Purple = P1
Orange = P2
Green = P3
Blue = P4

Machine Learning

MODULE-1

1. For the given data calculate Gini indexes and determine which attribute is root attribute and generate two level deep decision tree.

2. What is machine learning? How is it different than Data Mining? OR What is machine learning? Explain how supervised learning is different from unsupervised learning. OR Define Machine Learning? Briefly explain the types of learning.

3. What are the elements of reinforcement learning? OR Explain the given terms with respect to Reinforcement learning: Delayed rewards, exploration, and partially observable states. OR Explain reinforcement learning in detail along with the various elements involved in forming the concept. Also define what is meant by partially observable state.

4. Explain the steps of developing Machine Learning applications.

5. Write a short note on 1) Temporal Difference Learning. 2) Issues in Machine learning

6. Explain procedure to design a machine learning system.

7. What are the key tasks of Machine learning?

8. What is Q-learning? Explain algorithm for learning Q.

9. What are the steps in designing a machine learning problem? Explain with the checkers problem.

10. Define well learning problem. Hence define root driving learning problem.

11. Explain the steps required for selecting the right machine learning algorithm.

MODULE-2

1. Draw and discuss the structure of radial basis function network. How RBFN can be used to solve non linearly separable pattern?

2. Determine weights and threshold for the given data using McCulloch-Pitts neuron model. Plot all data points and show separating hyper-plane.

MODULE-3

1. Describe Downhill simplex method . Why is it called Derivative Free method? Consider Markov chain model for 'Rain' and 'Dry' is shown in fig.

2. Differentiate Derivative based and Derivative free optimization techniques.

3. Write a short note on 1) DownHill simplex method 2) Radial Basis functions 3) Model Based Learning.

MODULE-4

1. Write a short note on Logistic Regression

2. For a sunburn dataset given, construct a decision tree.

3. Explain how regression problem can be solved using Steepest descent method. Write down the steps.

4. Explain procedure to construct decision trees.

5. What is linear regression ? Find the best fit line for the following example:

6. What is the decision tree? How you will choose the best attribute for decision tree classifier? Give suitable example.

7. What are the issues in decision tree induction?

8. Explain the concepts behind Linear Regression.

9. The given tale shown the midterm and final exam grade obtained for the students in database course. Use the method of least squares using regression to predict the final exam grade of a student who received 86 on the midterm exam.

10. For a SunBurn dataset given below, construct a decision tree.

MODULE-5

1. What is the goal of the support vector machine(SVM)? How to compute the margin?

2. For a given set of points identify clusters using complete link and average link using agglomerative clustering.

3. Illustrate support vector machine with neat labeled sketch and also show how to derive optimal hyperplane?

4. Explain in brief Bayesian Belief networks. OR Explain classification using Bayesian belief Network with an example. OR Define Bayes theorem based on these probabilities.

5. Write a short note on 1) Back propagation algorithm 2) Hidden Markov Model. 3) Soft margin SVM OR What is Support Vector Machine(SVM)? How to compute the margin? 4) Explain Bayes theorem. 5) Hierarchical Clustering Algorithms.

6. Define support vector machine(SVM) and further explain the maximum margin linear separators concept.

7. Apply agglomerative clustering algorithm on given data and draw dendrogram. Show three clusters with its allocated points. Use single link method.

8. Explain following terms Initial hypothesis, Expectations step and Maximization step wrt E-M algorithm. Explain How Initial hypothesis converges to optimal solutions?

9. Explain the given terms w.r.t Bayes theorem with proper examples 1) Independent probabilities 2) Dependent probabilities 3) Conditional probabilities 4) Prior & Posterior probabilities.

10. Explain how support vector machine can be used to find optimal hyperplane to classify linearly separate data. Give suitable example.

11. Explain K-Mean clustering algorithm giving example. Also explain how K-mean clustering differs from hierarchical clustering.

12. What are the requirements of clustering algorithms?

13. What is the role of radial basis function in separating nonlinear patterns.

14. Explain the key terminologies of support vector machine.

15. Explain how back Propagation algorithm helps in classification.

16. **For a given set of points identify clusters using complete link and average link using agglomerative clustering.**

MODULE-6

1. **Why Dimensionality Reduction is very Important step in Machine Learning? OR Why Dimensionality reduction is an important issue? Describe the steps to reduce dimensionality using principal component analysis method by clearly stating mathematical formula used. OR Explain in detail Principal Component Analysis for dimension reduction. OR Describe the two methods for reducing dimensionality.**

2. **Write a short note on 1) Independent Component Analysis 2) ISA and compare it with PCA**

3. **Use Principal Component analysis(PCA) to arrive at the transformed matrix for the given matrix A**