Assignment:- 1

AI1110: Probability and Random Variables
Indian Institute of Technology, Hyderabad

Dudekula Dheeraj
CS22BTECH11019

NCERT(12.13.6.18)

Question: If $\Pr(A|B) > \Pr(A)$, then which of the following is correct?

(A) $\Pr(B|A) < \Pr(B)$
(B) $\Pr(AB) < \Pr(A)\Pr(B)$
(C) $\Pr(B|A) > \Pr(B)$
(D) $\Pr(B|A) = \Pr(B)$

Solution: We can write the given condition as:

$$\Pr(A|B) = \frac{\Pr(AB)}{\Pr(B)} > \Pr(A) \tag{1}$$

Multiplying both sides of Equation (1) by $\Pr(B)$, we get:

$$\Pr(AB) > \Pr(A)\Pr(B) \tag{2}$$

Dividing both sides of Equation (2) by $\Pr(A)$, we get:

$$\frac{\Pr(AB)}{\Pr(A)} > \Pr(B) \tag{3}$$

Using the definition of conditional probability, we have:

$$\Pr(B|A) = \frac{\Pr(AB)}{\Pr(A)} \tag{4}$$

Substituting Equation (4) into Equation (3), we get:

$$\Pr(B|A) > \Pr(B) \tag{5}$$

Therefore, the answer is option (C), $\Pr(B|A) > \Pr(B)$.

Hence, we can conclude that if $\Pr(A|B) > \Pr(A)$, then $\Pr(B|A) > \Pr(B)$.