Assignment 8

Gautam Singh (CS21BTECH11018)

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Outline

Problem Statement

(NCERT Class 12, Exercise 13.2.16) In a hostel, 60% of the students read Hindi newspaper, 40% read English newspaper and 20% read both Hindi and English newspapers. A student is selected at random.

- Find the probability that she reads neither Hindi nor English newspapers.
- If she reads Hindi newspaper, find the probability that she reads English newspaper.
- If she reads English newspaper, find the probability that she reads Hindi newspaper.

Solution

Events

1. E: Student reads English newspaper
2. F: Student reads Hindi newspaper

Given

1. $\Pr(E) = 0.4$
2. $\Pr(F) = 0.6$
3. $\Pr(EF) = 0.2$

To find

1. $\Pr(E' + F')$
2. $\Pr(E|F)$
3. $\Pr(F|E)$

1. $\Pr(E' + F')$

Using De-Morgan's Laws,

$$\Pr\left(E' + F'\right) = \Pr\left((EF)'\right) \tag{1}$$
$$= 1 - \Pr(EF) \tag{2}$$
$$= 1 - 0.2 = \frac{4}{5} \tag{3}$$

2. $\Pr(E|F)$

$$\Pr(E|F) = \frac{\Pr(EF)}{\Pr(F)} \tag{4}$$
$$= \frac{0.2}{0.6} = \frac{1}{3} \tag{5}$$

3. $\Pr(F|E)$

$$\Pr(F|E) = \frac{\Pr(EF)}{\Pr(E)} \tag{6}$$

$$= \frac{0.2}{0.4} = \frac{1}{2} \tag{7}$$

Answers

1. $\Pr(E' + F') = \frac{4}{5}$
2. $\Pr(E|F) = \frac{1}{3}$
3. $\Pr(F|E) = \frac{1}{2}$