Assignment 1

Tanmay Goyal - AI20BTECH11021

Download all python codes from

https://github.com/tanmaygoyal258/AI1103---Probability/blob/main/Assignment%201/code.py

and latex-tikz codes from

https://github.com/tanmaygoyal258/AI1103---Probability/blob/main/Assignment%201/main.tex

1 Problem

(Prob 5.18) An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of accident is 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that it is a scooter driver?

2 Solution

By definition

$$\Pr(A|B) = \frac{\Pr(AB)}{\Pr(B)} \tag{2.0.1}$$

Also, by Bayes' Theorem

$$\Pr(A) = \sum_{i=1}^{n} \Pr(A|E_i)\Pr(E_i) \tag{2.0.2}$$

where $E_1, E_2 \dots E_n$ are partitions of the complete sample set.

The following symbols would be used:

S	Scooter Drivers
C	Car Drivers
T	Truck Drivers
A	Involved in an Accident

where S, C and T represent all the partitions of the sample set.

Also, the following values are known:

$$\Pr(S) = \frac{2000}{2000+4000+6000} = \frac{1}{6} \tag{2.0.3}$$

$$\Pr(C) = \frac{4000}{2000+4000+6000} = \frac{1}{3} \tag{2.0.4}$$

$$\Pr(T) = \frac{6000}{2000+4000+6000} = \frac{1}{2} \tag{2.0.5}$$

$$\Pr(A|S) = 0.01 \tag{2.0.6}$$

$$\Pr(A|S) = 0.03 \tag{2.0.7}$$

$$\Pr(A|T) = 0.15 \tag{2.0.8}$$

We have to find:

$$\Pr(S|A) = \frac{\Pr(SA)}{\Pr(A)} \tag{2.0.9}$$

Using (2.0.1) and (2.0.2), we get:

$$\Pr(S|A) = \frac{\Pr(A|S)\Pr(S)}{\Pr(A|S)\Pr(S) + \Pr(A|C)\Pr(C) + \Pr(A|T)\Pr(T)} \tag{2.0.10}$$

$$= \frac{\frac{0.01}{6}}{\frac{0.01}{6} + \frac{0.03}{3} + \frac{0.15}{2}} \tag{2.0.11}$$

$$= \frac{1}{52} \tag{2.0.12}$$