The difference between naïve bayes and conditional probability

Naive Bayes and conditional probability are related concepts but they have distinct meanings and applications.

Conditional probability refers to the probability of an event occurring given that another event has already occurred. It expresses the likelihood of an outcome based on the knowledge of some prior information or condition. Mathematically, the conditional probability of event A given event B is denoted as P(A|B) and is calculated as the probability of both events A and B occurring divided by the probability of event B occurring:

P(A|B) = P(A and B) / P(B)

Naive Bayes, on the other hand, is a classification algorithm based on Bayes' theorem, which involves conditional probability. Naive Bayes assumes that the features (or attributes) used for classification are conditionally independent of each other given the class label. This assumption simplifies the calculation of probabilities and allows for efficient classification.

In the context of Naive Bayes, the algorithm calculates the conditional probability of a class label given a set of features. It uses Bayes' theorem to determine the posterior probability of a class label given the features:

P(class|features) = (P(class) * P(features|class)) / P(features)

Here, P(class) is the prior probability of the class, P(features|class) is the conditional probability of the features given the class, and P(features) is the probability of the features occurring.

In summary, conditional probability is a fundamental concept that relates to the likelihood of an event given another event, while Naive Bayes is a classification algorithm that utilizes conditional probability to determine the probability of a class label given a set of features.