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Welcome to Review Of Research

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CENTRAL TENDENCY AND IT'S MEASURES

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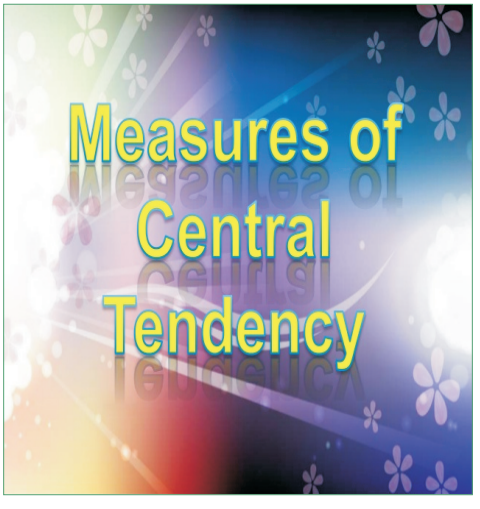
ABSTRACT:

Measures of Central Tendency is used for an introduction of measures of the central tendency and variability of continuous distributions. A number of examples shows that new measures are plausible namely for such distributions, for which the mean and/or the variance do not exist. The estimates of both measures are new characteristics of random samples taken from the distribution.



KEY WORDS: *Measures of central tendency, Mathematical average, Average of position, Measures of partition values.*

INTRODUCTION:

Measures of Central Tendency

Generally it is found that values of the variable tend to concentrate around some central value of observations of an investigation, which can be taken as a representative for the whole data. This tendency of the distribution is known as central tendency and the measures devised to consider this tendency are known as measures of central tendency. Measures of central tendency provide a single figure called average which describes the entire series of observations.

Types of Measures of Central Tendency

There are usually three basic measures of central tendency. These are :

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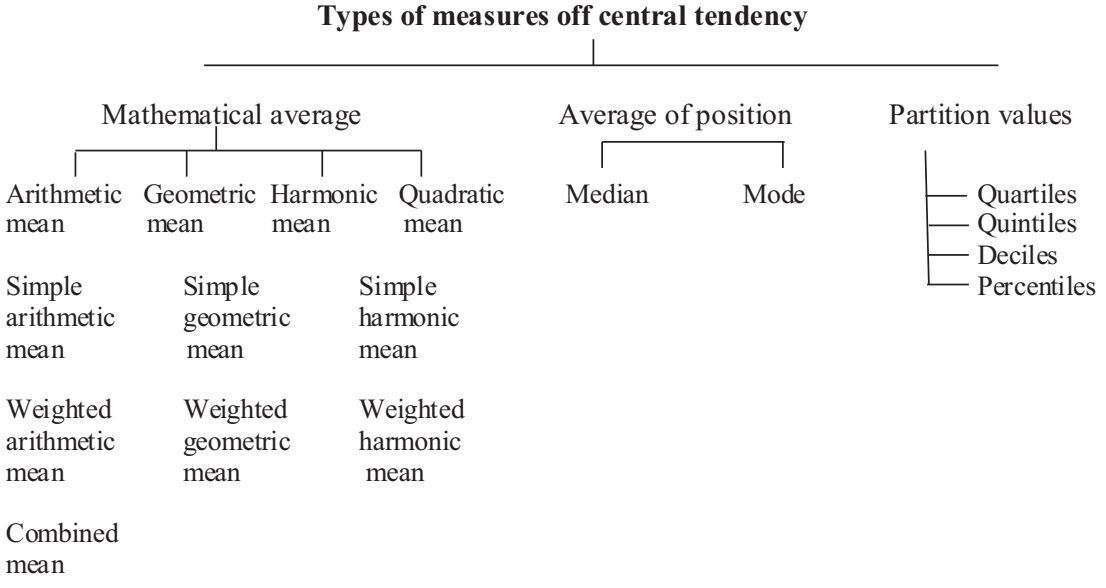
(1) Mathematical average
(2) Average of position
(3) Measures of partition values

1. Mathematical average - Averages represented purely in mathematical values are known as mathematical average. It is of three types : (i) Arithmetic mean, (ii) Geometric mean and (iii) Harmonic mean.

2. Average of position- Mean exhibited by position is called average of position. It is of two types : (i) Median and (ii) Mode.



3. Measures of partition value - It is measures of location. It divides the total observations by an imaginary line into two or more parts expressed in percentage.

Mathematical Average

1) Arithmetic Mean

Central value or average, obtained arithmetically, is known as arithmetic mean. It is the most common average, used in our day today life. Depending upon whether all the items in the data are to be considered of equal or unequal importance we get three sub-types of arithmetic mean. Accordingly arithmetic mean are of following types :

(1) Simple arithmetic mean
(2) Combined arithmetic mean

[I] Simple arithmetic mean

It is most commonly used of all averages. It is the value which we get by dividing the aggregate of various items of the same series by the total number of observations.

1) Arithmetic mean (Ungrouped data). If the values of N items are X1, X2, X3, Xn ... be the value of variate X, then simple arithmetic mean (X) is obtained by dividing the sum of the values of all the items

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by the total number of observations. Symbolically.

Merits and demerits of arithmetic mean. It is most commonly used for measure of central tendency though it has got both merits and demerits.

