AI5002: Assignment 5

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AI20RESCH11003

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1 PROBLEM

An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accidents are 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that he is a scooter driver?

2 SOLUTION

Let A be the event denoting an accident.
Let B_1, B_2 and B_3 be the event denoting the number of insured scooter drivers, car drivers and truck drivers respectively.
Given are:

$$P(B_1) = \frac{2000}{12000} = \frac{2}{12} = \frac{1}{6} \qquad (2.0.1)$$

$$P(B_2) = \frac{4000}{12000} = \frac{4}{12} = \frac{1}{3} \qquad (2.0.2)$$

$$P(B_3) = \frac{6000}{12000} = \frac{6}{12} = \frac{1}{2} \qquad (2.0.3)$$

$$P(A|B_1) = 0.01 \qquad (2.0.4)$$

$$P(A|B_2) = 0.03 \qquad (2.0.5)$$

$$P(A|B_3) = 0.15 \qquad (2.0.6)$$

We have to find $P(B_1|A)$.
Using Bayes Theorem,

$$P(B_1|A) = \frac{P(A|B_1).P(B_1)}{\sum_{i=1}^{3} P(A|B_i).P(B_i)} \qquad (2.0.7)$$

$$= \frac{0.01 * \frac{2}{12}}{0.01 * \frac{2}{12} + 0.03 * \frac{4}{12} + 0.15 * \frac{6}{12}} \qquad (2.0.8)$$

$$= \frac{1}{52} \qquad (2.0.9)$$

$$= 0.01923 \qquad (2.0.10)$$