Mode.

⇒ Measure of Dispersion:

Dispersion (also called variability, scatter, or spread).

To determine the reliability of an average.

To compare the variability of two or more series.

⇒ There are types of measure of dispersion.

1) Absolute ~~dis~~ measure of dispersion (same unit)

2) relative measure of dispersion. (in the form of ratio, %)

⇒ 1) Range.

$$R = X_m - X_o$$

X_o → mini value.

X_m → max value

⇒ **Coefficient of dispersion.** (i.e used for the Purpose of comparison)

$$= \frac{X_m - X_o}{X_m + X_o}$$

score formula

⇒ The Semi-Interquatile Range or the Quartile deviation:

It is a measure of dispersion, defined by the diff between the third and the first quartiles and half of this range is called semi-interquatile Range. (SIQR) or Quatile deviation (Q.D)

$$QD = \frac{Q_3 - Q_1}{2}.$$

Q.D is also an absolute measure of dispersion. Its relative measure called coefficient of Q.D.

$$\text{Coefficient of } QD = \frac{Q_3 - Q_1}{Q_3 + Q_1}$$

∵ used to compare the variation of two or more sets of data.

⇒ The Mean (or Average) Deviation.

M.D of a set of data is defined as the arithmetic mean of the deviations measured either from the mean or from the median, all deviations being counted as positive.

$$M.D = \frac{\Sigma |x_i - \bar{x}|}{n}$$ for sample data.

$$M.D = \frac{\Sigma |x_i - \mu|}{N}$$ for pop data.

for grouped data.

$$M.D = \frac{\Sigma f_i |x_i - \bar{x}|}{n}$$

for median & mode same formula.

$$M.D = \frac{\Sigma |x_i - \tilde{x}|}{n} \qquad M.D = \frac{\Sigma |x_i - \hat{x}|}{n}.$$

$$M.D = \frac{\Sigma f_i |x_i - \tilde{x}|}{n} \qquad M.D = \frac{\Sigma f_i |x_i - \hat{x}|}{n}$$

...ore formula

⇒ **Coefficient of Mean Deviation** -

$$\text{coefficient of M.D} = \frac{M.D.}{Mean} \quad \text{or} \quad \frac{M.D}{Median}$$

⇒ **Variance & ~~Standars~~ ~~dard~~ Standard deviation**

Var
$$\sigma^2 = \frac{\Sigma_i (x_i - \mu)^2}{N} \quad \text{for pop data}$$
$$s^2 = \frac{\Sigma_i (x_i - \bar{x})^2}{n} \quad \text{for sample data.}$$

S.D
$$\sigma^2 = \sqrt{\frac{\Sigma_i (x_i - \mu)^2}{N}} \quad \text{for pop data}$$
$$s^2 = \sqrt{\frac{\Sigma_i (x_i - \bar{x})^2}{n}} \quad \text{for sample data.}$$

Alternative formula

$$\sigma^2 = \frac{\Sigma_i x_i^2}{N} - \left(\frac{\Sigma x_i}{N}\right)^2$$
$$s^2 = \frac{\Sigma_i x_i^2}{n} - \left(\frac{\Sigma x_i}{n}\right)^2$$

for grouped data.
$$\sigma^2 = \frac{\Sigma f x_i^2}{N} - \left(\frac{\Sigma f x}{N}\right)^2$$

⇒ **Coefficient of variation**:

$$C.V = \frac{S}{\bar{x}} \times 100 \quad , \text{ for sample data}$$
$$= \frac{\sigma}{\mu} \times 100 \quad \text{for population data.}$$

The variability of two or more than two sets of data cannot be compared unless we have a relative measure of dispersion. For this Purpose Karl Pearson introduced a relative measure of variation known as coefficient of variation.