AI1110 Assignment 6

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Outline

Abstract

- This document contains the solution to Question of Chapter 13 (Probability) in the NCERT Class 12 Textbook.

Question

Probability ex 13.1 q5.

if $\Pr(A) = \frac{6}{11}$,$\Pr(B) = \frac{5}{11}$ and $\Pr(A+B) = \frac{7}{11}$,find

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

Theory

Inclusive and exculsive principle

If there are events A and B and the individuial probabilities ,probability of occurrence of both events at same time are known,then probability of occurence of either event A or B is

$$\Pr(A+B) = \Pr(A) + \Pr(B) - \Pr(AB) \tag{1}$$

Conditional probablity

'the probability of A given B'

$$\Pr(A|B) = \frac{\Pr(AB)}{\Pr(B)} \tag{2}$$

Solution

Let X,Y are random variables that represents the occurence of events A and B. In the problem it is given that $\Pr(X=1)=\frac{6}{11}, \Pr(Y=1)=\frac{5}{11}$ and $\Pr(\{X=1\}+\{Y=1\})=\frac{7}{11}$

Event	Random Variables
A'	$X=0$
A	$X=1$
B'	$Y=0$
B	$Y=1$

Table 1: Events

1. Intersection of A and B

$$\Pr(AB) = \Pr(\{X=1\},\{Y=1\}) \tag{3}$$
$$= \Pr(X=1) + \Pr(Y=1) - \Pr(\{X=1\} + \{Y=1\}) \tag{4}$$
$$= \frac{6}{11} + \frac{5}{11} - \frac{7}{11} \tag{5}$$
$$= \frac{4}{11} \tag{6}$$

2. Conditional probability of A given B

$$\Pr(A|B) = \frac{\Pr(\{X=1\},\{Y=1\})}{\Pr(Y=1)} \tag{7}$$
$$= \frac{\frac{4}{11}}{\frac{5}{11}} \tag{8}$$
$$= \frac{4}{5} \tag{9}$$

3. Conditional probability of B given A

$$\Pr(B|A) = \frac{\Pr(\{X=1\},\{Y=1\})}{\Pr(X=1)} \tag{10}$$

$$= \frac{\frac{4}{11}}{\frac{6}{11}} \tag{11}$$

$$= \frac{2}{3} \tag{12}$$