AI1103 : Assignment 1

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PROBLEM(2.8)

Two groups are competing for the position on the board of directors of a corporation.The probabilities that the first and the second groups 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 introduced was by the second group.

SOLUTION

Let $H \in \{0, 1\}$ be the random variable denoting which the group A wins, with $H = 0$ representing group A wins. Let $H \in \{0, 1\}$ be the random variable denoting whether the product being introduced, with $M = 0$ representing that the product is not introduced by A. We are given that:

$$Pr(H = 0) = 0.6$$
$$Pr(M = 1|H = 0) = 0.42$$
$$Pr(M = 1|H = 1) = 0.12$$

, by Bayes Theorem, we say that:

TABLE 0

	$H = 0$	$H = 1$
$M = 0$	0.18	0.12
$M = 1$	0.42	0.28

$$
\begin{aligned}
Pr(H = 1|M = 1) &= \frac{Pr(M = 1|H = 1) \cdot Pr(H = 1)}{\sum_{i=0}^{1} Pr(M = 1|H = i) \cdot Pr(H = i)} \\
&= \frac{\Pr(() M = 1|H = 1) \cdot Pr(H = 1)}{\begin{aligned}&Pr(M = 1|H = 1) \cdot Pr(H = 1) \\ &+ Pr(M = 1|H = 0) \cdot Pr(H = 0)\end{aligned}} \\
&= \frac{0.3 \cdot 0.4}{0.3 \cdot 0.4 + 0.6 \cdot 0.7} \\
&= \frac{12}{54} \\
&= 0.23
\end{aligned}
$$

The probability that the new product introduced by the second group B is 0.23.