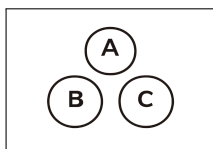


10 Discrete Distribution Posterior Probabilities

B

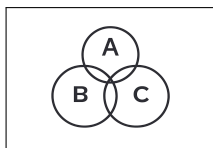


$$P(H) = 0.30$$

$$P(L) = 0.70$$

$$P(A|H) = 0.40$$

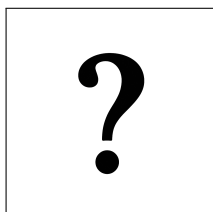
$$P(A|L) = 0.20$$



$$P(A) = P(A|H)P(H) + P(A|L)P(L)$$

$$P(A) = (0.4)(0.3) + (0.2)(0.7) = 0.12 + 0.14 = 0.26$$

$$P(H|A) = \frac{P(A|H)P(H)}{P(A)} = \frac{(0.4)(0.3)}{0.26} = \frac{0.12}{0.26} = \frac{6}{13} \approx 0.4615$$



$$P(S) = 0.50$$

$$P(P) = 0.40$$

$$P(U) = 0.10$$

$$P(D|S) = 0.010$$

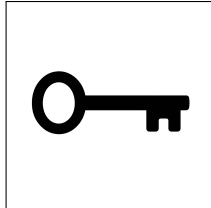
$$P(D|P) = 0.005$$

$$P(D|U) = 0.001$$

$$P(U|D) = ?$$

10 Discrete Distribution Posterior Probabilities

B



$$\begin{aligned}P(S) &= 0.50 \\P(P) &= 0.40 \\P(U) &= 0.10 \\P(D|S) &= 0.010 \\P(D|P) &= 0.005 \\P(D|U) &= 0.001 \\P(U | D) &= ?\end{aligned}$$

$$\begin{aligned}P(D) &= P(D|S)P(S) + P(D|P)P(P) + P(D|U)P(U) \\P(D) &= (0.010)(0.50) + (0.005)(0.40) + (0.001)(0.10) \\P(D) &= 0.005 + 0.002 + 0.0001 \\P(D) &= 0.0071\end{aligned}$$

$$P(U | D) = \frac{P(D|U) \cdot P(U)}{P(D)} = \frac{(0.001)(0.10)}{0.0071} = \frac{0.0001}{0.0071} \approx 0.01$$