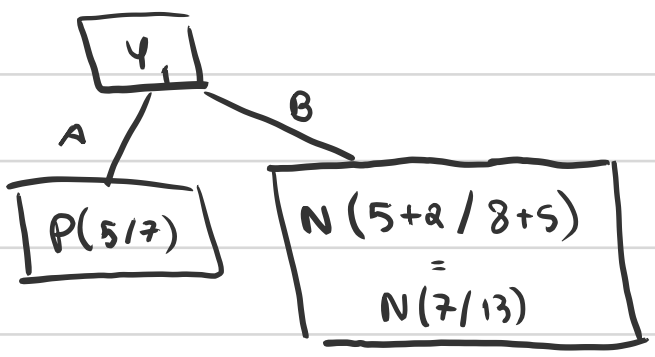
1)

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	0 (FN)	7 (TN)

$$Sens = \frac{TP}{TP+FN} = \frac{5}{5+0} = \frac{5}{11}$$

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

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

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}	12	8	: 20

$$\Rightarrow P(Y_{out} = P) = \frac{3}{5}$$

$$P(Y_{out} = N) = \frac{2}{5}$$

$$I(Y_{out}) = -\left[\frac{3}{5}\log\left(\frac{3}{5}\right) + \frac{2}{5}\log\left(\frac{2}{5}\right)\right] \simeq 0.97$$

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

$$= \frac{7}{20}(-0) + \frac{13}{20} \cdot -\left(\frac{8}{13}\log\left(\frac{8}{13}\right) + \frac{5}{13}\log\left(\frac{5}{13}\right)\right)$$

$$\simeq \frac{13}{20} \cdot -0.9612$$

$$\simeq -0.6248$$

$$IG(Y_{out} \mid Y_1) = I(Y_{out}) - E(Y_{out} \mid Y_1) : 0.97 + 0.6248 = 1.5948$$

Pág. de testes

* Caso 3) estivesse 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	Yout
A	1	P
B	4	N
A	3	P
B	5	N
B	2	P
A	3	N
B	4	N
A	1	P