Assignment 3
AI1110

sumeeth kumar

May 16, 2022

LaTeX

Outline

1 Question

2 solution

Question 7(CBSE class 12-Ex 13.3)

- 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?

solution

- Let E_1 be the event that the driver is a scooter driver, E_2 be the event that the driver is a car driver and E_3 be the event that the driver is a truck driver.
  Total number of drivers $= 2000 + 4000 + 600 = 1200$
  Then,

$$\Pr[E_1] = \frac{2000}{12000} = \frac{1}{6} \tag{1}$$

$$\Pr[E_2] = \frac{4000}{12000} = \frac{1}{3} \tag{2}$$

$$\Pr[E_3] = \frac{6000}{12000} = \frac{1}{2} \tag{3}$$

solution

Let A be the event that the person meet with an accident. now,

$$\Pr[A|E_1] = \frac{1}{100} \tag{4}$$

$$\Pr[A|E_2] = \frac{3}{100} \tag{5}$$

$$\Pr[A|E_3] = \frac{15}{100} \tag{6}$$

Now the probability that the driver is a scooter driver, being given that he met with an accident, is $\Pr[E_1|A]$.

bayers theorem

$$\Pr[E_1|A] =$$

$$\frac{\Pr[E_1].\Pr[A|E_1]}{\Pr[E_1].\Pr[A|E_1] + \Pr[E_2].\Pr[A|E_2] + \Pr[E_1].\Pr[A|E_1]} \quad (7)$$

by substituting values we get,

$$\Pr[E_1|A] = \frac{(\frac{1}{6})(\frac{1}{100})}{(\frac{1}{6})(\frac{1}{100}) + (\frac{1}{3})(\frac{3}{100}) + (\frac{1}{2})(\frac{15}{100})} \quad (8)$$

$$\Pr[E_1|A] = \frac{1}{52} \quad (9)$$

$$\implies \Pr(E_1|A) = \frac{1}{52} \quad (10)$$