Naive Bayes is a probabilistic machine learning algorithm based on applying Bayes’ Theorem with a strong (naive) assumption of independence between the features. It’s especially useful for classification tasks, such as spam detection, sentiment analysis, and document categorization.

**BAYES Theorem :-**

Which is probability theory which describes the probability

of an event , based on prior knowledge of conditions that might be related to the event.

P(A∣B) = P(B∣A) \* P(A) / P(B)

​ P(class ∣ features) = P(features ∣ class)\* P(class) / P(features) ​

P(A ∣ B): Posterior - probability of **A given B is true**

P(B ∣ A) : Likelihood — probability of **B given A is true**

P(A) : Prior — initial probability of A being true

P(B) : Evidence — total probability of B happening

Naïve :- It is called naive because it assumes that the occurrence of a certain feature is independent of the occurrence of the other features

**Naive Assumption**

Naive Bayes assumes that all features are **independent given the class**:

P(x1,x2,..., xn ∣ y) = P(x1 ∣ y) \* P(x2 ∣ y) \* ...\* P(xn ∣ y)

**Types of Naive Bayes**

**1. Gaussian Naive Bayes**

Used when features are **continuous** and follow a **normal (Gaussian) distribution**

**2. Multinomial Naive Bayes**

Used when features are **discrete counts** also used when test classifications

**Bernoulli Naive Bayes**

Used when features are **binary**