

- **Conditional probability(formula)**

described as:

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

- **Total probability (formula)**

The law of total probability states a partition of any sample space is nothing but a collection of events that are disjoint. The total probability can be used to find the probability of an event A when you don't know enough about A's probability, instead you take a related Event B and calculate probability of A in terms of B.

$$P(A) = P(A \cap B) + P(A \cap B^c).$$

- **Chain Rule (formula)**

The Chain rule permits the calculation of any member of the disjoint distribution of a set of random variables using only conditional probabilities.

$$P(A_4, A_3, A_2, A_1) = P(A_4 | A_3, A_2, A_1) \cdot P(A_3 | A_2, A_1) \cdot P(A_2 | A_1) \cdot P(A_1)$$

- **Prior**

It is the probability that expresses an uncertain quantity with no evidence taken into account, or well the probability given to a root node.

- **Posterior**

It is the probability of an event that is assigned after the relevant evidence is taken into account.

- **Conditional Dependence**

It is the relationship between two or more events given that a third event occurs. If A and B are responsible for C, the posterior occurrence of A will reduce the probability of B.

- **Conditional Independence**

X and Y are conditionally independent given Z if and only if, given any value of Z, the probability distribution of X is the same for all values of Y and the probability distribution of Y is the same for all values of X.

- **Distribution of Probability / Probability distribution**

The probability distribution is the mathematical function that provides the value on of the probability of occurrence of different outcomes.

- **Bayes Theorem**

It allows us to update the probabilities of variables whose state not been observed given some set of new observations.

- **Bayesian Network**

A graphical structure that allows us to represent and reason about an uncertain domain. It is represented by nodes as variables and a set of arcs that link and connects each pair of nodes.