CANDY STORE - PROBLEM II

BAG 1	BAG 2
YELLOW - 20%	YELLOW - 14%
GREEN - 10%	GREEN - 20%
OTHERS - 70%	OTHERS - 76%

WE DRAW 2 CANDIES, ONE FROM EACH BAG.

CANDY A = GREEN

CANDY B = YELLOW

CALCULATE THE PROBABILITY THAT CANDY B WAS DRAWN FROM BAG 1

$$P(\text{CANDY B = BAG 1} \mid \begin{matrix}\text{candy A = GREEN} \\ \text{candy B = YELLOW}\end{matrix}) \qquad P(A|B) = \frac{P(B|A) \cdot P(A)}{P(B)}$$

PRIOR $(P(A))$

$P(\text{CANDY B = BAG 1}) = \frac{1}{2}$ (CANDY B, INDEPENDENT OF COLOR, CAN COME FROM BAG 1 OR BAG 2 W/ EQUAL PROBABILITY)

NORMALIZING CONSTANT $(P(B))$

$$P\begin{pmatrix}\text{CANDY A = GREEN} \\ \text{CANDY B = YELLOW}\end{pmatrix} = \underbrace{(0.2 \cdot 0.2)}_{\substack{P(\text{yellow}) \cdot P(\text{green}) \\ \text{BAG 1} \quad \text{BAG 2}}} \cdot 0.5 + \underbrace{(0.1 \cdot 0.14)}_{\substack{P(\text{Green}) \cdot P(\text{Yellow}) \\ \text{BAG 1} \quad \text{BAG 2}}} \cdot 0.5 \simeq 0,027$$

$(0.2 \cdot 0.2) \cdot 0.5$: PROBABILITY OF CANDY A = BAG 1, CANDY B = BAG 2,

$(0.1 \cdot 0.14) \cdot 0.5$: PROBABILITY CANDY A = BAG 2, CANDY B = BAG 1,

THIS IS THE PROBABILITY OF OBSERVING A (YELLOW, GREEN), DRAW INDEPENDENT OF WHICH BAG EACH CAME FROM!

LIKELIHOOD $(P(B|A))$

$$P\left(\begin{matrix}\text{CANDY A = GREEN} \\ \text{CANDY B = YELLOW}\end{matrix} \middle| \text{CANDY B = BAG 1}\right) = \underbrace{0.2}_{\substack{P(\text{yellow}) \\ \text{ON BAG 1}}} \cdot \underbrace{0.2}_{\substack{P(\text{GREEN}) \\ \text{ON BAG 2}}} = 0,04$$

POSTERIOR $(P(A|B))$

$$P\left(\text{CANDY B = BAG 1} \middle| \begin{matrix}\text{CANDY A = yellow} \\ \text{CANDY B = green}\end{matrix}\right) = \frac{0,04 \cdot 0,5}{0,027} \simeq 0,74$$