18EC745

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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 :
        i)   Version space
        ii)   Concept learning
        iii) General boundary, G
        iv)   Specific boundary, S
        v)   LMS weight update rule.   **(10 Marks)**

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}
         $S = [9+, 5-]$
         $S_{weak} = [6+, 2-]$
         $S_{strong} = [3+, 3-]$ **(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 :
         i) A XOR B   ii) A && $\neg$ 8.   **(10 Marks)**

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)**

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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