Mean

Averages are the typical value around which other items of the distribution congregate.

Requisites of a good average

* It should be rigidly defined.
* It should be easy to understand and calculate
* It should be based on all the observations
* It should suitable for further mathematical treatment
* It should be affected as little as possible by fluctuations of sampling.
* It should not be affected much by extreme observations.

Arithmetic Mean of a given set of observations is their sum divided by the number of observations.

$$\bar{x} = \frac{x_1 + x_2 + \cdots + x_n}{n} = \frac{\Sigma x}{n}$$

$$\frac{1+2+3+4+5+6+7+8+9}{9} = \frac{45}{9}$$

$$= 5$$

Steps for computation of Arithmetic Mean

1- Multiply each value of x or the mid value of the class (in case of grouped or continuous frequency distribution) by the corresponding frequency f.

2- Obtain the total of the products obtained in step 1 above to get Σfx.

3- Divide the total obtained in step 2 by $N = \Sigma f$, the total frequency.

x	Frequency (f)	fx
0	14	0
1	21	21
2	25	50
3	43	129
4	51	204
5	40	200
6	39	234
7	12	84
	$N = \Sigma f = 245$	$\Sigma fx = 922$

$$\bar{x} = \frac{\Sigma fx}{N} = \frac{922}{245}$$

$$= 3.763$$

Step Deviation Method

1- Compute $d = (x - A)/h$. A being any arbitary number and h is the common magnitude of the classes. Algebric signs + or − are to be taken with the deviations.

2. Multiply d by the corresponding frequency f to get fd.
3. Find the sum of the products obtained in step 2 to get Σfd.
4. Divide the sum obtained in step 3 by N, the total frequency.
5. Multiply the value obtained in step 4 by h;
6. Add A to the value obtained in step 5.

The resulting value gives the arithmetic mean of the given distribution.

Example

Marks	Mid-value (x)	No. of Students Frequency (f)	fx	$d = \frac{x-35}{10}$	fd
0-10	5	6	30	-3	-18
10-20	15	5	75	-2	-10
20-30	25	8	200	-1	-8
30-40	35	15	525	0	0
40-50	45	7	315	1	7
50-60	55	6	330	2	12
60-70	65	3	195	3	9
		$N = \Sigma f = 50$	$\Sigma fx = 1670$		$\Sigma fd = -8$

Direct Mean

$$\bar{x} = \frac{\Sigma fx}{\Sigma f} = \frac{1670}{50} = 33.4$$

Step Deviation Method

$$\bar{x} = A + \frac{h \Sigma fd}{N}$$

$$= 35 + \frac{10(-8)}{50}$$

$$= 35 - 1.6$$

$$= 33.4$$

Merits

1. It is rigidly defined.
2. It is easy to calculate and understand.
3. It is based on all the observations.
4. It is suitable for further mathematical treatment.

Demerits

1. It is very much affected by extreme observations.
2. It cannot be used in case of open ended class.
3. It cannot be used if we are dealing with the qualitative characteristics.
4. It cannot be obtained if a single observations is missing.
5. In extremely asymmetrical situations, usually arithmetic mean is not representative of the distribution and hence is not a suitable measure of location.

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