Assignment 2
Probability

Swati Mohanty (EE20RESCH11007)

I. PROBLEM

A die is thrown three times. Events A and B are defined as below:

A : 4 on the third throw.

B : 6 on the first and 5 on the second throw.

Find the probability of A given that B has already occurred?

II. SOLUTION

Total sample space =216

Sample space of A (4 on the third throw) = 36

Sample space of B (6 on the first and 5 on second throw) = 6

$$P(A) = \frac{36}{216} \tag{1}$$

$$P(B) = \frac{6}{216} \tag{2}$$

$$P(A \cap B) = P(A) \times P(B) \tag{3}$$

$$= \frac{36}{216} \times \frac{6}{216} = \frac{1}{216} \tag{4}$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)} \tag{5}$$

$$= \frac{\frac{1}{216}}{\frac{6}{216}} = \frac{1}{6} = 0.167 \tag{6}$$

III. SIMULATION

In an experiment of throwing a fair die, the outcome can be any number from 1 to 6. So total sample space = {1,2,3,4,5,6}. If a die is thrown for three times, then total sample space = 6 ×6 × 6 = 216.

$Samplespace = \{(1,1,1),(1,1,2),.....,(6,6,6)\}$

Each event in the sample space can be simulated by generating 3 random numbers between 0 to 6 and storing them into an array.

The frequency of event A from the simulated sample space = no. of times the last element of the generated array is 4 = a.

$$\implies P(A) = \frac{a}{totalsamplespace}$$

The frequency of event B from the simulated sample space = no. of times the first and second element of the generated array are 6 and 5 respectively = b .

$$\implies P(B) = \frac{b}{totalsamplespace}$$

Since event A and B are independent events,
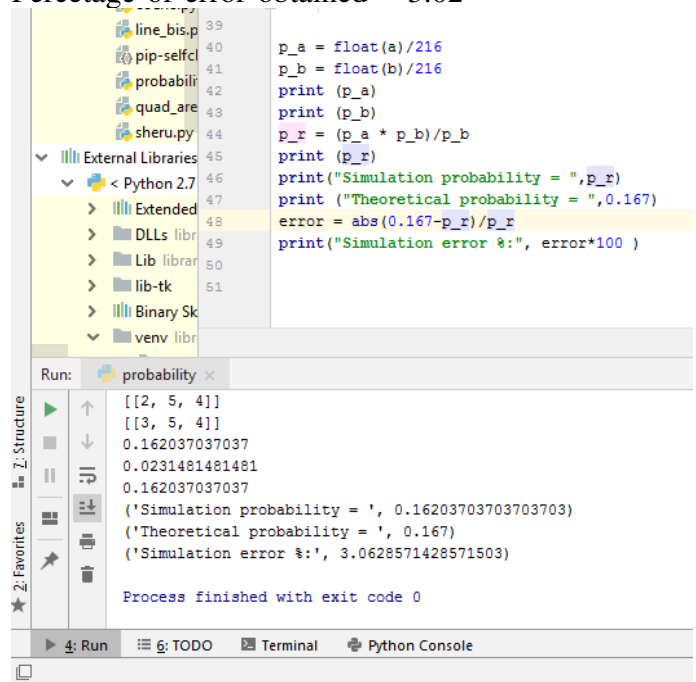
$$P(A \cap B) = P(A) \times P(B)$$

. Substituting the values in equation(5) we obtain the required probability.

IV. RESULT ANALYSIS

Theoretical probability = 0.167

Simulated probability = 0.162

Percetage of error obtained = 3.02

Python project link : https://github.com/Swati-Mohanty/EE5600/tree/master/Assignment