select the attribute for building a decision tree using ID3 algorithm. (10 Marks)
- b. Consider the following set of training examples:
 - i) What is the entropy of this collection of training example with respect to the target function classification?
 - ii) What is the information gain of A_2 relative to these training examples?

Instance	Classification	A_1	A_2
1	+	T	T
2	+	T	T
3	-	T	F
4	+	F	F
5	-	F	T
6	-	F	T

(10 Marks)

- 4 a. Discuss Inductive Bias in Decision Tree learning. Differentiate between two types of biases. Why prefer short Hypotheses? (10 Marks)
- b. What are issues in decision tree learning? Explain briefly how we can overcome. (10 Marks)
- 5 a. Define perception. Explain the concept of single perceptron with neat diagram. (10 Marks)
- b. Explain the back propagation algorithm. Why is it not likely to be trapped in local minima? (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 6 a. Discuss the perception training rule and delta rule that solves the learning problem of perception. (10 Marks)
- b. List the appropriate problems for neural network learning. (05 Marks)
- c. Write a note on representation of feed forward networks. (05 Marks)
- 7 a. Explain Naive Bayes classifier with an example. (10 Marks)
- b. The following table gives data set about stolen vehicles. Using Naive Bayes classifier classify the new data {Color: Red, Type: SUV, Origin: 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

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- (10 Marks)
- 8 a. Explain Bayesian belief network and conditional independence with example. (10 Marks)
- b. Define Bayesian theorem. What is the relevance and features of Bayesian theorem? (10 Marks)
- 9 a. Explain locally weighted linear regression. (10 Marks)
- b. What are instance based learning? Explain key features and disadvantages of these methods. (10 Marks)
- 10 a. Explain k-nearest neighbor learning algorithm. (10 Marks)
- b. Explain sample error, true error, confidence intervals and Q-learning function. (10 Marks)
