AI1103 : Assignment 7

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GATE-2014-S3-ME-ME SECN-PROBLEM(4)

A group consists of equal number of men and women. Of this group, 20% of the men and 50% of the women are unemployed. If a person is selected at random from this group, the probability of the selected person being employed is

GATE-2014-S3-ME-ME SECN-SOLUTION(4)

Let the random variable $X \in \{0, 1\}$ represent the gender of the person. $X = 0$ denotes a female, while $X = 1$ denotes a male. Given,

$$n(X = 0) = n(X = 1) \qquad (4.1)$$

$$\Rightarrow p_X(0) = p_X(1) = \frac{1}{2} \qquad (4.2)$$

Let the random variable $Y \in \{0, 1\}$ represent if the person is employed. $Y = 0$ denotes unemployed, while $Y = 1$ denotes employed. Given,

$$p_{Y|X}(0|0) = 0.5 \Rightarrow p_{Y|X}(1|0) = 0.5 \qquad (4.3)$$

$$p_{Y|X}(0|1) = 0.2 \Rightarrow p_{Y|X}(1|1) = 0.8 \qquad (4.4)$$

To find : $p_Y(1)$

$$p_Y(1) = p_{Y|X}(1|0)p_X(0) + p_{Y|X}(1|1)p_X(1) \qquad (4.5)$$

$$p_Y(1) = (0.5)(0.5) + (0.8)(0.5) \qquad (4.6)$$

$$\therefore p_Y(1) = 0.65 \qquad (4.7)$$