**Pruning**

Pruning is a technique to partition a tree repeatedly until you get subsets that are homogeneous.

**Entropy**

Entropy is a measure of impurity or disorder of the data. The higher is the entropy more is the information content.

**Information gain**

The change in the entropy is also known as information gain. It also tells us how important the given attribute of the future vector is.

**Standard deviation gain**

It is the deviation of the values from the actual value.

To find the entropy and Information gain for the given example

Step 1:

Calculate the entropy of Parent set (i.e) Entropy of total outputs considered as a whole.

Total number of outcomes = 16

Probability of a high at conversion is 5/16

Probability of a medium at conversion is 5/16

Probability of a low at conversion is 6/16

Total Entropy = - ∑Pi

= -5/16 log(5/16) – 5/16 log(5/16) – 6/16 log(6/16)

= 1.5794328

Step 2:

Calculate the entropy of the child process and average

Demand:

1. Heavy

P(high) = 3/7

P(medium) = 2/7

P(low) = 2/7

Entropy = -3/7 log(3/7) - 2/7 log (2/7) – 2/7 log(2/7)

= 1.55665658

1. Moderate

P(high) = 2/4

P(medium) = 1/4

P(low) = 1/4

Entropy by the similar calculation = 1.5

1. Low

P(medium) = 2/5

P(low) = 3/5

Similarly, Entropy = 0.9709508

Total entropy of child is

∑|Sv|/|S| Entropy(Sv)

= 7/16 \* 1.55665658 + 4/16 \* 1.5 + 5/16 \* 0.9709508

= 1.35945937

Step 4: Gain is calculated by subtracting the average entropy of child from the parent entropy

Gain (S, A) = Entropy (S) - ∑|Sv|/|S| Entropy(Sv)

Gain (S, Demand) = 1.5794328 – 1.35945937

= 0.21997343

= 0.22

Step 5: We have calculated gain by considering the demand as a criteria, Similar calculation has to made for Strategic and Campaign cases.

Gain (S, Strategic) = Parent entropy – Average of child entropy

= 1.5794328 – 1.57265994

= 0.00677286

= 0.006

Gain (S, Campaign) = Parent entropy – Average of child entropy

= 1.5794328 – 1.28570586

= 0.29372

= 0.293