**MEASURES OF LOCATION, PARTITION AND DISPERSION**

**MEASURES OF CENTRAL TENDENCY (LOCATION)**

Measures of central tendency are measures of location. The main types of measures of location are mean, media and mode.

1. **Arithmetic mean**: this is the most familiar method of central tendency usually it is refer to as the average or the mean. Arithmetic mean is therefore the sum of all values in the data set divided by the number of values. These is expressed in notational form as

, i= 1, 2, 3,…, n for ungrouped data

, i= 1, 2, 3,…, n for grouped data

, i= 1, 2, 3, … , n for assumed mean

Properties of the mean

1. Arithmetic mean is easy to compute and understand.
2. The arithmetic mean distribution is assumed to be symmetric.
3. It is the most flexible measure of central tendency to further calculation
4. It is used when comparism or averages of two or more groups are to be done using parametric technique.
5. .it is computed by using all the values of the set.
6. Extreme values affect the mean
7. It can only be use for qualitative data.
8. **Median:** The median is another measure of central tendency and it is the central value in a set of data when presented in array. It divides the set of data into two equal parts such that the number of value less than the median is the same as the number of value greater than the median.

Ungrouped data

* If the number of observation is odd then the media position

= of the array

* If the number of observation is even the X

= of the array

Grouped data

Xmedian =

Lm = lower class boundary of the median class

n = number of observation

Cumulative frequency of the class preceeding the median class.

Fm = Frequency of the median class

W = width/class size

**How to determine the median class**

To locate the median class of a set of data with a total of observation use position of the array for even and for odd.

**Properties of the median**

1. There is only one median for any set of data
2. . It is fairly easy to calculate
3. It is quick to obtain if an array is given
4. It ignores completely the actual sizes of the observation except those in the middle
5. It is robost to the valuation of non—normality
6. It is usually used for skewed or truncated distribution with no lower or upper limit of the first and last classes respectively.
7. **The Mode**: The mode of a set of data is that value of some group that occur most frequency. It is simply put as the value of values in the data set that occur(s) most frequently. If all the values are different there is no mode, on the other hand we may have more than one mode; two mode (bimodal), more than two mode (multimodal). If the modal are group, then the modal class is that class with highest frequency. If the line chart, bar chart or histogram, the modal class will be the peak of the diagram. Basically the mode can be obtained by using these formular.

- lower class boundary of the modal class

- frequency of the modal class

- frequency of the class preceding the modal class

- frequency of the class succeeding the modal class

W = width/class size

**Properties of the mode**

1. It is useful mainly for qualitative data
2. The mode may not exist if there may be more than one mode.
3. The basic idea of the mode is used to describe the shape of the frequency distribution.

**MEASURES OF PARTITION**

The median divides the distribution into two equal half. There are other measures that have the same effect of partition into several parts. These include quartile, deciles and percentiles.

**Quartiles:** The quartiles of a distribution are members of a distribution that divides the distribution into four equal parts. The lower, middle and upper quartiles are denoted by respectively. The middle Quartle is also known as the meridian.

Even

=

Odd

=

Where k = 1, 2 ,3

**The Deciles:** These are values that divide a distribution into 10 equal value with nine values which are ….

Even

=

Odd

=

**The percentile**: These are values that divide a set of data into 100 equal parts. It requires 99 values to achieve these which are labeled as ….

Even

=

Odd

=

Note: , , , ,

**MEASURE OF DISPERSION( SPREAD/VARIABILITY )**

1. **RANGE:** This is the simplest measure of dispersion define as the different between the highest and lowest value of sequence.

R = (Highest – Lowest) values

Properties of range

1. It is easy and quick to calculate
2. It uses only the two extreme values.
3. It is difficult to develop any statistical theory around the range.
4. **MEAN DEVIATION**: It is the mean of the absolute deviation of values from the mean. It is expressed notationally by

Md = , for ungrouped data

Md = , for grouped data

Properties

1. All the observation in the data set are used for the calculation.
2. It is relatively easy to calculate.
3. It is difficult to develop any statistical theory for the mean deviation.
4. **VARIANCE:** This is the mean of the square deviation of observation from the mean. It is expressed in notation as

= , for ungrouped data

= , for grouped data

Properties

1. It is mostly expressed in square unit.
2. **STANDARD DEVIATION (SD)**

This is the most important measure of dispersion which correct the defficency of variance. The square root of variance is called standard deviation.

, for ungrouped data

S = , for grouped data.

Properties

1. It is the most commonly use in measures of spread
2. It makes use of all observation.
3. A small value of standard deviation implies that the observation cluster closely around the mean.
4. Statistical theory have been developed has an off-short of these developed from variance.
5. It is affected by the magnitude or change in unit of the observation.
6. **COEFFICIENT OF VARIATION**

This is the measure of spread that correct for differences in magnitude or unit of observation. It is therefore define as the ratio of standard deviation to the mean of the data set. It is mathematically expressed as

C.V =

Properties

1. It is dimensionless there by useful for comparism of the spread of two or more data set efficiency when the unit are difference.
2. The lower the coefficient of variation the smaller the spread.