

Geoestatística - Exercício

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1 Exercícios

Exercício 2.2

Consider the following two models for a set of responses, $Y_i : i = 1, \dots, n$ associated with a sequence of positions $x_i : i = 1, \dots, n$ along a onedimensional spatial axis x .

(a) $Y_i = \alpha + \beta x_i + Z_i$, where α and β are parameters and the Z_i are mutually independent with mean zero and variance σ_Z^2 .

Calculando a esperança de $Y_i = \alpha + \beta x_i + Z_i$

$$\begin{aligned} E(Y_i) &= E(\alpha + \beta x_i + Z_i) & (1) \\ &= E(\alpha) + E(\beta x_i) + E(Z_i) \\ &= \alpha + \beta x_i + 0 \\ &= \alpha + \beta x_i \end{aligned}$$

$$\begin{aligned} V(Y_i) &= V(\alpha + \beta x_i + Z_i) & (2) \\ &= V(\alpha) + V(\beta x_i) + V(Z_i) \\ &= V(\alpha) + (x_i)^2 V(\beta) + V(Z_i) \\ &= 0 + (x_i^2) 0 + \sigma_z^2 \\ &= \sigma_z^2 \end{aligned}$$

(b) $Y_i = A + Bx_i + Z_i$ where the Z_i are as in (a) but A and B are now random variables, independent of each other and of the Z_i , each with mean zero and respective

variances σ_A^2 e σ_B^2 .

Calculando a esperança de $Y_i = A + Bx_i + Z_i$

$$\begin{aligned} E(Y_i) &= E(A + Bx_i + Z_i) & (3) \\ &= E(A) + E(Bx_i) + E(Z_i) \\ &= 0 + 0 + 0 \\ &= 0 \end{aligned}$$

$$\begin{aligned} V(Y_i) &= V(A + Bx_i + Z_i) & (4) \\ &= V(A) + V(Bx_i) + V(Z_i) \\ &= \sigma_A^2 + (x_i)^2 \sigma_B^2 + \sigma_z^2 \end{aligned}$$