

CHAPTER 14

Statistics

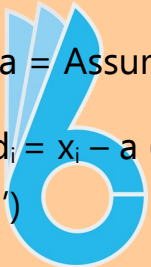
Method:

Assumed mean method (OR) Short cut method:

When the values of x_i and f_i are large, then the calculation of arithmetic mean by direct method becomes lengthy. To avoid such lengthy calculations, assumed mean method is used.

$$\left(\bar{x}\right) = a + \frac{\sum f_i d_i}{\sum f_i}$$

Where, a = Assumed mean

$d_i = x_i - a$ (Deviation of mid value ' x_i ' from the assumed mean ' a ')

Brainbox
 learn easy

x_i = Mid value

Procedure to find mean by short cut method:

Example:

Consider the following distribution of daily wages of 50 workers of a factory.

Daily	100 –	120 –	140 –	160 –	180 –
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wages (in Rs.)	120	140	160	180	200
No. of workers	12	14	8	6	10

Find the mean daily wages of the workers of the factory by using short cut method.

Sol.

Step – I:

Write the given data in columns. In first column, write class – intervals; in second column, write their given corresponding frequencies.

Step – II:

Obtain the mid value (x_i) of each class to prepare column III of the table.

Step – III:

Take an assumed mean (a) from amongst the mid values, as a figure, which is in the middle of the series or any one of the two middle values if the number of x_i 's is even.

Step – IV:

Calculate the deviations d_i of all the mid values from the assumed mean ' a ' i.e. $d_i = x_i - a$ to get column IV of the table.

Step – V:

Multiply the respective frequencies of each class in column II by the deviations in column IV and obtain the column V of $f_i d_i$.

Step – VI:

Find the total of $f_i d_i$ of column V to get $\sum f_i d_i$.

Step – VII:

Find the total of frequencies of column II and denote it by

$$\sum f_i \text{ (OR) } N.$$

Step – VIII:

Find
$$\bar{x} = a + \frac{\sum f_i d_i}{\sum f_i}.$$

Sol.

I	II	III	IV	V
Daily wages (Rs.)	No. of workers (f_i)	Class Mark (x_i)	$d_i = x_i - 150$ (a)	$f_i d_i$
100 – 120	12	110	-40	$-12 \times -40 = -480$
120 – 140	14	130	-20	$14 \times -20 = -280$
140 – 160	08	150 (a)	0	0
160 – 180	06	170	20	$6 \times 20 = 120$
180 – 200	10	190	40	$10 \times 40 = 400$
Total	$\sum f_i = 50$			$\sum f_i d_i = -240$

Take $a = 150$; Class – size (h) = 20

$$\therefore d_i = x_i - a \text{ and } u_i = \frac{x_i - a}{h} = \frac{x_i - 150}{20} = \frac{d_i}{20}$$

Using the shortcut method,

$$\bar{x} = a + \left(\frac{\sum f_i d_i}{\sum f_i} \right)$$

$$\bar{x} = 150 + \left(\frac{-240}{50} \right)$$

$$\bar{x} = 150 + \left(\frac{-240}{50} \right) \times \frac{2}{2}$$

$$\bar{x} = 150 - \frac{480}{100}$$

$$\bar{x} = 150 - 4.8$$

$$\bar{x} = 145.20$$

Hence, the mean daily wages of the workers of the factory is Rs. 145.20.

Note:

While selecting assumed mean (a), we normally choose a figure in the middle of a series so that on either side, the deviations are not very large.

