**UNIT - 1 QUIZ QUESTIONS**

1. Which of the following statements is not true about the Decision tree?
2. A Decision tree is also known as a classification tree
3. Each element of the domain of the classification in the decision tree is called a class.
4. It is a tree in which each internal node is labeled with an input feature.
5. It cannot be used in data mining applications as it only classifies but does not predict anything.

**Answer:** d  
**Explanation:** Decision trees can be widely used in data mining applications because it is able to classify and predict as well. It is also known as a classification tree. Each element of the domain of the classification in the decision tree is called a class and each internal node is labeled with an input feature.

1. Which of the following statements is not true about the Decision tree?
   1. It starts with a tree with a single leaf and assign this leaf a label according to a majority vote among all labels over the training set.
   2. It performs a series of iterations and on each iteration, it examine the effect of splitting a single leaf.
   3. It defines some gain measures that quantifies the improvement due to the split.
   4. Among all possible splits, it either choose the one that minimizes the gain and perform it or choose not to split the leaf at all.

**Answer:** d  
**Explanation:** In decision trees among all the possible splits, it chooses the one that maximizes the gain not the one that minimizes it. Or it chooses not to split the leaf at all. All other three are the correct statements about the Decision tree.

1. Which of the following is not a Decision tree algorithm?
   1. ID3
   2. C4.5
   3. DBSCAN
   4. CART

**Answer:** c  
**Explanation:** DBSCAN is a clustering algorithm. ID3, C4.5, and CART are the Decision tree algorithms. ID3 is known as Iterative Dichotomiser 3 and C4.5 is the successor of ID3. CART is the Classification and Regression Tree. There are many other decision-tree algorithms also.

1. Which of the following statements is not true about the ID3 algorithm?
   1. It is used to generate a decision tree from a dataset.
   2. It begins with the original set S as the root node.
   3. On each iteration of the algorithm, it iterates through every unused attribute of the set S and calculates the entropy or the information gain of that attribute.
   4. Finally, it selects the attribute which has the largest entropy value.

**Answer:** d  
**Explanation:** ID3 is an algorithm which is used to generate a decision tree from a dataset, and it begins with the original set S as the root node. On each iteration of the algorithm, it iterates through every unused attribute of the set S and calculates the entropy or the information gain of that attribute. And it then selects the attribute which has the smallest entropy value.

1. The algorithm is trying to find a suitable day for swimming. What is the most general hypothesis?
   1. A rainy day is a positive example.
   2. A sunny day is a positive example.
   3. No Day is a positive example.
   4. Every day is a positive example.

**Answer:** d  
**Explanation:** The most general hypothesis must accept any type of data instance. In this case, the hypothesis that states that any day is a positive example accepts all the specific days as positive.

1. Candidate-Elimination algorithm can be described by \_\_\_\_\_\_\_\_\_\_\_\_  
   1. just a set of candidate hypotheses.
   2. depends on the dataset.
   3. set of instances, set of candidate hypotheses.
   4. just a set of instances.

**Answer:** c  
**Explanation:** A set of instances is required. A set of candidate hypotheses are given. These are applied to the training data and the list of accurate hypotheses is output in accordance with the candidate-elimination algorithm.

1. How is the version space represented?  
   1. Least general members.
   2. Most general members.
   3. Most general and least general members.
   4. Arbitrary members chosen form hypothesis space.

**Answer:** c  
**Explanation:** The algorithm starts with the most general and most specific (least general members). Then it tries to specify more general members or generalize more specific members based on the data from the training examples.

1. Let G be the set of maximally general hypotheses. While iterating through the dataset, when is it changed for the first time?
   1. Negative example is encountered for the first time.
   2. Positive example is encountered for the first time.
   3. First example encountered, irrespective of whether it is positive or negative.
   4. S, the set of maximally specific hypotheses, is changed.

**Answer:** a  
**Explanation:** The most general hypothesis states that any example is a positive example. So, it changes the first time when it encounters the first negative example. It takes the values of each attribute, other than the values, in the negative example.

1. S = <phi, phi, phi, phi>Training data = <rainy, cold, normal, change> => No (negative example). How will S be represented after encountering this training data?
   1. <phi, phi, phi, phi>
   2. <sunny, warm, high, same>
   3. <rainy, cold, normal, change>
   4. <?, ?, ?, ?>

**Answer:** a  
**Explanation:** Initially S is phi, which implies that the learner is yet to encounter a positive example. S will remain the same after encountering another negative example. It will change only after encountering a positive example.

1. What is the primary goal of the FIND S Algorithm?
   1. To find the most general hypothesis that fits all examples.
   2. To eliminate all negative examples from the dataset.
   3. To find the most specific hypothesis that fits all positive examples
   4. To classify all examples without considering their positivity or negativity.

**ANS** C: The FIND S Algorithm aims to find the most specific hypothesis that fits all positive examples. This means it starts with a very specific hypothesis and generalizes it only when it fails to classify a positive training example correctly.

