## ABSTRACT

A **Bayesian network**, **Bayes network**, **belief network**, **Bayes(ian) model** or **probabilistic directed acyclic graphical model** is a probabilistic graphical model (a type of statistical model) that represents a set of random variables and their conditional dependencies via a directed acyclic graph (DAG). For example, a Bayesian network could represent the probabilistic relationships between diseases and symptoms. Given symptoms, the network can be used to compute the probabilities of the presence of various diseases.

Formally, Bayesian networks are DAGs whose nodes represent random variables in the Bayesian sense: they may be observable quantities, latent variables, unknown parameters or hypotheses. Edges represent conditional dependencies; nodes that are not connected represent variables that are conditionally independent of each other. Each node is associated with a probability function that takes, as input, a particular set of values for the node's parent variables, and gives (as output) the probability (or probability distribution, if applicable) of the variable represented by the node.

The **junction tree algorithm** (also known as 'Clique Tree') is a method used in machine learning to extract marginalization in general graphs. In essence, it entails performing belief propagation on a modified graph called a junction tree. The basic premise is to eliminate cycles by clustering them into single nodes.