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**III Semester M.C.A. Degree Examination June/July - 2024**  
**COMPUTER SCIENCE**  
**Machine Learning (Elective)**  
**(CBCS Scheme Y2K20)**  
**Paper : 3MCAE1**

**Time : 3 Hours** **Maximum Marks : 70**

**Instructions to Candidates :**

- Answer any **five** questions from Part - A.
- Answer any **four** questions from Part - B.

**PART - A**

Answer any **Five** questions. Each question carries 6 marks. (5×6=30)

1. Define Machine Learning? Briefly explain different types of learning methods.
2. Consider the following training example, we're trying to predict whether a person will play tennis based on the weather conditions: Outlook, Temperature, and Humidity. Identify only the first splitting attribute for decision tree using ID3 algorithm

Instance	Outlook	Temperature	Humidity	Wind	Play Tennis
a	Sunny	Hot	High	Weak	No
b	Sunny	Hot	High	Strong	No
c	Overcast	Hot	High	Weak	Yes
d	Rainy	Mild	High	Weak	Yes

3. State the mathematical formulation of the SVM problem. Give an outline of the method for solving the problem.
4. Explain the basic elements of a Hidden Markov Model (HMM). List any two applications of HMM.
5. What is K-means clustering? How does the K-means algorithm works?
6. With an example, explain FP growth algorithm.
7. Explain principal component analysis for space dimension reduction.
8. Explain different cross over operations and mutation performed in GA.

**PART - B**

Answer any **Four** questions. Each questions carries 10 marks. (4×10=40)

9. a) What are the basic design issues in learning system and approaches to machine learning? (5)
- b) Explain Find - S algorithm with given example and List limitations of Find - S algorithm. (5)

**[P.T.O.]**



10. a) Define the terms i) hypothesis. ii) Version space iii) inductive bias  
iv) Overfitting. (4)

b) Write the steps of ID3 Algorithm. Give example how decision tree is construct. (6)

11. a) Describe K-nearest Neighbour learning Algorithm for continues valued target function. (6)

b) Explain Backpropagation in Multilayer perceptron with an example. (4)

12. a) Consider the training data in the following table where Play is a class attribute. In the table, the Humidity attribute has values "L" (for low) or "H" (for high), Sunny has values "Y" (for yes) or "N" (for no), Wind has values "S" (for strong) or "W" (for weak), and Play has values "Yes" or "No".

What is class label of play for the following instance day (Humidity = L, Sunny = N, Wind = W), according to naive Bayesian classification? (6)

Humidity	Sunny	Wind	Play
L	N	S	No
H	N	W	Yes
H	Y	S	Yes
H	N	W	Yes
L	Y	S	No

b) What is Bayes optimal Classifier? (4)

13. a) Differentiate between hierarchical and non hierarchical clustering. (4)

b) List the steps involved in apriori algorithm. For the given dataset of transactions, find the frequent itemsets and generate the association rule of using Apriori algorithm.

TID	ITEMSETS
T1	A,B
T2	B,D
T3	B,C
T4	A,B,D
T5	A,C
T6	B,C
T7	A,C
T8	A,B,C,E
T9	A,B,C

Given: Minimum support = 2, Minimum Confidence = 50% (6)

14. a) Explain the steps involved in Genetic algorithm for determining the best hypotheses. (7)

b) Discuss the applications of Genetic algorithm. (3)