ASSIGNMENT 8

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Download all python codes from

https://github.com/manik2255/AI1103-PROBABILITY-AND-RANDOM-VARIABLES/blob/main/ASSIGNMENT_8/assign_8.py

and latex-tikz codes from

https://github.com/manik2255/AI1103-PROBABILITY-AND-RANDOM-VARIABLES/blob/main/ASSIGNMENT_8/ASSIGNMENT_8.tex

1 GATE 2018 (ME), PROBLEM.1 (ME SECTION)

Four red balls, four green balls and four blue balls are put in a box. Three balls are pulled out of the box at random one after another without replacement. The probability that all the three balls are red is

2 SOLUTION

Let $A, B, C \in \{0, 1\}$, where 0 denotes that pulled out ball is red, and 1 denotes that pulled out ball is not red. A denotes the first ball is pulled out of the box,B denotes the second ball is pulled out of the box,C denotes the third ball is pulled out of the box.

$$\Pr(A = 0) = \frac{4}{12} \tag{2.0.1}$$

$$\Pr(B = 0|A = 0) = \frac{3}{11} \tag{2.0.2}$$

$$\Pr(C = 0|(B = 0, A = 0)) = \frac{2}{10} \tag{2.0.3}$$

Applying Bayes Theorem to $\Pr(A = 0, B = 0)$,

$$\Pr(A = 0, B = 0) = \Pr(B = 0|A = 0)\Pr(A = 0) \tag{2.0.4}$$

using (2.0.1) and (2.0.2) ,

$$= \frac{3}{11} \cdot \frac{4}{12} \tag{2.0.5}$$

$$= \frac{1}{11} \tag{2.0.6}$$

similarly $\Pr(A = 0, B = 0, C = 0)$ can be written as,

$$= \Pr(C = 0|(B = 0, A = 0))\Pr(A = 0, B = 0) \tag{2.0.7}$$

using (2.0.3) and (2.0.6) ,

$$= \frac{2}{10} \cdot \frac{1}{11} \tag{2.0.8}$$

$$= \frac{1}{55} \tag{2.0.9}$$

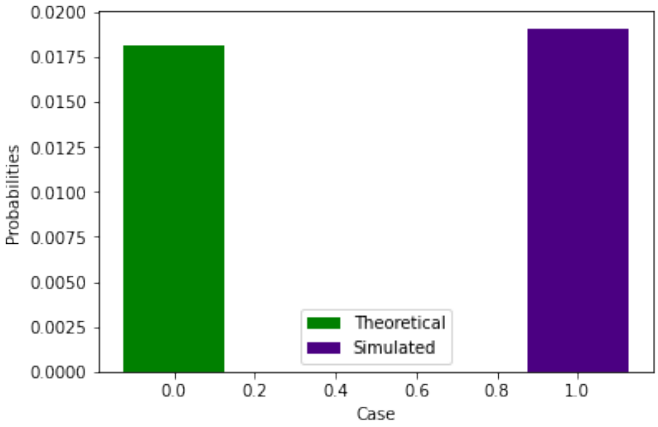

Fig. 1: Theoretical vs simulation