AI1103: Assignment 3

Damaragidda Bharadwaja Rao - CS20BTECH11012

Download all python codes from

https://github.com/Bharadwaja−rao−D/AI1103/blob
/main/assignment3/assignment3.py

and latex-tikz codes from

https://github.com/Bharadwaja−rao−D/AI1103/blob
/main/assignment3/assignment3.tex

PROBLEM GATE-CS(1995)-Q39:

A bag contains 10 white balls and 15 black balls . Two balls are drawn in succession. The probability that one of them is white and the other is black is.

SOLUTION:

Let X denote the number of white balls in the first draw and Y be the number of white balls in second draw and let E be the event mentioned in question.

$$
\begin{aligned}
\Pr(E) = \Pr(X = 1) &\times \Pr(Y = 0/X = 1) \\
&+ \Pr(X = 0) \times \Pr(Y = 1/X = 0)
\end{aligned} \tag{0.0.1}
$$

Let m and n be the number of black and white balls in the box.

$$\Pr(X = 0) = \frac{m}{m + n} \tag{0.0.2}$$

$$\Pr(X = 1) = \frac{n}{m + n} \tag{0.0.3}$$

$$\Pr(Y = 0/X = 0) = \frac{m - 1}{m + n - 1} \tag{0.0.4}$$

$$\Pr(Y = 1/X = 0) = \frac{n}{m + n - 1} \tag{0.0.5}$$

$$\Pr(Y = 0/X = 1) = \frac{m}{m + n - 1} \tag{0.0.6}$$

$$\Pr(Y = 1/X = 1) = \frac{n - 1}{m + n - 1} \tag{0.0.7}$$

$$
\begin{aligned}
\Pr(E) = \frac{n}{m + n} &\times \frac{m}{m + n - 1} \\
&+ \frac{m}{m + n} \times \frac{n}{m + n - 1} = \frac{1}{2}
\end{aligned} \tag{0.0.8}
$$