Merits -

(1) It is rightly defined and is an easy and ideal measures of central tendency.
(2) It covers all the observations and is easy to calculate.
(3) It is affected least by fluctuation of sampling. In other words arithmetic mean is a stable average.
(4) Arithmetic mean provides base of many other methods of statistics.

Demerits –

(1) Obtained mean in a series may not be represented by any observation.
(2) It is very much affected by extreme observation.
(3) By eliminating even a single series, calculation becomes unreal.
(4) It cannot be determined by inspection nor can be represented graphically.
(5) In extremely skewed distribution arithmetic mean is not representative of the distribution.

2) MEDIAN -

The value of the middle most observation, when the data are arranged in ascending or descending order of magnitude, is called the median of the data.

Remark - Median is also an average. When the two items of a given data differ by a large quantity, then mean is not an appropriate average to represent the data. In this case median is most appropriate.

Median of an Ungrouped Data (Individual Series)

We arrange the data in increasing or decreasing order. Let N be the total number of observations.
(i) If n is odd, then median is the value of l/2(n + l)th observation.

(ii) If n is even, then the average of $\left[\frac{n}{2}\right]^{th}$ and $\left[\frac{n}{2}+1\right]^{th}$ observations is the median.

Median of Ungrouped Data (Discrete Series)

We first arrange the terms in ascending or descending order. Then, we prepare a cumulative frequency table.

Now, if the total frequency n is odd, then the size of $\left(\frac{n+1}{2}\right)^{th}$ item is the **median**.

Computation of median when n is even.

The average of $[n/2]^{th}$ and $\left[\frac{n+1}{2}\right]^{th}$ items are median respectively.

Computation of Median for grouped data .- i) Discrete series : In a discrete series the items are first arranged according to the ascending order of magnitude and respective frequencies are written against them. The frequencies are then cumulated and the position of the median is located by the same formula

$$\text{Median} = \frac{(n+1)^{th}}{2} \text{ item where } N = f_1 + f_2 + \ldots f_n = \Sigma f_i$$

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ii) Continuous series – In this case the median cannot be found directly without recourse to the original data .It may however be estimated with sufficient accuracy by interpolation . To do this we first find the position of the median item and from the cumulative frequencies of the class , we

determine the class in which the median item occupying this position Then the Median is given by the formula.

$$\text{Median} = L_1 + \frac{N/2 - c}{f_m} \times h$$

Where, L_1 = lower limit of the class in which median lies. f frequency of the class in which the median lies. c = cumulative frequenc the class preceding the median class. N = total frequency = Σf and h = w of the class interval of the median class.

Merits and demerits of median

Merits -

1)If found directly, it represents an actual item.
2)It eliminates the effects of extreme items, since they are not taken into account in its calculations, except for arranging the data in increasing or decreasing order.
3)The values of only the middle items are required to be known.
4)It can be found even for data which cannot be measured quantitatively. For example, if Hb% of 10 frogs are arranged according to their numerical value, the median Hb% is the Hb% of the middle frog.
5)It is easy to calculate.
6)The median is most suitable for expressing qualitative data such as colour, health intelligence etc.

Demerits -

1)It may not be representative when the distribution is irregular. For example, heights of different plants of selected area of a forest are : 1, 5, 9, 12, 6, 60, 61 72, 78. Arrange the data in ascending order of magnitude – 1, 5, 6, 9, 12, 60, 61, 72, 78. The median height is [ ] item is 12 which is not at all a proper representative of the average height of plants.
2)It cannot be located with precision when the items jirc grouped. Then it can only be estimated and the estimated value may not be found in the series.
3)The data must be kept in ascending or descending order. This involves considerable work if the number of items is large.
4)The aggregate value of the items cannot be obtained when the median and the number of items are known.
5)It is not very useful in further analysis, because it is difficult to handle mathematically.
6)It is not as rigidly defined as the arithmetic mean.
7)It is not capable of further mathematical treatment
8)It is not based on all the observation hence it is not proper representative.

3) MODE

Mode of a frequency distribution is defined as "that value of the variable for which the frequency is maximum."

The definition of mode indicates that mode cannot be determined from a series of individual observations as it depends on the frequency of occurrence of the items. Hence to get the value of mode the series must be converted into a frequency distribution.

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Merits and demerits of mode -

Merits-

(1) It avoids the effects extreme (and hence abnormal) items.
(2) Often it can be ascertained by mere inspection.
(3) Only the values occurring with high frequencies are required to be known for its determination. All values need not be known.
(4) It refers to a measurement which is the most usual and hence the most likely variate.
(5) Bi-modal distribution may give a good indication of the heterogeneity of a population.

Demerits –

(1) It is not well defined and is rarely used for higher life science researches.
(2) Arithmetic explanation of mode is not possible.
(3) Sometimes it is indefinite.
(4) It becomes difficult in multi-modal distribution.
(5) It is not based on all the observation of a series.

CONCLUSION=

Measures of central tendency or averages are used to summarise the data. It specifies a single most representative value to describe the data set. Arithmetic mean is the most commonly used average. It is simple to calculate and is based on all the observation. But it is unduly affected by the presence of extreme items. Median is a better summary for such data. Mode is generally used to describe the qualitative data. Median and mode can be easily computed.

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