B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2022 Supplementary Examinations

Programme: B.E.
Branch: Computer Science and Engineering
Course Code: 20CS6PCMAL
Course: Machine Learning

Semester: VI
Duration: 3 hrs.
Max Marks: 100
Date: 26.09.2022

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Describe the following learning problem and write task T, Performance measure P and Training experience E.　　　　5

    i) A Robot Driving Learning Problem
    ii) Face Recognition Problem

  b) List and explain the perspective and issues in machine learning.　　　　5

  c) Write Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples. Explain with an example.　　　　10

OR

2 a) Write the algorithm used to classify instance by sorting them down the tree from the root to some leaf node and then returning the classification associated with this leaf. Give an example for binary classification using the same algorithm.　　　　10

  b) List and explain the steps involved in designing a learning system.　　　　10

UNIT - II

3 a) Suppose you test a hypothesis h and find that it commits r = 250 errors on a sample S of n = 2500 randomly drawn test examples. What is the standard deviation in error s (h)?　　　　5

  b) Analyze the differentiate between True error and Sample error.　　　　5

  c) Write the procedure to estimate the difference in error between two learning methods.　　　　10

UNIT – III

4 a) Analyze relationship between the maximum likelihood hypothesis and the least-squared error hypothesis, in Bayesian learning　　　　10

  b) List the applications of EM algorithm along with its advantages and disadvantages. Write the steps involved in EM iterations and explain the same.　　　　10

<div align="center">**OR**</div>

5 a) Prove that every MAP hypothesis produced Minimum Description Length for a given dataset (h_{MAP}=h_{MDL}).   **10**

b) Mention a classifier applied to learning tasks where each instance x is described by a conjunction of attribute values and where the target function f (x) can take on any value from some finite set. Explain the same with an example.   **10**

<div align="center">**UNIT - IV**</div>

6 a) List the advantages and disadvantages of instance-based learning. Write the algorithm for KNN and explain.   **10**

b) Apply K-nearest neighbour algorithm for the following dataset to classify the new example into one of the given target label species with K=6   **10**

New example is:

Sepal Length	Sepal Width	Species
7.3	3.1	?

Dataset is:

Sepal Length	Sepal Width	Species
5.3	3.7	Setosa
5.1	3.8	Setosa
7.2	3.0	Virginica
5.4	3.4	Setosa
5.1	3.3	Setosa
5.4	3.9	Setosa
7.4	2.8	Virginica
6.1	2.8	Vercicolor
7.3	2.9	Virginica
6.0	2.7	Vercicolor
5.8	2.8	Virginica
6.3	2.3	Vercicolor
5.1	2.5	Vercicolor
6.3	2.5	Vercicolor
5.5	2.4	Vercicolor

<div align="center">**UNIT - V**</div>

7 a) Write an algorithm for Learn-one-rule.   **10**

b) Discuss with an example how FOIL algorithm works to generate first-order logic rules for a concept?   **10**

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