



ML Unit wise important Question

Machine Learning (Jawaharlal Nehru Technological University, Hyderabad)



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Unit -2

1. What is Artificial Neural Network? Give some of its applications
2. Compare and contrast biological neural network and artificial neural network
3. Explain perceptron model with a neat diagram. Design a perceptron for X AND Y function
4. Discuss the representational power of a perceptron
5. Differentiate between Gradient Descent and Perceptron training rule.
6. Derive the Gradient Descent Rule
7. Write the gradient descent algorithm for training perceptron unit
8. Differentiate between Gradient Descent and Stochastic Gradient Descent
9. Derive the Backpropagation algorithm for training multi-layer networks
10. Write stochastic gradient descent backpropagation algorithm for multi-layer feedforward network
11. Briefly explain the following with respect to Backpropagation
 - a) Convergence and Local Minima of MLP
 - b) Representational Power of Feedforward Networks
 - c) Generalization, Overfitting, and Stopping Criterion
12. Define the following terms
 - a) Sample error
 - b) True error
 - c) Random Variable
 - d) Expected value
 - e) Variance
 - f) standard Deviation
 - g) Binomial distribution
 - h) Normal distribution
13. Suppose hypothesis h commits $r = 10$ errors over a sample of $n = 65$ independently drawn examples. What is the variance and standard deviation for number of true error rate $\text{error}_D(h)$? What is the 90% confidence interval (two-sided) for the true error rate?
14. Write the procedure to evaluate two learning algorithms

Unit - 1

1. What is machine learning > Discuss some applications of machine learning
2. What is well posed learning problem. Discuss any three well posed learning problems describing their task, performance and experience.
3. Explain the steps in designing a learning system for checkers game
4. What are the different issues in machine learning
5. Write Find-S algorithm and Find maximally specific hypothesis for the given

training examples

SIZE	Color	Shape	Class
Big	Red	Circle	No
Small	Red	Triangle	No
Small	Red	Circle	Yes
Big	Blue	Circle	No
Small	Blue	Circle	Yes

6. Write candidate elimination algorithm

SKY	AIR TEMP	HUMIDITY	WIND	WATER	FORECAST	ENJOY SPORT
Sunny	Warm	Normal	Strong	Warm	Same	Yes
Sunny	Warm	High	Strong	Warm	Same	Yes
rainy	Cold	High	Strong	Warm	Same	No
Sunny	Warm	High	Strong	Cool	Same	Yes

7. Find the maximally general hypothesis and maximally specific hypothesis for the training examples given in the table using the candidate elimination algorithm.
8. Define the following Concept learning Consistent hypothesis Version Space
9. Explain Decision Tree Algorithms with suitable example.
10. Explain inductive bias, overfitting and underfitting of ID3 algorithm of decision tree

Unit 3

- 1.a) Design the Brute Force Bayesian concept learning algorithm and elaborate.
- b) Explain the Mistake Bound for the Halving Algorithm. [8+7]
- 2.a) Explain the Maximum Likelihood Hypotheses for predicting probabilities.
- b) Elaborate the Locally Weighted Linear Regression. [8+7]
- 3.a) Explain the features of Bayesian learning methods.
- b) Discuss the relationship between the maximum likelihood hypothesis and the least-squared error hypothesis. [6+4]

- 4.a) Prove ϵ -exhausting the version space theorem.
- b) With suitable example discuss a radial basis function network. [5+5]
6. In KNN it is very likely to over fit due to the curse of dimensionality, which option would be optimal to handle such problem. Explain
7. Explain about Case -Based Reasoning
8. Explain the difference between Lazy and Eager Learning
9. Explain the concept of Radial Basis Function
10. How to find the sample Complexity for Finite Hypothesis Space
11. How to find the sample Complexity for Infinite Hypothesis Space
12. How to compute Optimal mistake bound in learning
13. Explain Minimum Description length principle for finding optimal hypothesis
14. Explain Naive Bayes classification algorithm with example of classifying text
15. Explain Bayesian Belief Networks
16. Explain Gibbs Algorithm
17. Explain EM Algorithm

Unit 4

1. Explain the concept of Induction rule and Deduction rule
2. a) Explain the Q-learning with suitable example.
3. b) Explain about the hypothesis space search. [8+7]
4. How rules are post pruned? Explain with an example.
5. What is Q function? Write an algorithm for learning
6. Explain an algorithm for regressing a set of literals through a single horn clause.
7. Define the terms in Genetic Algorithm
 - i) Chromosome
 - ii) Fitness function
 - iii) Cross over operation
 - iv) Mutation
8. Explain how Genetic Algorithm works
9. Explain in detail about Hidden Markov Models
10. Explain Sequential Covering algorithm for Learning set of rules
11. Explain FOIL algorithm for Learning set of rules

Unit 5

1. What is the essential difference between analytical and inductive learning methods?
2. What are the limitations of explanation based learning?
3. Explain PROLOG –EBG algorithm for Analytical learning
4. Explain KBANN algorithm for combining Inductive and Analytical learning
5. Explain EBNN algorithm for combining Inductive and Analytical learning
6. Explain FOCL algorithm for combining Inductive and Analytical learning
7. Explain how to initialize the hypothesis by using prior knowledge. (Domain Theory)