

Assignment-1

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Abstract—ICSE Class 10 Maths 2017 Q.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 |

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 :

| 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 |
| | | $\sum f = 100$ | | $\sum ft = 63$ |

$$\sum f = 100$$

$$\sum ft = 63$$

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

Hence ,
Mean of given data is 31.3

Solution(Vector Operations)

By given Data :

| | |
|-----------------------|-------------------------------|
| F | frequency vector |
| X | mid-value vector |
| i | 10 |
| T | $(\mathbf{X} - \mathbf{A})/i$ |
| F^TT | Dot-product |

$$\mathbf{F} = \begin{pmatrix} 10 \\ 9 \\ 25 \\ 30 \\ 16 \\ 10 \end{pmatrix} \quad (1)$$

$$\mathbf{X} = \begin{pmatrix} 5 \\ 15 \\ 25 \\ 35 \\ 45 \\ 55 \end{pmatrix} \quad (2)$$

$$\mathbf{A} = \begin{pmatrix} 25 \\ 25 \\ 25 \\ 25 \\ 25 \\ 25 \end{pmatrix} \quad (3)$$

$$\mathbf{T} = \begin{pmatrix} -2 \\ -1 \\ 0 \\ 1 \\ 2 \\ 3 \end{pmatrix} \quad (4)$$

$$\mathbf{F}^T \mathbf{T} = (10 \ 9 \ 25 \ 30 \ 16 \ 10) \begin{pmatrix} -2 \\ -1 \\ 0 \\ 1 \\ 2 \\ 3 \end{pmatrix} \quad (5)$$

$$= 63 \quad (6)$$

$$\sum f = F^T \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{pmatrix} \quad (7)$$

$$= (10 \ 9 \ 25 \ 30 \ 16 \ 10) \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{pmatrix} \quad (8)$$

$$= 100 \quad (9)$$

$$Mean = A + \frac{F^T T}{\sum f} * i \quad (10)$$

$$= 25 + \frac{63}{100} * 10 \quad (11)$$

$$= 25 + 6.3 \quad (12)$$

$$= 31.3 \quad (13)$$

Mean Deviation Method By Graph :

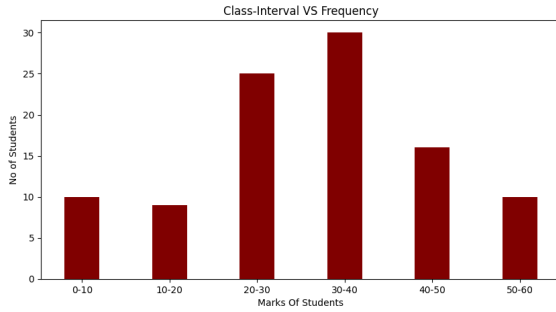


Fig. 1. Mean Deviation Method

In the graph we see distribution of Number of students against the marks of students.

In the Mean-Deviation-Method we assume a mean in this case the Assumed-Mean (A) is 25 , then we define the term 't' which is measure of deviation of any class interval wrt to the Assumed-Mean

Then we calculate the summation of this deviation multiplied by the frequency of that class to obtain overall deviation of the data

As we get the overall deviation to get the actual mean we add the mean of the deviation of each class-Interval to the Assumed-Mean.to calculate the mean of deviation we divide the summation of deviation by summation of frequency and multiply by classlength(i) (As in t is divided) . In this way we get the Mean of the Data.