**ASSIGNMENT**

**1. What is prior probability? Give an example.**

**2. What is posterior probability? Give an example.**

**3. What is likelihood probability? Give an example.**

**4. What is Naïve Bayes classifier? Why is it named so?**

**5. What is optimal Bayes classifier?**

**6. Write any two features of Bayesian learning methods.**

**7. Define the concept of consistent learners.**

**8. Write any two strengths of Bayes classifier.**

**9. Write any two weaknesses of Bayes classifier.**

**10. Explain how Naïve Bayes classifier is used for**

**1. Text classification**

**2. Spam filtering**

**3. Market sentiment analysis**

***SOLUTIONS***

1. ***Prior probability refers to the probability of an event occurring before any new evidence or information is taken into consideration. An example of prior probability is the probability of rolling a six on a fair die, which is 1/6.***
2. ***Posterior probability refers to the probability of an event occurring after taking new evidence or information into consideration. For example, if a person tests positive for a disease, the posterior probability of having the disease will be higher than the prior probability.***
3. ***Likelihood probability refers to the probability of observing the evidence or data given a particular hypothesis or model. For example, the likelihood of observing a particular DNA profile in a crime scene given that a suspect is guilty.***
4. ***Naïve Bayes classifier is a probabilistic machine learning algorithm based on Bayes' theorem. It assumes that the features are independent of each other and makes a classification decision based on the most probable class given the feature values. It is named Naïve because it assumes independence among features, which may not always hold in real-world applications.***
5. ***Optimal Bayes classifier is a probabilistic classifier that assigns a class label to an input data point based on the maximum posterior probability. It requires knowledge of the prior probabilities and the likelihood probabilities of each class.***
6. ***Two features of Bayesian learning methods are the ability to handle uncertainty and the ability to update the model with new data.***
7. ***Consistent learners are machine learning algorithms that converge to the true model as the amount of data increases. In other words, the estimated model becomes increasingly close to the true model as more data is fed into the algorithm.***
8. ***Two strengths of Bayes classifier are its simplicity and its ability to handle missing data or noisy features.***
9. ***Two weaknesses of Bayes classifier are the assumption of independence among features, which may not hold in some applications, and the sensitivity to the choice of prior probabilities.***
   1. ***In text classification, Naïve Bayes classifier can be used to classify documents into different categories, such as spam vs. ham emails or sports vs. politics news articles. The classifier uses the word frequencies in the document as features to make the classification decision.***
   2. ***In spam filtering, Naïve Bayes classifier can be used to identify emails that are likely to be spam based on the content of the email. The classifier uses features such as the presence of certain words or the frequency of punctuation marks in the email to make the classification decision.***
   3. ***In market sentiment analysis, Naïve Bayes classifier can be used to predict the sentiment of investors towards a particular stock based on news articles or social media posts. The classifier uses features such as the presence of positive or negative words in the text to make the classification decision.***