

Naive Bayes

A	B	class
no	green	N
no	red	Y
yes	green	N
no	red	N
no	red	Y
no	green	Y
yes	green	N

RECORD TO CLASSIFY

X = A B class
 yes red class
 ↓ prediction
 N

$$P(N) = 4/7$$

$$P(Y) = 3/7$$

ATTRIBUTE A

$$P(\text{no} | N) = \frac{2}{4} \quad P(\text{no} | Y) = \frac{3}{3}$$

$$P(\text{yes} | N) = \frac{2}{4} \quad P(\text{yes} | Y) = \frac{0}{3}$$

ATTRIBUTE B

$$P(\text{green} | N) = \frac{3}{4} \quad P(\text{green} | Y) = \frac{1}{3}$$

$$P(\text{red} | N) = \frac{1}{4} \quad P(\text{red} | Y) = \frac{2}{3}$$

$$P(X | N) \cdot P(N) = P(\text{yes} | N) \cdot P(\text{red} | N) \cdot P(N) = \frac{2}{4} \cdot \frac{1}{4} \cdot \frac{4}{7} = \frac{2}{28}$$

$$P(X | Y) \cdot P(Y) = P(\text{yes} | Y) \cdot P(\text{red} | Y) \cdot P(Y) = 0 \cdot \frac{2}{3} \cdot \frac{3}{7} = \emptyset$$

AVOID WITH LAPLACE

$$\frac{N_i + 1}{N_c + C}$$

ROCK we want to get 2 clusters
 SIMILARITY $\Theta = 0.4$
 THR.

	P ₁	P ₂	P ₃	P ₄	P ₅
P ₁	1	0.7	0.2	0.5	0.5
P ₂		1	0.6	0.8	0.1
P ₃			1	0.5	0.4
P ₄				1	0.3
P ₅					1

$$f(\Theta) = \frac{1-\Theta}{1+\Theta} = 0.43$$

$$1 + 2f(\Theta) = 1.86$$

	P ₁	P ₂	P ₃	P ₄	P ₅
P ₁	1	1	0	1	1
P ₂	1	1	1	1	0
P ₃	0	1	1	1	1
P ₄	1	1	1	1	0
P ₅	1	0	1	0	1

= A

GOODNESS FUNCTION

$$g(C_i, C_j) = \frac{\text{Link}(C_i, C_j)}{(n+m) \frac{1}{2} f(\Theta) - n \frac{1}{2} f(\Theta) - m \frac{1}{2} f(\Theta)}$$

A x A = Link

	P ₁	P ₂	P ₃	P ₄	P ₅
P ₁	-	3	3	3	2
P ₂		-	3	4	2
P ₃			-	3	2
P ₄				-	2
P ₅					-

	P ₁	P ₂	P ₃	P ₄	P ₅
P ₁	-	1.85	1.85	1.85	1.23
P ₂		-	1.85	2.46	1.23
P ₃			-	1.85	1.23
P ₄				-	1.23
P ₅					-

LINKS

	P ₁	P ₂₄	P ₃	P ₅
P ₁	-	6	3	2
P ₂₄		-	6	4
P ₃			-	2
P ₅				-

	P ₁	P ₂₄	P ₃	P ₅
P ₁	-	1.95	1.85	1.23
P ₂₄		-	1.95	1.3
P ₃			-	1.23
P ₅				-

⇒

P₁₂₄₃, P₅

We get 2 clusters so we can stop.

SPM

$\{A\}_0$ $\{B, C, D\}_1$ $\{C, D\}_2$ $\{A, D, E\}_3$ $\{A, B\}_4$ $\{F\}_5$ $\{A, B\}_6$ $\{B, D\}_7$

$\omega_1 = \{A\} \{D\}$

Occ:
 $\langle 0, 2 \rangle, \langle 0, 3 \rangle$
 $\langle 0, 7 \rangle, \langle 3, 7 \rangle$
 $\langle 4, 7 \rangle, \langle 6, 7 \rangle$

min-gap = 1 gap > 1

NO $\langle 6, 7 \rangle$

$\omega_2 = \{A\} \{E\} \{B\}$

$\langle 0, 3, 4 \rangle, \langle 0, 3, 6 \rangle$
 $\langle 0, 3, 7 \rangle$

$\langle 0, 3, 6 \rangle, \langle 0, 3, 7 \rangle$

$\omega_3 = \{A\} \{D\} \{E\}$

$\langle 0, 1, 3 \rangle, \langle 0, 2, 3 \rangle$

none