

Machine Learning Question Bank

Module 5

1. Explain with formulas and examples the Following
 - a. Sample Error (Training Error)
 - b. True Error
 - c. Confidence Intervals for Discrete Valued Hypothesis
 - d. Binomial Distribution
 - e. Mean
 - f. Variance
 - g. Standard Deviation
 - h. Estimators, Bias and Variance
 - i. Normal Probability Distribution
2. Discuss the General approach for deriving confidence intervals
3. How to estimate difference in error between two hypotheses using error $D(h)$ and error $S(h)$?
4. Describe in brief (any one) i. Lazy and eager learning ii. EM Algorithm
5. Explain the inductive biased hypothesis space and unbiased learner
6. What is the importance of binomial and Normal Distribution? Define True Error and Sample Error. What are they used for?
7. State and Explain Central Limit theorem
8. Write formula for the following
 - a. Difference in true error
 - b. Difference in sample error
 - c. Approximate Variance
 - d. Approximate $N\%$ confidence interval estimate for d
9. Explain Comparing Learning Algorithms. Write a procedure to estimate the difference in error between two learning methods LA and LB .
10. Explain the procedure to estimate difference in error between two learning methods. Consider a learned hypothesis h , for some Boolean concept. When h is tested on a set of 100 examples it classifies 83 correctly what is the standard deviation and 95% confidence interval for the true error rate for error $D(h)$?
11. What is instance-based learning? Explain and Give Examples.
12. What are the advantages and disadvantages of Instance based Learning
13. Describe k-nearest neighbor algorithm. Why is it called instance-based learning?
14. Write a KNN Algorithm for the following :
 - a. For approximating a discrete valued function
 - b. For approximating continuous valued function
 - c. For distance weighted discrete valued functions
 - d. For distance weighted continuous valued functions
15. Describe K- Nearest Neighbour learning algorithm for continuous valued target functions. Discuss one major drawback of this algorithm and how it can be corrected.

Or

- What is the curse of dimensionality in KNN Algorithm. What is the approach to correct it?
16. When to consider KNN Algorithm? What are the advantages and disadvantages of KNN Algorithm.
 17. Define the following :
 - a. Regression
 - b. Residual
 - c. Kernel function
 18. What is the basic idea of locally weighted regression? What are the three criteria of estimating errors for fitting the local training examples
 19. Explain the following
 - a. RBF : Radial Basis Function networks.
 - b. Case based Reasoning
 - c. Case based Reasoning in CADET
 - d. Generic properties of Case based Reasoning system
 20. What is reinforcement learning? What are the elements of reinforcement learning?
 21. Explain reinforcement learning from the perspective of building learning robot. With a neat diagram explain how agent interact with environment.
 22. Explain all four aspects which makes reinforcement learning different from other.
 23. Describe the following
 - a. Learning Task
 - b. Markov Decision Process
 - c. Value Function or discounted cumulative reward achieved by policy π .
 24. Explain the following :
 - a. Q Learning
 - b. Q function .
 - c. An Algorithm for Learning Q
 - d. Illustrative example for Q learning algorithm
 25. Describe the method of learning using Locally weighted linear regression