Indian Institute of Technology Hyderabad

PROBABILITY ASSIGNMENT

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1 problem

Let A and B be independent events with $\Pr(A) = 0.3$ and $\Pr(B) = 0.4$ Find

1. $\Pr(AB)$
2. $\Pr(A+B)$
3. $\Pr(A|B)$
4. $\Pr(B|A)$

2 solution

Since A and B are independent events, we have

1. $\Pr(AB)$

$$\begin{aligned}\Pr(AB) &= \Pr(A)\Pr(B)\\ &= 0.3 \times 0.4\\ &= 0.12\end{aligned} \tag{1}$$

2. $\Pr(A+B)$

$$\begin{aligned}\Pr(A+B) &= \Pr(A) + \Pr(B)\\ &\quad - \Pr(AB)\\ &= 0.3 + 0.4 - 0.12\\ &= 0.58\end{aligned} \tag{2}$$

3. $\Pr(A|B)$

$$\begin{aligned}\Pr(A|B) &= \frac{\Pr(AB)}{\Pr(B)}\\ &= \frac{0.12}{0.40}\\ &= 0.3\end{aligned} \tag{3}$$

4. $\Pr(B|A)$

$$\begin{aligned}\Pr(B|A) &= \frac{\Pr(BA)}{\Pr(A)}\\ &= \frac{0.12}{0.30}\\ &= 0.4\end{aligned} \tag{4}$$