CONCEPT OF CORRELATION

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Probable Error in Coefficient of Correlation

- Probable error is used to test the reliability of the value of Pearson's Coefficient of Correlation.
- It is used to interpret the value of the Correlation coefficient.
- If $|r| > 6P.E.$, then coefficient of Correlation (r) is significant & certain.
- If $|r| < 6P.E.$, then coefficient of Correlation (r) is insignificant. This implies that there is no evidence of the existence of correlation in both the series.

$$\text{Probable Error (P.E.)} = 0.6745 \times \frac{1-r^2}{\sqrt{N}}$$

where, 'r' is the correlation coefficient and 'N' is the number of pairs of observations

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$$\underset{(S.E.)}{\text{Standard Error}} = \frac{1-r^2}{\sqrt{N}}$$

Probable Error in Coefficient of Correlation

- **Probable error also determines the upper and lower limits within which the value of correlation of another randomly selected sample from the same universe, will lie.**
- **Upper limit= r + P.E.**
- **Lower limit= r – P.E.**
- **If the constant 0.6745 is omitted from the formula of probable error, we get the *Standard Error of the Coefficient of Correlation.***

Probable Error in Coefficient of Correlation

- **Ques 1: A student calculates the value of r as 0.7 when the value of N is 5 and concludes that r is highly significant. Is he correct?**
- **Ques 2: The correlation coefficient of a sample of 100 pairs of items was 0.92. Within what limits does it hold good for another sample taken from the same universe?**

$$r = 0.7, \quad N = 5$$

$$P.E. = 0.6745 \times \frac{1 - r^2}{\sqrt{N}}$$

$$P.E. = 0.6745 \times \frac{1 - (0.7)^2}{\sqrt{5}}$$

$$P.E. = 0.15$$

Now, $6\,P.E. = 6 \times 0.15$

$= 0.9$

$|r| > 6PE$

$0.7 > 0.9$

this is false.

Hence the student is incorrect

Given, $N = 100$, $r = 0.92$

$$P.E. = 0.6745 \times \frac{1 - r^2}{\sqrt{N}}$$

$$= 0.6745 \times \frac{1 - (0.92)^2}{\sqrt{100}}$$

$$P.E. = 0.0103$$

Upper Limit $= r + PE$
$= 0.92 + 0.0103 = 0.9303$

Lower limit $= r - PE$
$= 0.92 - 0.0103 = 0.9097$

Thus, the limits are 0.93 and 0.90.

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THANK YOU