## MIND MAP: LEARNING MADE SIMPLE CHAPTER - 15

Variance of a discrete frequency distribution

$$\operatorname{Var}\left(\sigma^{2}\right) = \frac{1}{N} \sum f_{i} \left(x_{i} - \overline{x}\right)^{2}$$

Standard Deviation (S.D.) of a discrete frequency distribution

S.D  $(\sigma) = \sqrt{\frac{1}{N}} \sum f_i (x_i - \overline{x})^2$ 

where  $N = \sum_{i} f_{i}$  and  $\overline{x} = \text{mean}$ 

Variance of ungrouped data

$$Var \left(\sigma^2\right) = \frac{1}{n} \sum_{i} \left(x_i - \overline{x}\right)^2$$

Standard Deviation (S.D.) for un grouped data:

Deviation for ungrouped data

Statistics

S.D. 
$$(\sigma) = \sqrt{\frac{1}{n} \sum (x_i - \overline{x})^2}$$

Coefficient of variation (C.V.)

$$=\frac{\sigma}{x}\times 100$$
;  $\overline{x}\neq 0$ 

where  $\bar{\chi}$  is mean

Variance

$$\left(\sigma^{2}\right) = \frac{h^{2}}{N^{2}} \left[ N \sum_{i} f_{i} y_{i}^{2} - \left(\sum_{i} f_{i} y_{i}\right)^{2} \right]$$

**Standard Deviation** 

$$\sigma = \frac{h}{N} \sqrt{N \sum f_i y_i^2 - \left(\sum f_i y_i\right)^2}$$

where  $y_i = \frac{x_i - A}{h}$ 

$$N = \sum_{i} f_{i}$$

A=assumed mean

h=width of class interval

The degree to which numerical data tend to spread about an average value is called the dispersion of the data. The four dispersions are: Range, Mean deviation, Standard deviation and Variance.

> The difference between the highest and the lowest element of a data called its range.

$$range = x_{max} - x_{min}$$

**Eg:** Find the range of the given data:

Here, 
$$x_{\text{max}} = 17$$
 and  $x_{\text{min}} = 4$ 

Range = 
$$17-4 = 13$$

•  $M.D.(\overline{x}) = \frac{1}{N} \sum f_i |x_i - \overline{x}|$ 

where 
$$\overline{x} = a + \frac{\sum_{i=1}^{n} f_i d_i}{N} \times h$$

and 
$$d_i = \frac{x_i - a}{h}$$

Here, a = assumed mean

h = common factor

N = sum of frequencies

 $\bullet M.D.(M) = \frac{1}{N} \sum f_i |x_i - M|$ 

where, M(median) =  $l + \frac{\frac{N}{2} - C}{f} \times h$ 

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Shortcut method to find variance

Step Deviation or

Variance & Sample of Property of Property

$$Var (\sigma^2) = \frac{1}{N} \sum f_i (x_i - \overline{x})^2$$

Standard deviation of a continuous frequency distribution

S.D (
$$\sigma$$
) =  $\frac{1}{N} \sqrt{N \sum f_i x_i^2 - (\sum f_i x_i)^2}$ 

Median class is the class interval whose C.F. is just greater than or equal to  $\underline{N}$ , f, h and C are

Measures of Dispersion

Range

respectively the lower limit, the frequency, width of the median class and C the cumulative frequency (C.F.) of class just preceding to median class.

Mean Deviation (M.D.) for ungrouped data

- M.D. about mean i.e.,  $M.D.(\overline{x}) = \frac{\sum |x_i \overline{x}|}{n}$ , where
  - $\overline{x}$  is mean and n = no. of terms
- M.D. about median i.e.,  $M.D.(M) = \frac{\sum |x_i M|}{M}$ , where M is median and n = no. of terms

Mean Deviation (M.D.) for grouped data

- M.D. about mean i.e.,  $M.D.(\overline{x}) = \frac{\sum f_i |x_i \overline{x}|}{x_i}$
- M.D. about median i.e.,  $M.D.(M) = \frac{1}{N} \sum_{i} f_i |x_i M|$

where 
$$N = \sum f_i$$