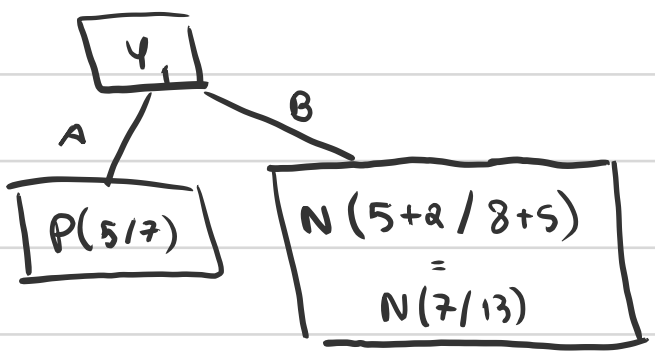
1)

Predicted \ real	P	N
P	5+3	2+2
N	3	5

=

Predicted \ real	P	N
P	8	4
N	3	5

2) Pruning (depth : 1)



CM:

Predicted \ real	P	N
P	5 (TP)	2 (FP)
N	6 (FN)	7 (TN)

$$Sens = \frac{TP}{TP+FN} = \frac{5}{5+6} = \frac{5}{11}$$

$$Prec = \frac{TP}{TP+FP} = \frac{5}{5+2} = \frac{5}{7}$$

$$F1 = \frac{2\,Prec \cdot Sens}{Prec + Sens} = \frac{2\,\frac{5}{7}\,\frac{5}{11}}{\frac{5}{7}+\frac{5}{11}} = \frac{5}{9}$$

3) Two reasons that can justify why the left path was not further decomposed are:

- To avoid overfitting, because exploring the left path would make the model adapted to the training data.
- All the observations of $Y_1 = A$ lead to $Y_{out} = P$.

4) $IG(Y_{out} \mid Y_1) = I(Y_{out}) - E(Y_{out} \mid Y_1)$

	P	N
Y_{out}	5+3+(8-5) = 11	5+(7-5)+(5-3) = 9

$$\Rightarrow P(Y_{out} = P) = 11/20$$

$$P(Y_{out} = N) = 9/20$$

$$I(Y_{out}) = -\left[\frac{11}{20}\log\left(\frac{11}{20}\right) + \frac{9}{20}\log\left(\frac{9}{20}\right)\right]$$

$$\simeq 0.992774454$$

$$E(Y_{out} \mid Y_1) = \frac{7}{20} I(Y_{out} \mid Y_1 = A) + \frac{13}{20} I(Y_{out} \mid Y_1 = B)$$

$$= -\frac{7}{20}\left(\frac{5}{7}\log_2\frac{5}{7} + \frac{2}{7}\log_2\frac{2}{7}\right) - \frac{13}{20}\left(\frac{7}{13}\log\frac{7}{13} + \frac{6}{13}\log\frac{6}{13}\right)$$

$$\simeq 0.949315$$

$$IG(Y_{out} \mid Y_1) = I(Y_{out}) - E(Y_{out} \mid Y_1)$$

$$\simeq 0.992774454 - 0.949315$$

$$= 0.043459$$

Pág. de testes

* Caso 3) estiveste bem *

- The information gain on the right path was greater than on the left one;

Testei "simula" Tabela
Ñ sei se é este a ideia

Y_1	Y_2	Y_{out}
A	1	P
B	4	N
A	3	P
B	5	N
B	2	P
A	3	N
B	4	N
A	1	P

16 Tem q dar: 0.0434594...

$E_{before} = 0.947746$

$E_{after} = 0.947935$