AI 1103 Assignment-1

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Download all python codes from here

`https://github.com/Shantanu467/AI1103/blob/main/Assignemt_1/codes/Assignemt1.py`

and latex-tikz codes from

`https://github.com/Shantanu467/AI1103/blob/main/Assignemt_1/codes/Assignmet-1.tex`

QUESTION-4.7

A bag consists of 10 balls each marked with one of the digits 0 to 9. If four balls are drawn successively with replacement from the bag, what is the probability that none is marked with the digit 0?

SOLUTION

Let X be number marked on ball drawn. Since the balls are drawn with replacement, the trials are Bernoulli trials.
So X has Binomial Distribution

$$\Pr(X = k) = {}^{n}C_k \times q^{n-k} \times p^k \tag{1}$$

Here,

$$n = \text{number of times we pick the ball} \tag{2}$$
$$p = \text{Probability of getting ball marked as 0} \tag{3}$$
$$q = 1 - p \tag{4}$$

Variables	n	p	q	k
Values	4	1/10	9/10	0

Table 1: Variables and their values

Now,

$$\Pr(X = 0) = {}^{4}C_0 \times \left(\frac{9}{10}\right)^{(4-0)} \times \left(\frac{1}{10}\right)^{0} \tag{5}$$
$$= \frac{4!}{(4-0)!0!} \times 1 \times \left(\frac{9}{10}\right)^{4} \tag{6}$$
$$= \left(\frac{9}{10}\right)^{4} \tag{7}$$
$$= 0.6561 \tag{8}$$

Therefore, The probability that none of ball is marked with 0 is **0.6561**

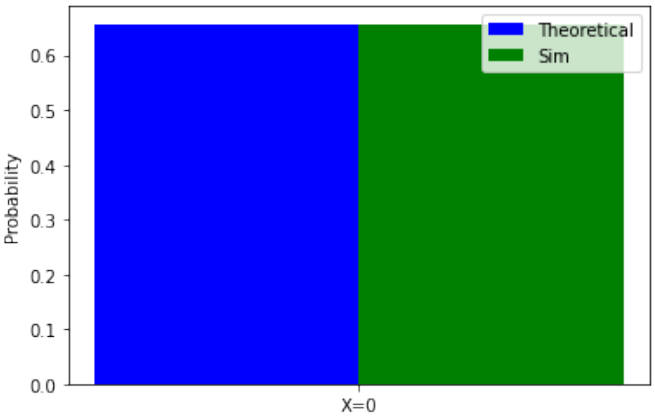

Figure 1: The close relation between Theoretical and simulated results.