

## MODULE 4 –BAYESIAN LEARNING

1. Define Bayesian theorem? What is the relevance and features of Bayesian theorem?  
Explain the practical difficulties of Bayesian theorem.
2. Define is Maximum a Posteriori (MAP) Maximum Likelihood (ML) Hypothesis. Derive the relation for  $h_{MAP}$  and  $h_{ML}$  using Bayesian theorem.
3. Consider a medical diagnosis problem in which there are two alternative hypotheses: 1. that the patient has a particular form of cancer (+) and 2. That the patient does not (-). A patient takes a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the disease is actually present, and a correct negative result in only 97% of the cases in which the disease is not present. Furthermore, .008 of the entire population have this cancer. Determine whether the patient has Cancer or not using MAP hypothesis.
4. Explain Brute force Bayes Concept Learning
5. What are Consistent Learners?
6. Discuss Maximum Likelihood and Least Square Error Hypothesis
7. Describe Maximum Likelihood Hypothesis for predicting probabilities.
8. Explain the Gradient Search to Maximize Likelihood in a Neural Net
9. Describe the concept of MDL. Obtain the equation for  $h_{MDL}$
10. Explain Naïve Bayes Classifier with an Example
11. What are Bayesian Belief nets? Where are they used?
12. Explain Bayesian belief network and conditional independence with example
13. Explain Gradient Ascent Training of Bayesian Networks
14. Explain the concept of EM Algorithm. Discuss what are Gaussian Mixtures