Ejercicios Manuales:

Queremos saber cuáles son las posibles notas que las personas tendrían en un examen con base a dos variables, si la persona está borracha o si está sobria y si el examen está fácil o difícil:

Caso 1: $E = No$, $D = easy$

$$P(grade \mid Ebrio = No,\ Difficulty = easy)$$

$$\propto P(grades \wedge Ebrio \wedge Diff)$$

$$\rightarrow \propto P(grades \wedge Ebrio \wedge Diff \wedge Intelligence)$$

Para $G = A$

$$P(A \mid E = No,\ D = Easy)$$

$$= P(E = no)\ P(D = easy)\ P(\ I\ )\ P(G = A \mid I, D, E)$$

$$= \quad \| \quad P(I = low) \quad \|$$

$$+$$

$$\| \quad P(I = high) \quad \|$$

$$= (0,99)(0,6)\overset{0,04158}{(0,7)}(0,1) + (0,99)(0,6)\overset{0,16038}{(0,3)}(0,1)$$

$$= 0,20196$$

Para $G = B$

$$= (0,99)(0,6)\overset{0,04158}{(0,7)}(0,1) + (0,99)(0,6)\overset{0,014256}{(0,3)}(0,08)$$

$$= 0,05583$$

Para G=C

$$(0,99)(0,6)\overset{0,3326}{(0,7)}(0,8) + (0,99)(0,6)\overset{0,003}{(0,3)}(0,02)$$

$$= 0,336204$$

Así: $[\,0,20196,\ 0,055836,\ 0,336204\,]$

$$1 = \alpha\left[0,20196 + 0,05\overset{0,5940}{\cancel{5}}836 + 0,336204\right]$$

$$\rightarrow \quad \alpha = 1/0,5940 = 1,6835$$

$$\rightarrow \quad \mathcal{D}_C \text{ normaliza:}$$

$$P(\text{grados} \mid \text{Fibra} = \text{No},\ \text{Dificultad} = \text{easy})$$

$$= [\underset{A}{0,3399},\ \underset{B}{0,0939},\ \underset{C}{0,5659}]$$

Caso 2: $E = Si$, $D = easy$

$$P(Grade \mid Ebrio = Si , Difficulty = easy)$$

$$\propto P(Grade \wedge Ebrio \wedge Diff)$$

$$\rightarrow \propto P(Grade \wedge Ebrio \wedge Diff \wedge Intelligence)$$

Para $G = A$

$$P(A \mid E = si , D = Easy)$$

$$= P(E = si)\ P(D = easy)\ P(\ I\ )\ P(G = A \mid I, D, E)$$

$$= \quad \| \quad P(I = low) \quad \|$$

$$+$$

$$\| \quad P(I = high) \quad \|$$

$$= (0,01)\ (0,6)\ (0,7)\ (0,05) + (0,01)\ (0,6)\ (0,3)\ (0,7)$$

(0,00021 → $(0,01)\ (0,6)\ (0,7)\ (0,05)$; 0,00126 → $(0,01)\ (0,6)\ (0,3)\ (0,7)$)

$$= 0,00147$$

Para $G = B$

$$= P(E = si)\ P(D = easy)\ P(\ I\ )\ P(G = B \mid I, D, E)$$

$$= \quad \| \quad P(I = low) \quad \|$$

$$+$$

$$\| \quad P(I = high) \quad \|$$

$$= (0,01)\ (0,6)\ (0,7)\ (0,05) + (0,01)\ (0,6)\ (0,3)\ (0,2)$$

(0,00021 → $(0,01)\ (0,6)\ (0,7)\ (0,05)$; 0,00036 → $(0,01)\ (0,6)\ (0,3)\ (0,2)$)

$$= 0,00057$$

Para $G=C$

$$= P(E=si)\,P(D=easy)\,P(\;I\;)\,P(G=C \mid I,D,E)$$

$$= \quad '' \quad P(I=low) \quad ''$$

$$+ \quad '' \quad P(I=high) \quad ''$$

$$= \overbrace{(0{,}01)(0{,}6)(0{,}7)(0{,}9)}^{\to 0{,}000378} + \overbrace{(0{,}01)(0{,}6)(0{,}3)(0{,}1)}^{0{,}00018}$$

$$= 0{,}00396$$

$\to$ $P(G \mid E=si,\; D=Easy)$

$$= \alpha\,[\,0{,}00147,\; 0{,}00057,\; 0{,}00396\,] \quad \to \beta$$

$$= sum(\beta) = 0{,}006$$

$\to$ $\alpha = \frac{1}{0{,}006} = 166{,}66\ldots$

así

$$P(G \mid E=si,\; D=Easy) = [\,0{,}2449,\; 0{,}0949,\; 0{,}6599\,]$$

A B C

Caso 3: $E = Si$, $D = hard$

$$P(Grade \mid Ebrio = Si, Difficulty = hard)$$

$$\propto P(Grade \wedge Ebrio \wedge Diff)$$

$$\rightarrow \propto P(Grade \wedge Ebrio \wedge Diff \wedge Intelligence)$$

Para $G = A$

$$P(G \mid E = si, D = hard)$$

$$= P(E = si)\ P(D = hard)\ P(I)\ P(G = A \mid I, D, E)$$

$$= \quad \| \quad P(I = low) \quad \| \quad + \quad \| \quad P(I = high) \quad \|$$

$$= (0,01)(0,4)(0,7)(0,01) \rightarrow 0,000028 \quad + \quad (0,01)(0,4)(0,3)(0,6) \rightarrow 0,00072$$

$$= 0,000748$$

Para $G = B$

$$P(G \mid E = si, D = hard)$$

$$= P(E = si)\ P(D = hard)\ P(I)\ P(G = B \mid I, D, E)$$

$$= \quad \| \quad P(I = low) \quad \| \quad + \quad \| \quad P(I = high) \quad \|$$

$$= (0,01)(0,4)(0,7)(0,01) \rightarrow 0,00028 \quad + \quad (0,01)(0,4)(0,3)(0,3) \rightarrow 0,00036$$

$= 0{,}0003879$

$P_{2.1.2}$ $G = C$

$P(G \mid E = si, D = hard)$

$= P(E = si)\, P(D = hard)\, P(\;I\;)\, P(G = C \mid I, D, E)$

$=$ " $P(I = low)$ "

$+$

" $P(I = high)$ "

$= (0{,}01)(0{,}4)\overbrace{(0{,}7)(0{,}98)}^{\to 0{,}002744} + (0{,}01)(0{,}4)\overbrace{(0{,}3)(0{,}1)}^{0{,}00012}$

$= 0{,}002864$

$\to P(G \mid E = si, D = hard)$

$= \alpha[0{,}000748,\ 0{,}000387,\ 0{,}0028]$

$= sum(\beta) = 0{,}004$

$\to \alpha = \dfrac{1}{0{,}004} = 250$

así

$P(G \mid E = si, D = Easy) = [0{,}187,\ 0{,}0969,\ 0{,}716]$

A B C