

Assignment 3 -Probability and Random Variable

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Download Python code from here

https://github.com/annu100/AI5002-Probability-and-Random-variables/blob/main/ASSIGNMENT_3/Assignment_3_Bayes.py

Download latex code from here-

https://github.com/annu100/AI5002-Probability-and-Random-variables/blob/main/ASSIGNMENT_3/main.tex

$$Pr(C1) = \frac{4}{7}$$

$$Pr(C2) = \frac{3}{7}$$

$$Pr(A|C1) = \frac{4}{10} = \frac{2}{5}$$

$$Pr(A|C2) = \frac{5}{10} = \frac{1}{2}$$

From Baye's theorem

$$Pr(\text{Drawn ball is red}) = P(A)$$

$$\begin{aligned} &= Pr\left(\frac{A}{C1}\right) \times Pr(C1) + Pr(C2) \times Pr\left(\frac{A}{C2}\right) \\ &= \frac{4}{10} \times \frac{4}{7} + \frac{5}{10} \times \frac{3}{7} \\ &= \frac{16 + 15}{70} \\ &= \frac{31}{70} \end{aligned}$$

I. PROBLEM STATEMENT-PROBLEM 2.10

Bag I contains 3 red and 4 black balls and Bag II contains 4 red and 5 black balls. One ball is transferred from Bag I to Bag II and then a ball is drawn from Bag II. The ball so drawn is found to be red in colour. Find the probability that the transferred ball is black.

The probability that the transferred ball is black
It is equal to conditional probability of C1 when
event A has already happened
The desired probability is given by

$$\begin{aligned} Pr\left(\frac{C1}{A}\right) &= \frac{Pr(C1 \cap A)}{Pr(A)} \\ &= \frac{Pr\left(\frac{A}{C1}\right)Pr(C1)}{Pr(A)} \\ &= \frac{\frac{4}{10} \times \frac{4}{7}}{\frac{31}{70}} \\ &= \frac{16}{31} \end{aligned}$$

Hence the desired probability is

$$\frac{16}{31} = 0.516$$

II. SOLUTIONS

Bag 1 contains 3 red and 4 black balls.
Bag 2 contains 4 red and 5 black balls.

let C1: Event of transferring black ball from bag 1 to 2

let C1: Event of transferring red ball from bag 1 to 2

let A : Event that the ball drawn from 2 is red after the transfer of a ball from bag 1 to bag 2.

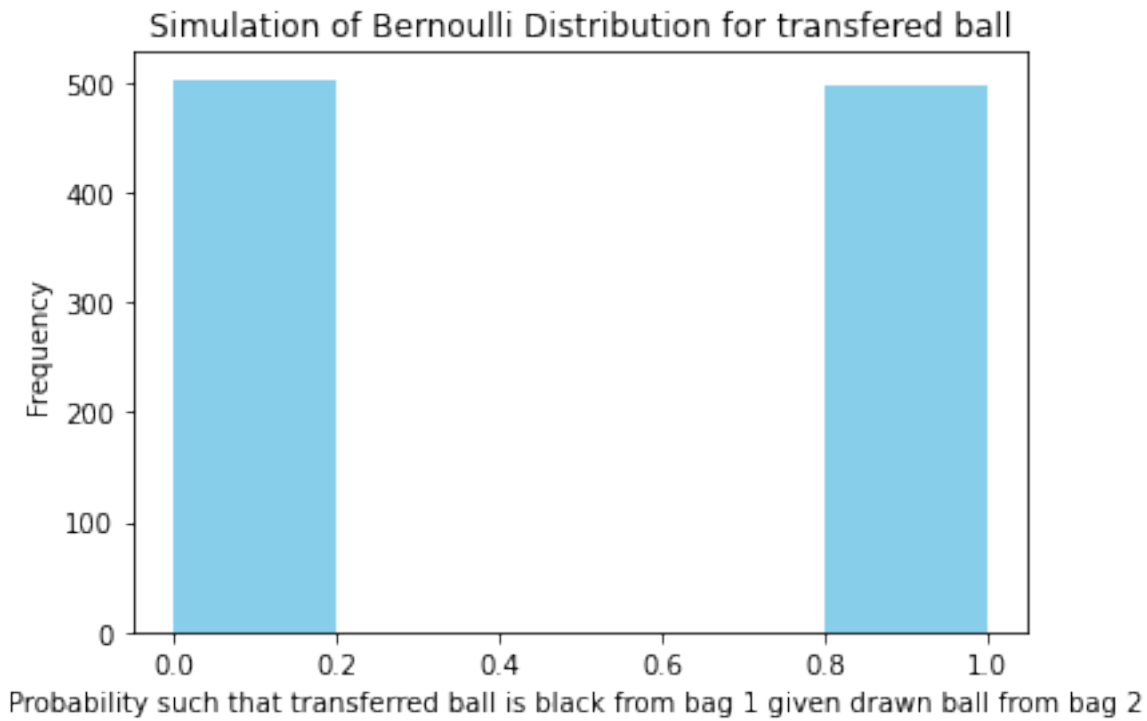


Figure 1: simulation of bernaulli distribution for transferred ball

III. SIMULATION PART

Using random variable simulation,bernauilli random variables are generated for the two cases:-
 $P(X=0)$ =probability for drawnball
 $P(X=1)$ =probability for transffered ball