

Assignment 2

Probability and Random Variables

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I. PROBLEM

In a meeting, 70% of the members favour and 30% oppose a certain proposal. A member is selected at random and we take $X = 0$ if he opposed, and $X = 1$ if he is in favour. Find $E(X)$ and $\text{Var}(X)$.

<https://github.com/Swati-Mohanty/AI5002/blob/main/Assignment%202/codes/bernoullidist.py>

Download latex code from here-

<https://github.com/Swati-Mohanty/AI5002/blob/main/Assignment%202/codes/assignment2.tex>

II. SOLUTION

A member opposes the proposal : $X=0$;

A member favours the proposal : $X=1$;

$P(X=0) = 70 \% = 0.7$

$P(X=1) = 30 \% = 0.3$

$$E(X) = \sum_{i=1}^n x_i p_i \quad (1)$$

$$= 1 \times 0.7 + 0 \times 0.3 = 0.7 \quad (2)$$

$$\implies E(X) = 0.7 \quad (3)$$

$$E(X^2) = \sum_{i=1}^n (x_i)^2 p_i \quad (4)$$

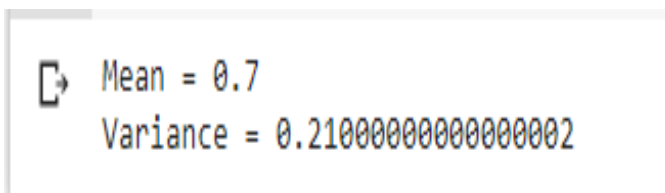
$$= 1^2 \times 0.7 + 0^2 \times 0.3 = 0.7 \quad (5)$$

$$\text{Var}(X) = E(X^2) - [E(X)]^2 \quad (6)$$

$$= 0.7 - 0.7^2 = 0.21 \quad (7)$$

$$\implies \text{Var}(X) = 0.21 \quad (8)$$

The same result is also obtained using the python code.



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Mean = 0.7
Variance = 0.21000000000000002

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Figure 1: Result obtained from python code

Download python code from here