AI1103 ASSIGNMENT 3

NAME:RONGALA ARUN SIDDARDHA, ROLLNO:AI20BTECH11019

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and latex-tikz code from

1 PROBLEM GATE 1997 CS Q1

The probability that it will rain today is 0.5. The probability that it will rain tomorrow is 0.6. The probability that it will rain either today or tomorrow is 0.7 What is the probability that it will rain today and tomorrow?

2 SOLUTION

Let X_0,X_1 be two random variable taking two values 0 and 1(Bernoulli random variable).
let X_0=0 be an event of not raining today ,let X_0=0 be an event of not raining today

X_1=0 be an event of not raining tomorrow , let X_1=1 be an event of not raining tomorrow.

Given that
Probability that it will rain today

$$\Pr(X_0 = 1) = \frac{1}{2} \qquad (2.0.1)$$

Probability that it will rain tomorrow

$$\Pr(X_1 = 1) = \frac{3}{5} \qquad (2.0.2)$$

Probability that it will either today or tomorrow

$$\Pr(X_0 = 1 \cup X_1 = 1) = \Pr(X_0 = 1) + \Pr(X_1 = 1) -$$
$$\Pr(X_0 = 1, X_1 = 1) = \frac{7}{10} \qquad (2.0.3)$$

We have to find the probability that it will rain today and tomorrow which is

$$\Pr(X_0 = 1, X_1 = 1) = \Pr(X_0 = 1 \cap X_1 = 1) \quad (2.0.4)$$

from (2.0.3)
$\Pr(X_0 = 1 \cap X_1 = 1) = \Pr(X_0 = 1) + \Pr(X_1 = 1) - \Pr(X_0 = 1 \cup X_1 = 1)$

Substituting the values gives

$$\Pr(X_0 = 1 \cap X_1 = 1) = 0.5 + 0.6 - 0.7 = 0.4 \qquad (2.0.5)$$

So, therefore the probability that it will rain today and tomorrow is 0.4.