AI1103: Assignment 4

Damaragidda Bharadwaja Rao - CS20BTECH11012

Download all python codes from

https://github.com/Bharadwaja−rao−D/AI1103/blob/main/assignment4/assignment4.py

and latex-tikz codes from

https://github.com/Bharadwaja−rao−D/AI1103/blob/main/assignment4/assignment4.tex

Problem GATE-CS(2015)-Q3(General Aptitude):

Given set A = {2,3,4,5} and set B = {11,12,13,14,15}, two numbers are randomly selected , one from each set. What is the probability that sum of two numbers is equal to 16?

Solution:

Let X and Y be a random variable which takes values from set A and B respectively.We want to calculate Pr(X+Y=16)

$$p_X(n) = \begin{cases} \frac{1}{4}, & \text{if } 2 \le n \le 5. \\ 0, & \text{otherwise.} \end{cases} \tag{0.0.1}$$

$$p_Y(n) = \begin{cases} \frac{1}{5}, & \text{if } 11 \le n \le 15. \\ 0, & \text{otherwise.} \end{cases} \tag{0.0.2}$$

$$\Pr(X + Y = 16) = \Pr(Y = 16 - X) \tag{0.0.3}$$

$$= \sum_{k \in A} \Pr(Y = 16 - k | X = k) \times \Pr(X = k) \tag{0.0.4}$$

$$= \sum_{k \in A} \Pr(Y = 16 - k) \times \Pr(X = k) \tag{0.0.5}$$

since X and Y are independent of each other

$$\begin{aligned} = \Pr(Y = 14) \times \Pr(X = 2) \\ + \Pr(Y = 13) \times \Pr(X = 3) \\ + \Pr(Y = 12) \times \Pr(X = 4) \\ + \Pr(Y = 11) \times \Pr(X = 5) \end{aligned} \tag{0.0.6}$$

$$= \frac{1}{5} \times \frac{1}{4} + \frac{1}{5} \times \frac{1}{4} + \frac{1}{5} \times \frac{1}{4} + \frac{1}{5} \times \frac{1}{4} = \frac{1}{5} \tag{0.0.7}$$