

Prova

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Prove que

$$b(x, y) = r \sqrt{\frac{\text{var}(y)}{\text{var}(x)}}$$

Sabemos que:

$$b(x, y) = \frac{\text{cov}(x, y)}{\text{var}(x)} \quad (\text{Eq. 01})$$

e que,

$$r = \frac{\text{cov}(x, y)}{\sqrt{\text{var}(x) \cdot \text{var}(y)}} \quad (\text{Eq. 02})$$

Portanto:

$$\frac{\text{cov}(x, y)}{\text{var}(x)} = \frac{\text{cov}(x, y)}{\sqrt{\text{var}(x) \cdot \text{var}(y)}} \cdot \frac{\sqrt{\text{var}(y)}}{\sqrt{\text{var}(x)}} \quad (\text{Eq. 03})$$

$$\text{Como } \frac{\sqrt{\text{var}(y)}}{\sqrt{\text{var}(y)}} = 1$$

A Eq. 03 torna-se:

$$\frac{\text{cov}(x, y)}{\text{var}(x)} = \frac{\text{cov}(x, y)}{\sqrt{\text{var}(x)}} \cdot \frac{1}{\sqrt{\text{var}(x)}} \quad (\text{Eq 04})$$

E ao multiplicar os termos da Eq.04 temos: $\frac{\text{cov}(x, y)}{\text{var}(x)} = \frac{\text{cov}(x, y)}{\sqrt{\text{var}(x)^2}}$

O elevado a 2 de $\sqrt{\text{var}(x)}$ corta com a raiz, então:

$$\frac{\text{cov}(x, y)}{\text{var}(x)} = \frac{\text{cov}(x, y)}{\text{var}(x)}$$