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LECTURE- 23

BSc (AG)
2nd Year , IIIrd Sem.
Statistical Methods
AES-213



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Outline of Lecture

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- Linear Regression Equations
- Linear Regression Definition
- Equations of Lines of Regression
- y on x line
- x on y line
- Relation between Coefficient of Correlation & Coefficient of Regression
- Suggested Readings & References



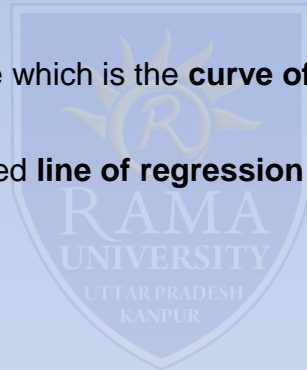
Linear Regression

If a relation between two variables x and y exists then the dots of the scatter diagram will more or less concentrated around a curve which is the **curve of regression**.

If this curve is a straight line then it is called **line of regression** and also called **linear regression**.

There are two lines of regression-

- y on x line
- x on y line



Equations of lines of regression

Let $y = ax + b$ is an equation of straight line. 'r' is a coefficient of correlation. \bar{x} and \bar{y}

\bar{x} and \bar{y} are means of x and y series respectively.

➤ y on x linear regression line is-

$$(y - \bar{y}) = \frac{r \cdot \sigma_y}{\sigma_x} (x - \bar{x})$$

or

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

Equations of lines of regression continue

- x on y linear regression line is-

$$(x - \bar{x}) = \frac{r \cdot \sigma_x}{\sigma_y} (y - \bar{y})$$

or

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

where,

\bar{x} = mean of x series

\bar{y} = mean of y series

σ_x = s.d. of x series

σ_y = s.d. of y series

b_{yx} = coefficient of regression of y on x line

b_{xy} = coefficient of regression of x on y line

Relation between coefficient of correlation & regression coefficients

Let $y = ax + b$ is an equation of straight line. 'r' is a coefficient of correlation.

Then relation between coefficient of correlation & regression coefficients is

$$r^2 = b_{yx} \cdot b_{xy}$$

Hence coefficient of correlation is geometric mean of regression coefficients

Suggested Readings & References

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- 1) Statistical Methods: P.N. Arora, Sumeet Arora & S. Arora; S. Chand & Company Ltd.
- 2) Fundamental of Mathematical Statistics: S.C. Gupta & V. Kapoor; Sultan Chand & Sons.
- 3) Statistics: M.R. Spiegel; Schaum's Outline Series, Mc-Graw Hill Publication.
- 4) Advanced Engineering Mathematics: Erwin Kreyszig; John Wiley & Sons Inc.
- 5) Elements of Statistics: J.P. Chauhan & S. Kumar; Krishna Publication.



*** THANK YOU ***