1.What is prior probability? Give an example.

Ans.

Prior probability is the probability of an event occurring before any evidence is taken into account. It represents our initial belief about the likelihood of an event. For example, if we are trying to predict whether it will rain tomorrow, our prior probability might be that there is a 30% chance of rain based on historical weather patterns.

2.What is posterior probability? Give an example.

Ans.

Posterior probability is the updated probability of an event occurring after taking into account new evidence. It represents our revised belief about the likelihood of an event. For example, if we observe dark clouds in the sky, our posterior probability of rain may increase to 60%.

3.What is likelihood probability? Give an example.

Ans.

Likelihood probability is the probability of observing the evidence given a certain hypothesis or event. It represents the strength of the evidence supporting a particular hypothesis. For example, if we observe lightning in the sky, the likelihood probability of rain may increase.

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

Ans.

Naïve Bayes classifier is a probabilistic machine learning algorithm that uses Bayes' theorem to make predictions. It is named "naïve" because it makes the simplifying assumption that the features are conditionally independent given the class label. Despite this simplification, it has been shown to be effective in many real-world applications, such as spam filtering and sentiment analysis.

5.What is optimal Bayes classifier?

Ans.

Optimal Bayes classifier is a theoretical classifier that achieves the lowest possible error rate when given enough data to learn the true underlying probability distribution. It is often used as a benchmark for evaluating the performance of other classifiers.

6.Write any two features of Bayesian learning methods.

Ans.

Two features of Bayesian learning methods are:

Bayesian methods allow for the incorporation of prior knowledge or assumptions about the data, which can help improve the accuracy of predictions.

Bayesian methods provide a probabilistic framework for modeling uncertainty, allowing us to quantify the uncertainty in our predictions and make more informed decisions.

7.Define the concept of consistent learners.

Ans.

Consistent learners are machine learning algorithms that converge to the true underlying function as the amount of training data increases. In other words, a consistent learner will eventually make accurate predictions if given enough data. This property is important for ensuring that the algorithm can generalize well to new, unseen data.

8.Write any two strengths of Bayes classifier.

Ans.

Two strengths of Bayes classifier are:

It can handle high-dimensional data with a relatively small number of training examples.

It provides probabilistic predictions, allowing us to quantify the uncertainty in our predictions and make more informed decisions.

9.Write any two weaknesses of Bayes classifier.

Ans.

Two weaknesses of Bayes classifier are:

It makes the simplifying assumption that the features are conditionally independent given the class label, which may not hold in some real-world applications.

It can be sensitive to irrelevant features, which may decrease its accuracy.

10.Explain how Naïve Bayes classifier is used for

Ans.

Text classification:

Naïve Bayes classifier is commonly used for text classification tasks such as topic categorization, sentiment analysis, and spam filtering. In text classification, the classifier takes as input a document represented by a bag-of-words model (i.e., a vector of word counts) and predicts its category based on the probabilities of the words given each category.

Spam filtering:

Naïve Bayes classifier is often used for spam filtering. In this application, the classifier is trained on a dataset of labeled emails (spam or non-spam) and learns to predict the probability that a new email is spam based on its word frequency distribution. If the probability exceeds a certain threshold, the email is flagged as spam.

Market sentiment analysis:

Naïve Bayes classifier can also be used for market sentiment analysis, which involves predicting the sentiment of market participants towards a particular asset or company based on news articles, social media posts, and other sources. In this application, the classifier is trained on a dataset of labeled texts (positive, negative, or neutral sentiment) and learns to predict the probability that a new text expresses a certain sentiment based on its word frequency distribution.