Exercice :

$$info(\bar{T}) = -\sum_{j=1}^{2} \frac{freq(\bar{T}, c_j)}{|\bar{T}|} \cdot \log_2 \frac{freq(\bar{T}, c_j)}{|\bar{T}|}$$

$$= -\frac{5}{10} \cdot \log_2 \frac{5}{10} - \frac{5}{10} \log_2 \frac{5}{10}$$

$$= 1$$

info Age ($\bar{T}$) ?

$$info(\bar{T}_{age}) = -\frac{3}{3} \log_2\left(\frac{3}{3}\right) = 0$$

$$info(\bar{T}_{moyen}) = -\frac{2}{4} \log_2\left(\frac{2}{4}\right) - \frac{2}{4} \log_2\left(\frac{2}{4}\right) = 1$$

$$info(\bar{T}_{recent}) = -\frac{3}{3} \log_2\left(\frac{3}{3}\right) = 0$$

$$info_{Age}(\bar{T}) = \frac{3}{10} info(\bar{T}_{age}) + \frac{4}{10} info(\bar{T}_{moyen}) + \frac{3}{10} info(\bar{T}_{recent})$$

$$= 0.4$$

Gain ratio (Age) ?

$$Gain(\bar{T}, Age) = info(\bar{T}) - info_{Age}(\bar{T}) = 1 - 0,4 = 0,6$$

$$Split\ Info(\bar{T}, Age) = -\frac{3}{10} \log_2 \frac{3}{10} - \frac{4}{10} \log_2 \frac{4}{10} - \frac{3}{10} \log_2 \frac{3}{10}$$

$$= 1,57$$

$$Gain\ Ratio(\bar{T}, Age) = \frac{Gain(\bar{T}, Age)}{Split\ info(\bar{T}, Age)} = \frac{0,6}{1,57} = 0,382$$

info concurrence ($\bar{T}$) ?

$$info(\bar{T}_{non}) = -\frac{2}{6} \log_2 \frac{2}{6} - \frac{4}{6} \log_2 \frac{4}{6} = 0,91$$

$$info(\bar{T}_{oui}) = -\frac{3}{4} \log_2 \frac{3}{4} - \frac{1}{4} \log_2 \frac{1}{4} = 0,81127$$

$$info_{conc}(\bar{T}) = \frac{6}{10} info(\bar{T}_{non}) + \frac{4}{10} info(\bar{T}_{oui}) = 0,87$$

Gain ratio (concurrence) ?

$$Gain(\bar{T}, concurrence) = info(\bar{T}) - info_{concur}(\bar{T}) = 1 - 0,87 = 0,13$$

$$Split\ info(\bar{T}, concurrence) = -\frac{6}{10} \log_2 \frac{6}{10} - \frac{4}{10} \log_2 \frac{4}{10} = 0,97$$

$$Gain\ Ratio(\bar{T}, concurrence) = \frac{0,13}{0,97} = 0,134$$

info Type ($\bar{T}$) ?

$$info(\bar{T}_{software}) = -\frac{3}{6} \log_2\left(\frac{3}{6}\right) - \frac{3}{6} \log_2\left(\frac{3}{6}\right) = 1$$

$info(T_{hardware}) = -\frac{2}{4}\log_2\left(\frac{2}{4}\right) - \frac{2}{4}\log_2\left(\frac{2}{4}\right) = 1$

$info_{type}(T) = \frac{6}{10} info(T_{software}) + \frac{4}{10} info(T_{hardware}) = 1$

Gain ratio (type)

$Gain(T, type) = info(T) - info_{type}(T) = 0$

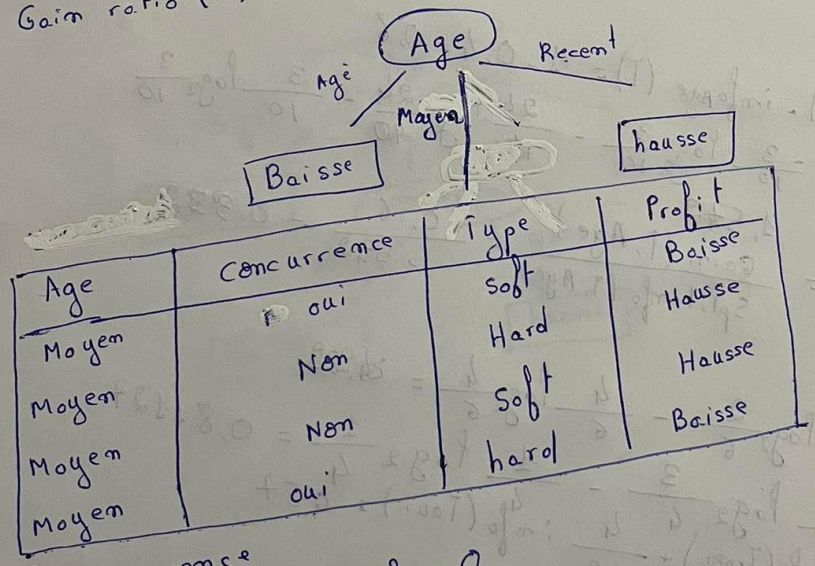
$Split info(T, type) = -\frac{6}{10}\log_2\frac{6}{10} - \frac{4}{10}\log_2\frac{4}{10} = 0,97$

$Gain\ ratio(T type) = \frac{0}{0,97} = 0$

$Gain\ ratio(T, type) = 0$

$Gain\ ratio(T, age) = 0,38$

$Gain\ ratio(T, concarrence) = 0,134$



Age	Concurrence	Type	Profit
Moyen	oui	soft	Baisse
Moyen	Non	Hard	Hausse
Moyen	Non	Soft	Hausse
Moyen	oui	hard	Baisse

Concurrence

$info(T_{oui}) = \frac{-2}{2}\log_2\frac{2}{2} = 0$

$info(T_{non}) = \frac{-2}{2}\log_2\frac{2}{2} = 0$

$info_{conc.}(T) = \frac{2}{4} info(T_{oui}) + \frac{2}{4} info(T_{non}) = 0$

$Gain(T, concurrence) = info(T) - info_{concur}(T) = 1$

$Splitinfo(T, concurrence) = -\frac{2}{4}\log_2\frac{2}{4} - \frac{2}{4}\log_2\frac{2}{4} = 1$

$Gain\ ratio(T, concurrence) = \frac{1}{1} = 1$

Type

$info(T_{soft}) = -\frac{1}{2}\log_2\frac{1}{2} - \frac{1}{2}\log_2\frac{1}{2} = 1$

$info(T_{harol}) = -\frac{1}{2}\log_2\frac{1}{2} - \frac{1}{2}\log_2\frac{1}{2} = 1$

$info_{Type}(T) = \frac{2}{4} info(T_{soft}) + \frac{2}{4} info(T_{harol}) = 1$

$Gain(T, type) = info(T) - info_{type}(T) = 0$

$split\ info = -\frac{2}{4}\log_2\frac{2}{4} - \frac{2}{4}\log_2\frac{2}{4} = 1$

$Gain\ ratio(T, type) = \frac{0}{1} = 0$

Gain ratio (T, concarrence) = 1

Gain ratio (T, type) = 0

Arbre :