Statistics

Arithmatic mean ⇒ A.M or $\bar{x} = \dfrac{\Sigma fx}{\Sigma f} = \dfrac{\Sigma fx}{N}$

Assumed mean or Short-cut method

$$\bar{x} = A + \frac{\Sigma fd}{N}$$

$d = x - A$

A = Assumed mean

Step deviation method ⇒

$$\bar{x} = A + \left(\frac{\Sigma fd}{N}\right) \times i$$

$d = \dfrac{x - A}{i}$

A = Assumed mean

i = common interval

Median

For individual series if data is odd

$$M = \left(\frac{n+1}{2}\right)^{th} \text{ term}$$

If Number is even

$$M = \frac{\left(\frac{n}{2}\right)^{th} \text{ term} + \left(\frac{n}{2} + 1\right)^{th} \text{ term}}{2}$$

Continuous series :-

Partition values

- Median: $\dfrac{N}{2}$
- Quartiles
  - First: $\dfrac{N}{4}$
  - Second: $\dfrac{3N}{4}$
- Deciles: $\dfrac{N}{10}$
- Percentile: $\dfrac{N}{100}$

Find Median of both

$$M = L + \left(\frac{\frac{N}{2} - C.F}{F} \right) i$$

L = Lower limit of median class

F = frequency of median class

CF = cumulative frequency of class preceding

i = class interval

Mode

Maximum No. of repetation.

Mode = 3 Median − 2 Mean

Mode of continuous series :-

$$Mode = L + \left(\frac{F_1 + F_0}{2F_1 - F_0 - F_2} \right) \times i$$

L = lower class

i = class interval

F_0 = Preceding frequency of model class

f_1 = Frequency of model class

F_2 = succeeding frequency of model class

Range = Highest Value − Lowest value

Co-efficient of Range = $\frac{H.V - L.V}{2}$

Quartile deviation = $\frac{Q_3 - Q_1}{2}$

Co-efficient of Q.D = $\frac{Q_3 - Q_1}{Q_3 + Q_1}$

Mean deviation = $\frac{1}{n} \Sigma |x - \bar{x}|$

Discrete and continuous series

$$= \frac{1}{N} \Sigma (f(x - \bar{x}))$$

S.D = $\sigma = \sqrt{\frac{1}{n} \Sigma (x - \bar{x})^2}$ for individual series

S.D - of Discrete & continuous series

$$= \sqrt{\frac{1}{N} \Sigma (f(x - \bar{x})^2)}$$

$$= \left[\sqrt{\frac{\Sigma fd^2}{N} - \left(\frac{\Sigma fd}{N}\right)^2} \right] \times i$$

$$d = x - A$$

Variance = σ^2

Correlation coefficient or Karl's Pearson's

$$r = \frac{\frac{1}{n}\Sigma\{(x-\bar{x})(y-\bar{y})\}}{\sqrt{\frac{1}{n}\Sigma(x-\bar{x})^2}\cdot\sqrt{\frac{1}{n}\Sigma(y-\bar{y})^2}}$$

$$r = \frac{cov(x,y)}{\sigma x \cdot \sigma y}$$

$$\bar{x} = \frac{\Sigma f(x)}{\Sigma f}$$

$$\bar{y} = \frac{\Sigma f(y)}{\Sigma f}$$

$$S.E = \frac{1-r^2}{\sqrt{n}}$$ Standard error

$r =$ Co-ordination

$$P.E = 0.674 \times \frac{1-r^2}{\sqrt{n}}$$ Probable error

Rank Co-ordination :- or Spearman Rank correlation :-

$$R = 1 - \frac{6\,\Sigma d^2}{n(n^2-1)}$$

$$d = R_1 - R_2$$

Spearman rank correlation

$$R = 1 - \frac{6\left[\Sigma d^2 + \frac{m_1(m_1^2-1)}{12} + \frac{m_2(m_2^2-1)}{12} + \cdots\right]}{n(n^2-1)}$$

Regression :-

x on y

$$x - \bar{x} = b_{xy}(y - \bar{y})$$

$$b_{xy} = \frac{cov(x,y)}{\sigma^2 y} = \frac{r \cdot \sigma x}{\sigma y}$$

$$= \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\Sigma(y-\bar{y})^2}$$

y on x

$$y - \bar{y} = b_{yx}(x - \bar{x})$$

$$b_{yx} = \frac{cov(x,y)}{\sigma^2 x} = \frac{r \cdot \sigma y}{\sigma x}$$

$$= \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\Sigma(x-\bar{x})^2}$$

Regression line x on y

$$x - \bar{x} = b_{xy}(y - \bar{y})$$

Regression line y on x

$$y - \bar{y} = b_{yx}(x - \bar{x})$$