- How does a Decision Tree decide on its splits (what is the criteria for a split point)?

- A decision tree can use the Information Gain to decide on the splitting criteria.
- Let's give a brief overview of how this works.

- The decision tree is built in a top-down fashion, but the question is how do you choose which attribute to split at each node?
- The answer is find the feature that best splits the target class into the purest possible children nodes.

- This measure of purity is called the information.
- It represents the expected amount of information that would be needed to specify whether a new instance should be classified 0 or 1, given the example that reached the node.

- Entropy on the other hand is a measure of impurity (the opposite). It is defined for a binary class with values a/b as:
  - **- p(a)*log(p(a)) - p(b)*log(p(b))**
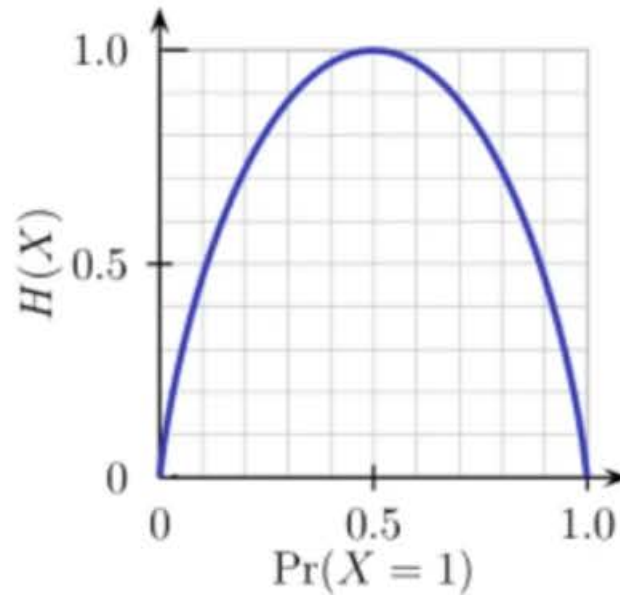
- Now by comparing the entropy before and after the split, we obtain a measure of information gain, or how much information we gained by doing the split using that particular feature:
- **Information_Gain = Entropy_before - Entropy_after**

- What advantages does a decision tree model have?

- Advantages of Decision Trees
  - Very easy to interpret and understand
  - Works on both continuous and categorical features
  - No normalization or scaling necessary
  - Prediction algorithm runs very fast

- What is the difference between a random forest versus boosting tree algorithms?

- Boosting Trees
  - Reassign weights to samples based on the results of previous iterations of classifications.
  - Harder to classify points get weighted more.

- Boosting Trees
  - Iterative algorithm where each execution is based on the previous results.

- Random Forest
  - RF applies bootstrap aggregation to train many different trees.
  - This creates an ensemble of different individual decision trees

- Random Forest
  - In random forest algorithm, Instead of using information gain or gini index for calculating the root node, the process of finding the root node and splitting the feature nodes will happen randomly.