AI1103: Assignment 1

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Download all python codes from

https://github.com/Bharadwaja−rao−D/AI1103/blob/main/assignment1/assignment1.py

and latex-tikz codes from

https://github.com/Bharadwaja−rao−D/AI1103/blob/main/assignment1/assignment1.tex

Q 1.17

Determine P(E/F), if two coins are tossed once, where
(i) E : tail appears on one coin, F : one coin shows head
(ii) E : no tail appears, F : no head appears

Solution:

Let X denote the number of heads shown on the coins, where n = 2 and p = 0.5, q = 1-p

$$p(x) = \Pr(X = x) = \binom{n}{x} \times p^x \times q^{n-x} \tag{0.0.1}$$

X	0	1	2
P(X)	$\binom{2}{0}(0.5)^2 = \frac{1}{4}$	$\binom{2}{1}(0.5)^2 = \frac{1}{2}$	$\binom{2}{2}(0.5)^2 = \frac{1}{4}$

TABLE 0: Probability of number of heads shown on the coins

i

$$\Pr(F) = \Pr(X \geq 1) \tag{0.0.2}$$

$$\Pr(F) = \Pr(X = 1) + \Pr(X = 2)$$

$$= \frac{1}{2} + \frac{1}{4} = \frac{3}{4} \tag{0.0.3}$$

$$\Pr(EF) = \Pr(X = 1) = \frac{1}{2} \tag{0.0.4}$$

$$\Pr(E/F) = \frac{\Pr(EF)}{\Pr(F)} = \frac{2}{3} \tag{0.0.5}$$

ii

$$\Pr(F) = \Pr(X = 0) = \frac{1}{4} \tag{0.0.6}$$

$$\Pr(EF) = 0 \tag{0.0.7}$$

$$\Pr(E/F) = \frac{\Pr(EF)}{\Pr(F)} = 0 \tag{0.0.8}$$