

Naive Bayes classifiers are a collection of classification algorithms based on Bayes' Theorem. It is not a single algorithm but a family of algorithms where all of them share a common principle, i.e. every pair of features being classified is independent of each other.

Naive Bayes assumes that each feature/variable of the same class makes an independent & equal contribution to the outcome.

Because of the independence assumption, NB doesn't need to learn all possible correlations between the features. If  $N$  is the number of the features, then a general algorithm requires to analyze  $2^N$  possible feature interactions, while NB only needs the order of  $N$  data points.

Thus, NB classifiers can learn easier from small training data sets due to the class independence assumption. At the same time, NB is not affected by the curse of dimensionality.

The runtime complexity of the naive Bayes classifier is  $O(Nk)$ , where  $N$  is the number of features &  $k$  is the number of label classes.

Naive Bayes (NB) is a very fast method. It depends on conditional probabilities, which are easy to implement & evaluate. Therefore, it doesn't require an iterative process. NB supports binary classification as well as multinomial one. NB assumes that features are independent between them, but this assumption does not always hold. Even though, NB gives good results when applied to short text like tweets. For some datasets, NB may defeat other classifiers using feature selection.