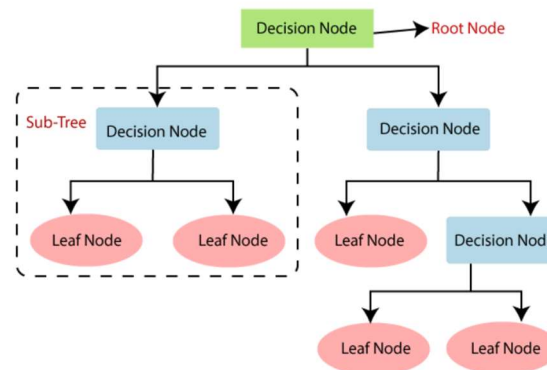# Decision Trees

A decision tree is a unique type of tree that provides the capability to draw conclusions regarding a method used for a dependent variable with discrete values.

In a Decision tree, there are two nodes, which are the Decision Node and Leaf Node. Decision nodes are used to make any decision and have multiple branches, whereas Leaf nodes are the output of those decisions and do not contain any further branches. It is a graphical representation for getting all the possible solutions to a problem/decision based on given conditions. In order to build a tree, we use the CART algorithm, which stands for Classification and Regression Tree algorithm.



## Terminologies

**Root node** is from where the decision tree starts. It represents the entire dataset, which further gets divided into two or more homogeneous sets.

**Leaf nodes** are the final output node, and the tree cannot be segregated further after getting a leaf node.

**Splitting** is the process of dividing the decision node/root node into sub-nodes according to the given conditions.

**Branch/Sub Tree:** A tree formed by splitting the tree.

**Pruning** is the process of removing the unwanted branches from the tree.

The root node of the tree is called the **parent node**, and other nodes are called the **child nodes.**

## Working

**Step-1**: Begin the tree with the root node, says S, which contains the complete dataset.

**Step-2**: Find the best attribute in the dataset using Attribute Selection Measure (ASM).

**Step-3**: Divide the S into subsets that contains possible values for the best attributes.

**Step-4**: Generate the decision tree node, which contains the best attribute.

**Step-5**: Recursively make new decision trees using the subsets of the dataset created in step -3. Continue this process until a stage is reached where you cannot further classify the nodes and called the final node as a leaf node.

Attribute selection measure or ASM problem rises to resolve this 2 techniques are used Information Gain and Gini Index. Firstly you understand these concepts.