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18EC745

## Seventh Semester B.E. Degree Examination, Feb./Mar. 2022 Machine Learning with Python

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Identify the basic design issues and approaches to machine learning. (10 Marks)
- b. Consider the Enjoysport concept and instances given below. Identify the general and specific hypothesis using candidate – Elimination learning algorithm.

Instance	Sky	Air Temp	Humidity	Wind	Water	Fore cost	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)

**OR**

- 2 a. Illustrate the candidate elimination algorithm with suitable example. (10 Marks)
- b. Explain the following terms : (10 Marks)
  - i) Version space
  - ii) Concept learning
  - iii) General boundary, G
  - iv) Specific boundary, S
  - v) LMS weight update rule.

### Module-2

- 3 a. Identify appropriate problems for decision tree learning. (06 Marks)
- b. Calculate Information gain of attribute “wind” for the given context.  
Let values (wind)= {weak, strong}  
 $S = [9+, 5-]$   
 $S_{\text{weak}} = [6+, 2-]$   
 $S_{\text{strong}} = [3+, 3-]$  (08 Marks)
- c. Write a python program for decision tree classifier. (06 Marks)

**OR**

- 4 a. Explain inductive bias in decision tree learning. (04 Marks)
- b. Explain the impact of reduced error pruning on the accuracy of the decision tree. (06 Marks)
- c. Build decision trees to represent the following Boolean functions : (10 Marks)
  - i) A XOR B
  - ii) A &&  $\neg$  B.

### Module-3

- 5 a. Derive an expression for Gradient descent rule. (06 Marks)
- b. Explain how a single perceptron can be used to represent AND Boolean function. (08 Marks)
- c. Identify the issues in Gradient descent algorithm. (06 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.



OR

- 6 a. Derive back propagation rule considering training rule for output unit weights. (10 Marks)  
b. What Artificial Neural Network? Explain appropriate problems for Neural network learning with its characteristics. (10 Marks)

**Module-4**

- 7 a. Explain Baye's Theorem maximum likelihood hypothesis. (10 Marks)  
b. Identify how maximum likelihood hypothesis can be used for predicting probabilities. (10 Marks)

OR

- 8 a. Explain Naïve Baye's classifier with an example. (08 Marks)  
b. 8% of the entire population has a particular types of cancer. The medical screening test return a current positive result in 98% of the cases in which the disease is actually present and a correct negative result in 97% of the cases in which disease is not present. Determine whether the patient has cancer or not using MAP hypothesis. (10 Marks)  
c. List two practical difficulties in applying Bayesian methods. (02 Marks)

**Module-5**

- 9 a. List out the advantages and disadvantages of Instance based learning. (06 Marks)  
b. Explain the Q function and Q learning algorithm assuming deterministic rewards and actions with example. (10 Marks)  
c. Briefly explain Binomial distribution. (04 Marks)

OR

- 10 a. Explain Reinforcement learning problem characteristics. (06 Marks)  
b. Define the following terms :  
i) Estimation bias  
ii) Variance  
iii) Standard deviation. (06 Marks)  
c. Explain CADET system using Case Based Reasoning (CBR). (08 Marks)

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