ASSIGNMENT-12

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Download all python codes from

https://github.com/unnatigupta2320/Assignment_12/blob/master/codes.py

and latex-tikz codes from

https://github.com/unnatigupta2320/Assignment_12

1 Question No. 2.8

Two groups are competing for the position on the Board of directors of a corporation.The probabilities that first and second group will win are 0.6 and 0.4 respectively.Further if the first group wins,the probability of introducing a new product is 0.7 and the corresponding probability is 0.3 if the second group wins.Find the probability that the new product is introduced by the second group.

2 Solution

- Let X and Y be the input variables which can be referred from the table 2.1:-

X	X=1 : New product is introduced
	X=0 : No New product
Y	Y=1 : First group wins
	Y=0 : Second group wins

TABLE 2.1: Assumed Variables

- Furthermore, Data given is tabularised in the table 2.2 :-

	Expression	Value
a.)	Pr(Y=1)	0.6
b.)	Pr(Y=0)	0.4
c.)	$\Pr(X=1\|Y=1)$	0.7
d.)	$\Pr(X=1\|Y=0)$	0.3

TABLE 2.2: Data Given

- So, the probability that new product is introduced by the second group can be given using **Baye's Theorem** as:-

$$\implies \Pr(Y=0|X=1) = \frac{\Pr(X=1|Y=0)\Pr(Y=0)}{\sum_{i=0}^{1}\Pr(X=1|Y=i)\Pr(Y=i)} \tag{2.0.1}$$

$$\implies \Pr(Y=0|X=1) = \frac{0.3\times 0.4}{0.3\times 0.4 + 0.7\times 0.6} \tag{2.0.2}$$

$$\implies \Pr(Y=0|X=1) = \frac{0.12}{0.54} = \frac{2}{9} \tag{2.0.3}$$

$$\boxed{\therefore \Pr(Y=0|X=1) = \frac{2}{9}} \tag{2.0.4}$$