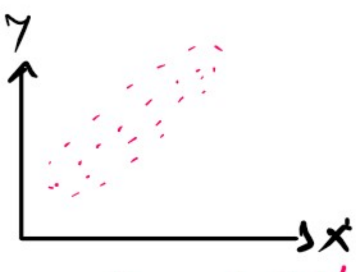
20 December 2023 08:10 PM

Scatter Diagram: It is a diagrammatic representation of bivariate data.
Suppose we are given 'n' pair of values of variables x and y. Taking two mutually perpendicular straight lines as axes of reference for x and y, each pair of given value can be plotted as a point in the graph. The figure obtained when all the 'n' pairs of values have been plotted is called a scatter diagram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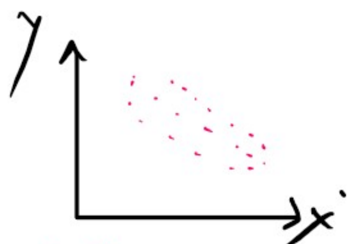
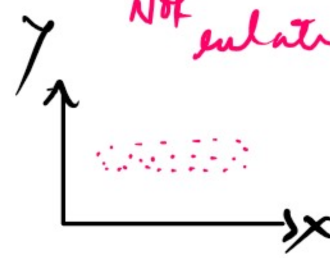

−vely associated

Not related.



Q

A → event that 'A' can solve problem

$P(A) = \frac{90}{100}$

$P(M) = \frac{90}{100}$

$N \rightarrow$ event that 'B' can . . .

$P(N) = \frac{70}{100}$

A and B independent

$\therefore P(A \cap B) = P(A)\,P(B) = \frac{90}{100} \times \frac{70}{100}$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{90}{100} + \frac{70}{100} - \frac{90}{100} \times \frac{70}{100}$$

$$= 0.9 + 0.7 - 0.63$$

$$= 1.6 - 0.63$$

$$= 0.97$$

$$s.d = \sqrt{\frac{1}{\Sigma f} \Sigma x^2 f - \bar{x}^2} \rightarrow \boxed{\Sigma xf / \Sigma f} \cdot \bar{x}$$

clas inter	x	f	xf	x^2	$x^2 f$
		$\Sigma f = 100$	Σxf		$\Sigma x^2 f$

$\bar{x}$

$\sigma = \sqrt{\dfrac{\Sigma x^2 f}{100} - \bar{x}^2}$ cm]

Sheppard's corrections for moments

In calculating moments for grouped frequency distribution using formula

$$\boxed{m_r'(A) = \frac{1}{N}\sum_{i=1}^{n}(x_i - A)^r f_i}$$

$r = 0, 1, 2 \dots$

where m_r' = raw moment

and $\boxed{m_r = \frac{1}{N}\Sigma (x_i - \bar{x})^r f_i}$

m_r = central moment

all values are included in a class are taken to be equal to the class-mark of that class.

By this we introduce some error known as the error due to grouping.

removing ~~[illegible]~~

So some corrections are necessary for removing this grouping error.

W.H. Sheppard has developed a technique for adjustments of moments in case of grouped frequency distribution having classes of equal width.

Sheppard's corrections for first four ordinary moments are as follows:

$$m_1' (\text{corrected}) = m_1'$$

$$m_2' (\text{corrected}) = m_2' - \frac{c^2}{12}$$

$$m_3' (\text{corrected}) = m_3' - \frac{c^2}{4} m_1'$$

$$m_4' (\text{"}) = m_4' - \frac{c^2}{2} m_2' + \frac{7}{240} c^4$$

Again for Central Moments

$$m_2 (\text{corrected}) = m_2 - c^2/12$$

$$m_3 (\text{corrected}) = m_3$$

$$m_4 (\text{corrected}) = m_4 - c^2/2 \, m_2 + \frac{7}{240} c^4$$

where c is the common width of the class.

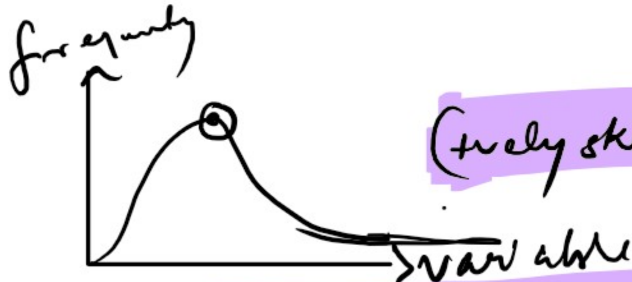
Few important formulas related to skewness and kurtosis

(1) Pearson's II measure of skewness

$$\boxed{S_k = \frac{(\text{mean} - \text{mode})}{\sigma}}$$

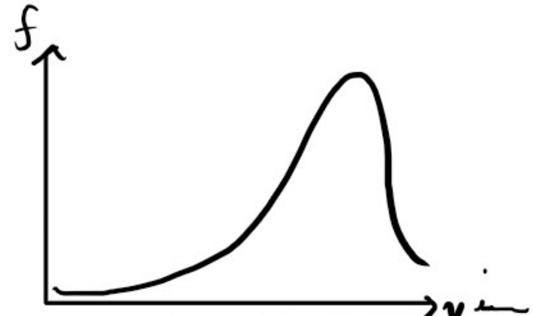
σ → standard deviation

skewness → degree of asymmetricity



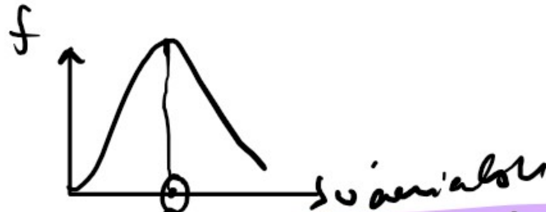
(+vely skewed)

mean > median > mode



-vely skewed

mean < med < mode



mean = med = mode (symmetric)

0 → skewness

(2) emperical relation between mean, median and mode,

$$\boxed{\text{mean} - \text{mode} = 3(\text{mean} - \text{median})}$$

$$\boxed{\text{mean} - \text{median} = 3(\text{mean} - \ldots)}$$

$$S_K = \frac{3(\text{mean} - \cancel{\text{mode}}\ \text{median})}{S} \leftarrow \text{standard deviation.}$$

(3) Bowley's measure of skewness. (N)

$$S_K = \frac{Q_3 - 2Q_2 + Q_1}{Q_3 - Q_1}$$

$Q_1 \to N/4$
$Q_2 \to 2N/4$
$Q_3 \to 3N/4$
$\cancel{Q_4 \to 4N/4}$

Q. In a group of 20 males & 5 females, 10 males and 3 females are service holders.

What is the probability that a person is a service holder, given he is a male.

A, B

$$P(A/B) = \frac{P(A \cap B)}{P(B)}$$

A: event of selecting a service holder.

B: event of selecting

A : event of selecting a service holder. P(B)

B : event of selecting a male

$P(A) = 13/25$

$P(B) = \frac{20}{25}$

$P(A \cap B) = \frac{10}{25}$

$\therefore P(A/B) = \frac{10/25}{20/25} = \frac{1}{2}$ (ans)

N exhaustive & mutually exclusive event

Baye's theorem: $A_1 \quad A_2 \cdots A_n$ &

Further B event is also there

Then $$\boxed{P(A_i/B) = \frac{P(A_i)\,P(B/A_i)}{\sum_{j=1}^{n} P(A_j)\,P(B/A_j)}}$$