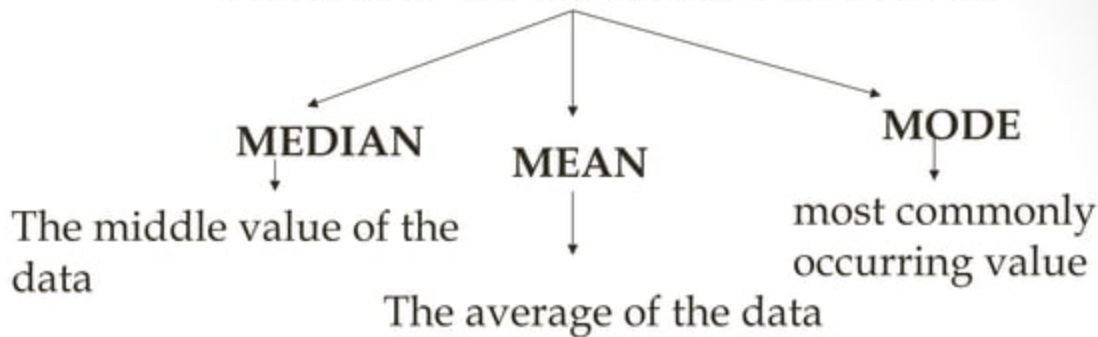


- Measures of central tendency are also usually called as the averages.
- They give us an idea about the concentration of the values in the central part of the distribution.
- The following are the five measures of central tendency that are in common use:
 - (i) Arithmetic mean, (ii) Median, (iii) Mode, (iv) Geometric mean, and (v) Harmonic mean (vi) weighted mean

MEASURE OF CENTRAL TENDANCY



Mean (Average)

Mean locate the centre of distribution.

Also known as arithmetic mean

Most Common Measure

The mean is simply the sum of the values divided by the total number of items in the set.

Affected by Extreme Values

$$\bar{X} = \frac{\sum_{i=1}^n X_i}{n} = \frac{X_1 + X_2 + \dots + X_n}{n}$$

Merits:

- It is easy to understand and easy to calculate
- It is based upon all the observations
- It is familiar to common man and rigidly defined
- It is capable of further mathematical treatment.
- It is affected by sampling fluctuations. Hence it is more stable.

Demerits

- It cannot be determined by inspection.
- Arithmetic mean cannot be used if we are dealing with qualitative characteristics, which cannot be measured quantitatively like caste, religion, sex.
- Arithmetic mean cannot be obtained if a single observation is missing or lost
- Arithmetic mean is very much affected by extreme values.

MEAN

UNGROUPED DATA

GROUPED DATA

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

$$\bar{x} = \frac{\sum_{i=1}^n f_i x_i}{n}$$

$$\text{MEAN} = \frac{\text{Sum of observations}}{\text{total no. of observations}}$$

□ Birth weight of new borns are :

3.3, 6.1, 5.8, 3.8, 2.7, 4.1, 3.4, 3.9, 5.1, 3

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n} = 41.2/10 = 4.12 \text{ kg}$$

Q. A Survey of 100 families each having five children, revealed the following distribution

No. of male children	0,	1,	2,	3,	4,	5
No. of Families	9,	24,	35,	24,	6,	2

Find the Mean of male children.

x	f	f . X
0	9	0
1	24	24
2	35	70
3	24	72
4	6	24
5	2	10

$$N=100 \quad \Sigma f.x = 200$$

$$\text{Mean} = \bar{X} = \Sigma f.x / \Sigma f$$

$$\bar{X} = 200 / 100 = 2$$

Find mean days of confinement after delivery in the following series:-

Day of confinement	No. of patients
6	5
7	4
8	4
9	3
10	2

Solution:-

Day of confinement (x)	No. of patients (f)	X*f
6	5	30
7	4	28
8	4	32
9	3	27
10	2	20
Total	18	137

$$\bar{x} = \frac{\sum_{i=1}^n f_i X_i}{n} = 137/18 = 7.61$$

Median

1. Measure of Central Tendency.

2. The median is determined by sorting the data set from lowest to highest values and taking the data point in the middle of the sequence.

3. Middle Value In Ordered Sequence

- If Odd n , Middle Value of Sequence
- If Even n , Average of 2 Middle Value

4. Not Affected by Extreme Values

Merits:

- It is rigidly defined
- It is easy to understand and easy to calculate.
- It is not at all affected by extreme values.
- It can be calculated for distributions with open-end classes.
- Median is the only average to be used while dealing with qualitative data.
- Can be determined graphically.

Demerits:

- In case of even number of observations median cannot be determined exactly.
- It is not based on all the observations.
- It is not capable of further mathematical treatment

For ungrouped data:-

Step-1

Arranged data in ascending or descending order.

Step:-2

If total no. of observations 'n' is **odd** then used the following formula for median

$$= \frac{n+1}{2} \text{th observation.}$$

Step:-3

If total no. of observations 'n' is **even** then used the following formula for

median = arithmetic mean of two middle observations.