MIND MAP
CORRELATION AND REGRESSION

RITU JINDAL

Correlation

- Positive
- Negative
- $-1 \le \mu \le 1$

Scatter Diagram
- Positive Slope
- Negative Slope

Karl Pearson Correlation

$$\frac{Cov(x,y)}{\sigma_x \sigma_y}$$

$$\frac{n\Sigma xy - \Sigma x \Sigma y}{\sqrt{n\Sigma x^2 - (\Sigma x)^2}\sqrt{n\Sigma y^2 - (\Sigma y)^2}}$$

$x = dx$, $y = dy$

$$\frac{\Sigma xy}{\sqrt{\Sigma x^2 \Sigma y^2}}$$

$$\frac{\Sigma xy}{n\sigma_x \sigma_y}$$

Spearman's Rank Corr.
- Simple: $\frac{1 - 6\Sigma d_i^2}{n(n^2-1)}$
- Tied Rank: $\frac{1 - 6\left[\Sigma d_i^2 + \frac{\Sigma(t_j^3 - t_j)}{12}\right]}{n(n^2-1)}$

Coefficient of Concurrent deviation

$$\mu_k = \pm\sqrt{\pm\frac{2c-m}{m}}$$

Regression

Line Y on X

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

$$b_{yx} = \mu\frac{\sigma_y}{\sigma_x}$$

Line X on Y

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

$$b_{xy} = \mu\frac{\sigma_x}{\sigma_y}$$

Main Questions
- Point of Intersection = Mean
- Identity Line
- Find μ
- Eqn of Line

Important Formulae

- S.E: $\frac{1-\mu^2}{\sqrt{n}}$
- P.E.: $\frac{2}{3} \times \frac{1-\mu^2}{\sqrt{n}}$ or $.6745 \times \frac{1-\mu^2}{\sqrt{n}}$
- Coefficient of Determination: μ^2
- Coeff of Non-Determination: $1-\mu^2$

Properties

Correlation
- Independent of change of origin & scale.
- $\mu_{xy} = \frac{bd}{|b||d|}$ same

$$\mu = \pm\sqrt{b_{yx} b_{xy}}$$

Regression
- Independent of change of origin but dependent on scale
- $b_{yx} = \frac{q}{p} b_{uv}$, $u = \frac{x-a}{p}$
- $b_{xy} = \frac{p}{q} b_{uv}$, $v = \frac{y-c}{q}$

→ $\mu = 0$ Regression lines are Perpendicular

$\mu = \pm 1$ Regression lines Coincide