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Question Paper Code : 70424

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Seventh Semester

Computer Science and Engineering

CS 8082 – MACHINE LEARNING TECHNIQUES

(Common to : Computer and Communication Engineering/ Electronics and
Communication Engineering/ Information Technology)

(Regulations – 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is consistent hypothesis in learning?
2. Define Inductive bias.
3. Explain Multilayer Perception.
4. Differentiate between Gradient Descent and Stochastic Gradient Descent.
5. What are Bayesian Belief nets? Where are they used?
6. What is minimum description length principle?
7. Distinguish between k-nearest neighbour and case based learning.
8. Explain locally weighted regression.
9. What is explanation based learning?
10. What is Temporal Difference Learning? Give an example.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Discuss the Find-s algorithm with an example. (7)
 (ii) Explain the various stages involved in designing a learning system. (6)

Or

- (b) (i) With the help of training examples explain the Inductive Learning Hypothesis. (7)
 (ii) Differentiate between Supervised, Unsupervised and Reinforcement Learning. (6)

12. (a) Discuss the model of Artificial Neural Network and its learning process in detail. (13)

Or

- (b) Explain Genetic Learning in detail with a suitable example. (13)

13. (a) Consider the weather prediction problem in which there are three season names {Sunny, Rainy, Foggy} and the corresponding transition probabilities are given in the table below :

	Sunny	Rainy	Foggy
Sunny	0.8	0.05	0.15
Rainy	0.2	0.6	0.2
Foggy	0.2	0.3	0.5

- (i) What is the probability that the next two days are rainy given today is sunny? (6.5)
 (ii) What is the probability of tomorrow is foggy if today is rainy? (6.5)

Or

- (b) Given 10 training examples of Car stolen history with attributes color, type, origin and stolen. (13)

Example No.	Color	Type	Origin	Stolen?
1	Red	Sports	Domestic	Yes
2	Red	Sports	Domestic	No
3	Red	Sports	Domestic	Yes
4	Yellow	Sports	Domestic	No
5	Yellow	Sports	Imported	Yes

6	Yellow	SUV	Imported	No
7	Yellow	SUV	Imported	Yes
8	Yellow	SUV	Domestic	No
9	Red	SUV	Imported	No
10	Red	Sports	Imported	Yes

Classify the new instance a Red Domestic SUV is getting stolen or not. using Naïve Bayes Classifier.

14. (a) Exemplify K-nearest Neighbor learning Algorithm and Derive the gradient descent rule for a distance-weighted local linear approximation to the target function of K-nearest neighbor. (13)

Or

- (b) (i) Distinguish Lazy and Eager Learners. (7)
- (ii) Exemplify Radial basis function as kernel in learning system. (6)
15. (a) (i) Explain Q learning algorithm assuming deterministic rewards and actions. (6)
- (ii) Write a short note on Analytical Learning. (7)

Or

- (b) (i) Discuss general to specific beam search for Learn-One-Rule. (6)
- (ii) Discuss First-order-Horn-clauses. (7)

PART C — (1 × 15 = 15 marks)

16. (a) A popular online store wants to develop a recommendation engine to analyze its customer reviews to promote the sales of certain good impact commodities of its partners. Explain the machine learning process involved in this development under the following aspects: (15)
- (i) Type of machine learning model well suited and why?
- (ii) Dataset needed and how much?
- (iii) Input parameters and expected outcome.
- (iv) Methodology
- (v) Possible evaluation strategy

Or

- (b) For the given table of factors affecting Sunburn, construct a decision tree using ID3 algorithm. (15)

Name	Hair	Height	Weight	Lotion	Sunburned
Sarah	Blonde	Average	Light	No	Yes
Dana	Blonde	Tall	Average	Yes	No
Alex	Brown	Short	Average	Yes	No
Annie	Blonde	Short	Average	No	Yes
Emily	Red	Average	Heavy	No	Yes
Pete	Brown	Tall	Heavy	No	No
John	Brown	Average	Heavy	No	No
Katie	Blonde	Short	Light	Yes	No