**Unit-2 Quiz Questions**

Question 1: What is the primary objective of backpropagation in neural networks?

A) To optimize the learning rate

B) To update the model parameters

C) To compute the output of the network

D) To initialize the weights and biases

Question 2: Which of the following is a key component of backpropagation?

A) Forward pass

B) Backward pass

C) Gradient descent

D) Activation function

Question 3: What is the purpose of the loss function in backpropagation?

A) To compute the output of the network

B) To update the model parameters

C) To measure the difference between predicted and actual outputs

D) To regularize the model

Question 4: What is the name of the algorithm used to update the model parameters in backpropagation?

A) Gradient Ascent

B) Gradient Descent

C) Stochastic Gradient Descent

D) Batch Gradient Descent

Question 5: What is the role of the output layer in backpropagation?

A) To compute the error gradient

B) To compute the output of the network

C) To update the model parameters

D) To regularize the model

Question 6: What is the primary function of an activation function in a neural network?

A) To reduce the dimensionality of the input data

B) To introduce non-linearity into the model

C) To increase the computational complexity of the model

D) To reduce the overfitting of the model

Question 7: What is the type of neural network architecture used for image recognition tasks?

A) Recurrent Neural Network (RNN)

B) Convolutional Neural Network (CNN)

C) Autoencoder

D) Long Short-Term Memory (LSTM) network

Question 8: What is the purpose of the backpropagation algorithm in neural networks?

A) To optimize the model's performance on unseen data

B) To update the weights and biases of the model

C) To regularize the model's parameters

D) To initialize the model's parameters

Question 9: Which of the following is a type of supervised learning problem in neural networks?

A) Regression

B) Clustering

C) Dimensionality reduction

D) Reinforcement learning

Question 10: What is the term for the process of adjusting the model's parameters to minimize the loss function?

A) Gradient descent

B) Gradient ascent

C) Stochastic gradient descent

D) Batch gradient descent

**Correct answers:**

1. B) To update the model parameters
2. B) Backward pass
3. C) To measure the difference between predicted and actual outputs
4. B) Gradient Descent
5. B) To compute the output of the network
6. B) To introduce non-linearity into the model
7. B) Convolutional Neural Network (CNN)
8. B) To update the weights and biases of the model
9. A) Regression
10. A) Gradient descent

**Unit-3 Quiz Questions**

Question 1: What is the primary goal of Bayesian learning in neural networks?

A) To minimize the loss function  
B) To maximize the posterior probability  
C) To optimize the model parameters  
D) To reduce overfitting

Question 2: What is the key concept in Bayesian neural networks that allows for uncertainty estimation?

A) Frequentist inference  
B) Bayesian inference  
C) Maximum likelihood estimation  
D) Empirical risk minimization

Question 3: What is the type of distribution often used to model the weights of a Bayesian neural network?

A) Gaussian distribution  
B) Uniform distribution  
C) Laplace distribution  
D) Dirichlet distribution

Question 4: What is the advantage of Bayesian neural networks over traditional neural networks?

A) Faster computation  
B) Better interpretability  
C) Improved scalability  
D) Ability to model uncertainty

Question 5: What is the process of approximating the posterior distribution in Bayesian neural networks?

A) Variational inference  
B) Markov chain Monte Carlo  
C) Expectation-maximization  
D) Gradient descent

Question 6: What is the primary goal of instance-based learning?

A) To reduce the dimensionality of the dataset  
B) To identify the relationship between instances and classify new instances  
C) To improve the efficiency of the algorithm  
D) To reduce the number of features in the dataset

Question 7: Which of the following is an advantage of instance-based learning?

A) It can handle noisy data effectively  
B) It requires a large amount of training data  
C) It can learn from small amounts of data  
D) It is sensitive to outliers

Question 8: What is the name of the popular instance-based learning algorithm that uses a weighted sum of the k-nearest neighbors?

A) k-Means  
B) k-Nearest Neighbors (k-NN)  
C) Decision Trees  
D) Support Vector Machines

Question 9: Which of the following is a characteristic of instance-based learning?

A) It uses a model to make predictions  
B) It stores all the training data  
C) It is sensitive to the choice of distance metric  
D) It is only suitable for classification problems

Question 10: What is the purpose of the distance metric in instance-based learning?

A) To calculate the similarity between instances  
B) To reduce the dimensionality of the dataset  
C) To select the most important features  
D) To improve the efficiency of the algorithm

**Correct Answers**

1. B) To maximize the posterior probability
2. B) Bayesian inference
3. A) Gaussian distribution
4. D) Ability to model uncertainty
5. A) Variational inference
6. B) To identify the relationship between instances and classify new instances
7. C) It can learn from small amounts of data
8. B) k-Nearest Neighbors (k-NN)
9. B) It stores all the training data
10. A) To calculate the similarity between instances