2023feb17

Friday, February 17, 2023 12:58

1)

		A	
		0	1
B	0	0.42	0.18
	1	0.28	0.12

$P(B)$

		$P(B)$
0	0.42 + 0.18 =	0.6
1	0.28 + 0.12	= 0.4

$P(A=1) = P(A=1, B=0) + P(A=1, B=1)$
$= 0.18 + 0.12$
$= 0.3$

$P(A=0)$
$= 0.7$

	0	1
$P(A) =$	0.7	0.3

$P(A=0) = 0.42 + 0.28$
$P(A=1) = 0.18 + 0.12$

b) Are they independent?

Does $P(A,B) = P(A)\,P(B)$?

$P(A=0, B=1) = P(A=0)\,P(B=1)$?

$0.28 = 0.7 \times 0.4$ ✓ Yes

Yes, independent b/c

$P(A=0, B=1) = P(A=0)\,P(B=1)$

and b/c they're binary, this implies that

$P(A=a, B=b) = P(A=a)\,P(B=b)$ FOR ALL a, b

$P(A=1, B=1) = P(B=1) - P(A=0, B=1)$

$P(A=1) = 1 - P(A=0)$

$P(A=1, B=1) = 0.12 \stackrel{?}{=} P(A=1)\,P(B=1) = 0.3 \times 0.4$ ✓

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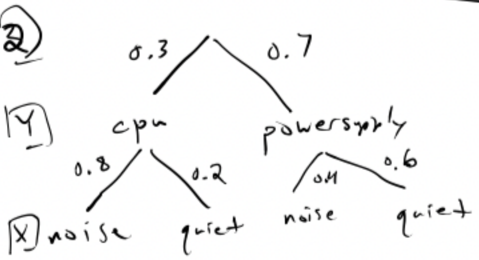
2)



		Y	
		cpu	pow
X	noise	(0.3)(0.8)	(0.7)(0.4)
	quiet	(0.3)(0.2)	(0.7)(0.6)

$f(X) = \arg\max_Y P(Y \mid X) = \arg\max_Y P(Y, X)$

$= \begin{cases} \text{cpu} & \text{never} \\ \text{powerSupply} & \text{if } X = \text{quiet or } X = \text{noisy} \end{cases}$