AI1103-Assignment 1

Name: Kethavath Praneeth Nayak, Roll Number: CS20BTECH11025

Download all python codes from

https://github.com/PraneethNyk/Assignment_1-AI1103/blob/main/ASSIGNMENT_1.py

and latex codes from

https://github.com/PraneethNyk/Assignment_1-AI1103/blob/main/ASSIGNMENT_1.tex

Question

Ten cards numbered 1 to 10 are placed in a box, mixed up thoroughly and then one card is drawn randomly. If it is known that the number on the drawn card is more than 3, what is the probability that it is an even number?

Solution

The set of sample space which contains cards numbered from 1 to 10 be $S \in \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ Now probability of picking a random card from ten cards is be $Pr(x)$. Then,

$$Pr(x \in S) = \frac{1}{10} \tag{0.0.1}$$

Let the Set of Even numbered cards be E and Set of cards numbered greater than 3 is A. and we know that the set of even numbers from 1 to 10 is {2,4,6,8,10} . Then,

$$E \in \{2, 4, 6, 8, 10\} \tag{0.0.2}$$

Now here, The Set of numbers greater than 3 is {4,5,6,7,8,9,10}. Then,

$$A \in \{4, 5, 6, 7, 8, 9, 10\} \tag{0.0.3}$$

$$Pr(A) = \frac{No.of elements in (A)}{Number of cards} \tag{0.0.4}$$

$$Pr(A) = \frac{7}{10} = 0.7 \tag{0.0.5}$$

Now, the favoured outcomes are set of $E \cap A$ and Here the set $E \cap A$ contains the cards which are even and numbered greater than 3.

$$Pr(E \cap A) = \frac{No.of elements in E \cap A}{Number of cards} \tag{0.0.6}$$

$X \in (E \cap A)$	4	6	8	10
Pr(X):	$Pr(4)$	$Pr(6)$	$Pr(8)$	$Pr(10)$
Value:	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$

$$Now, Pr(E \cap A) = Pr(4) + Pr(6) + Pr(8) + Pr(10) \tag{0.0.7}$$

$$= \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} \tag{0.0.8}$$

$$Pr(E \cap A) = \frac{4}{10} = 0.4 \tag{0.0.9}$$

The probability that the card drawn is even number which is greater than 3 is

$$Pr(E|A) = \frac{Pr(E \cap A)}{Pr(A)} \tag{0.0.10}$$

Now,using (0.0.5) and (0.0.9).

$$(\because Pr(E \cap A) = 0.4 \; and \; Pr(A) = 0.7)$$

$$And, Pr(E|A) = \frac{Pr(E \cap A)}{Pr(A)}$$

$$= \frac{0.4}{0.7}$$

$$\therefore Pr(E|A) = \frac{4}{7} \tag{0.0.11}$$

$$\therefore Pr(E|A) = 0.5714285714285714 \tag{0.0.12}$$

Fig. 0: Plots of Theoritical versus expermental probabilities