Assignment-1

Satpute Aniket Tukaram : CS21BTECH11056

31 March 2022

1 2017-ICSE-10th Board Question Paper : 8(a)

Question 8

(a) Calculate the mean of the following distribution using step deviation method.

Marks	0-10	10-20	20-30	30-40	40-50	50-60
Number of Students	10	9	25	30	16	10

Table 1: Given Table

Solution :
Here, In the Assignment-1-Solution-Table :

$$Assumed mean : A = 25$$

$$Mid - value : x$$

$$class - size : i$$

$$t = \frac{(x - A)}{i}$$

From the Solution Table :

$$\sum f = 100$$

$$\sum ft = 63$$

Class-Interval (Marks)	Mid-value (x)	No of Students (f)	t	ft
0-10	5	10	-2	-20
10-20	15	9	-1	-9
20-30	25	25	0	0
30-40	35	30	1	30
40-50	45	16	2	32
50-60	55	10	3	30
		$\sum f = 100$		$\sum ft = 63$

Table 2: Solution Table

$$\begin{aligned} Mean &= A + \frac{\sum ft}{\sum f} * i \\ &= 25 + \frac{63}{100} * 10 \\ &= 25 + 6.3 \\ &= 31.3 \end{aligned}$$

Hence , Mean of given data is 31.3

Solution(Vector Operations)
By given Data :

$$\begin{aligned}\mathbf{F} &: frequencyvector\\ \mathbf{X} &: mid-valuevector\\ \mathbf{T} &: (X-A)/i\\ \mathbf{FT} &: Dot-product\end{aligned}$$

$$\mathbf{F} = \begin{bmatrix}10 & 9 & 25 & 30 & 16 & 10\end{bmatrix}$$

$$\mathbf{T} = \begin{bmatrix}-2\\-1\\0\\1\\2\\3\end{bmatrix}$$

$$\mathbf{FT} = \begin{bmatrix}10 & 9 & 25 & 30 & 16 & 10\end{bmatrix} * \begin{bmatrix}-2\\-1\\0\\1\\2\\3\end{bmatrix}$$

$$= 63$$

$$\begin{aligned}Mean &= A + \frac{\mathbf{FT}}{\sum f} * i\\ &= 25 + \frac{63}{100} * 10\\ &= 25 + 6.3\\ &= 31.3\end{aligned}$$

Hence , Mean of given data is 31.3