# **Questions Bank**

**Subject Name: Machine Learning** 

**Subject Code: CS601PC** 

Sem: VI

## **Unit-1Questions.**

- 1. Define the following terms:
  - a. Learning
  - b. LMS weight update rule
  - c. Version Space
  - d. Consistent Hypothesis
  - e. General Boundary
  - f. Specific Boundary
  - g. Concept
- 2. What are the important objectives of machine learning?
- 3. Explain find –S algorithm with given example. Give its application. Table 1

Example	Sky	AirTemp	Humidity	Wind	Water	Forecast	EnjoySport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

- 4. What do you mean by a well –posed learning problem? Explain the important features that are required to well –define a learning problem.
- 5. Explain the inductive biased hypothesis space and unbiased learner
- 6. What are the basic design issues and approaches to machine learning?
- 7. How is Candidate Elimination algorithm different from Find-S Algorithm
- 8. How do you design a checkers learning problem
- 9. Explain the various stages involved in designing a learning system

10. Trace the Candidate Elimination Algorithm for the hypothesis space H' given the sequence of training examples from Table 1.

- 11. Differentiate between Training data and Testing Data
- 12. Differentiate between Supervised, Unsupervised and Reinforcement Learning
- 13. What are the issues in Machine Learning
- 14. Explain the List Then Eliminate Algorithm with an example
- 15. What is the difference between Find-S and Candidate Elimination Algorithm
- 16. Explain the concept of Inductive Bias
- 17. With a neat diagram, explain how you can model inductive systems by equivalent deductive systems
- 18. What do you mean by Concept Learning?

### **Unit-II Questions.**

- 1. Give decision trees to represent the following boolean functions:
  - (a) A ∧~B
  - (b) A V [B ∧ C]
  - (c) A XOR B
  - (d)  $[A \land B] \lor [C \land D]$
- 2. Consider the following set of training examples:

<u>Instance</u>	Classification	<u>a1</u>	<u>a2</u>
1	+	T	T
2	+	T	T
3	-	T	F
4	+	F	F
5	-	F	T
6	-	F	T

- (a) What is the entropy of this collection of training examples with respect to the target function classification?
- (b) What is the information gain of a 2 relative to these training examples?
- NASA wants to be able to discriminate between Martians (M) and Humans (H) based on the following characteristics: Green ∈{N, Y}, Legs ∈{2,3}, Height ∈{S, T}, Smelly ∈{N, Y}

Our available training data is as follows:

	<b>Species</b>	Green	Legs	<u>Height</u>	Smelly
1	M	N	3	S	Y
2	M	Y	2	T	N
3	M	Y	3	T	N
4	M	N	2	S	Y
5	M	Y	3	T	N
6	Н	N	2	T	Y
7	Н	N	2	S	N
8	Н	N	2	Т	N
9	Н	Y	2	S	N
10	Н	N	2	T	Y

- a) Greedily learn a decision tree using the ID3 algorithm and draw the tree.
- b) (i) Write the learned concept for Martian as a set of conjunctive rules (e.g., if (green=Y and legs=2 and height=T and smelly=N), then Martian; else if ... then Martian;...; else Human).
- (ii) The solution of part b)i) above uses up to 4 attributes in each conjunction. Find a set of conjunctive rules using only 2 attributes per conjunction that still results in zero error in the training set. Can this simpler hypothesis be represented by a decision tree of depth 2? Justify.
- 4. Discuss Entropy in ID3 algorithm with an example
- 5. Compare Entropy and Information Gain in ID3 with an example.
- 6. Describe hypothesis Space search in ID3 and contrast it with Candidate-Elimination algorithm.
- 7. Relate Inductive bias with respect to Decision tree learning.
- 8. Illustrate **Occam's razor and** relate the importance of **Occam's razor** with respect to ID3 algorithm.
- 9. List the issues in Decision Tree Learning. Interpret the algorithm with respect to **Overfitting the data.**
- 10. Discuss the effect of **reduced Error pruning** in decision tree algorithm.
- 11. What type of problems are best suited for decision tree learning

- 12. Write the steps of ID3Algorithm
- 13. What are the capabilities and limitations of ID3
- 14. Define (a) Preference Bias
- (b) Restriction Bias
- 15. Explain the various issues in Decision tree Learning
- 16. Describe Reduced Error Pruning
- 17. What are the alternative measures for selecting attributes
- 18. What is Rule Post Pruning

#### **UNIT III Questions.**

- 1) What is Artificial Neural Network?
- 2) What are the type of problems in which Artificial Neural Network can be applied.
- 3) Explain the concept of a Perceptron with a neat diagram.
- 4) Discuss the Perceptron training rule.
- 5) Under what conditions the perceptron rule fails and it becomes necessary to apply the delta rule
- 6) What do you mean by Gradient Descent?
- 7) Derive the Gradient Descent Rule.
- 8) What are the conditions in which Gradient Descent is applied.
- 9) What are the difficulties in applying Gradient Descent.
- 10) Differentiate between Gradient Descent and Stochastic Gradient Descent
- 11) Define Delta Rule.
- 12) Derive the Backpropagation rule considering the training rule for Output Unit weights and Training Rule for Hidden Unit weights
- 13) Write the algorithm for Back propagation.
- 14) Explain how to learn Multilayer Networks using Gradient Descent Algorithm.
- 15) What is Squashing Function?

#### **UNIT-IV Questions.**

- 1) Explain the concept of Bayes theorem with an example.
- 2) Explain Bayesian belief network and conditional independence with example.
- 3) What are Bayesian Belief nets? Where are they used?
- 4) Explain Brute force MAP hypothesis learner? What is minimum description length principle

- 5) Explain the k-Means Algorithm with an example.
- 6) How do you classify text using Bayes Theorem
- 7) Define (i) Prior Probability (ii) Conditional Probability (iii) Posterior Probability
- 8) Explain Brute force Bayes Concept Learning
- 9) Explain the concept of EM Algorithm.
- 10) What is conditional Independence?
- 11) Explain Naïve Bayes Classifier with an Example.
- 12) Describe the concept of MDL.
- 13) Who are Consistent Learners.
- 14) Discuss Maximum Likelihood and Least Square Error Hypothesis.
- 15) Describe Maximum Likelihood Hypothesis for predicting probabilities.
- 16) Explain the Gradient Search to Maximize Likelihood in a neural Net.

### **UNIT-V Questions.**

- 1. What is Reinforcement Learning?
- 2. Explain the Q function and Q Learning Algorithm.
- 3. Describe K-nearest Neighbour learning Algorithm for continues valued target function.
- 4. Discuss the major drawbacks of K-nearest Neighbour learning Algorithm and how it can be corrected
- 5. Define the following terms with respect to K Nearest Neighbour Learning:
  - i)Regression
- ii) Residual
- iii) Kernel Function.
- 6.Explain Q learning algorithm assuming deterministic rewards andactions?
- 7. Explain the K nearest neighbour algorithm for approximating a discrete –

valued function  $f: Hn \rightarrow V$  with pseudo code

- 8. Explain Locally Weighted Linear Regression.
- 9. Explain CADET System using Case based reasoning.
- 10. Explain the two key difficulties that arise while estimating the Accuracy of Hypothesis.
- 11.Define the following terms
- a. Sample error
- b. True error
- c. Random Variable

- d. Expected value
- e. Variance
- f. standard Deviation
- 12. Explain Binomial Distribution with an example.
- 13. Explain Normal or Gaussian distribution with an example.

		al Limit Theor are for estimati			between two	learning meth	iods.
App	roximate conf	fidence interva	als for this es	stimate			