V/S Modellieren in der Landschaftsarchäologie

Freie Universität Berlin
M.Sc. Landschaftsarchäologie

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Interpolation

Inverse Distance Weighting

Control points *i* in neighborhood *m*

$$\hat{z}_j = \sum_{i=1}^{m} w_{ij} z_i$$

Estimate at *j*

$$w_{ij} \propto \frac{1}{d_{ij}^k}$$

(O'Sullivan & Unwin, 2010)

Interpolation

Inverse Distance Weighting

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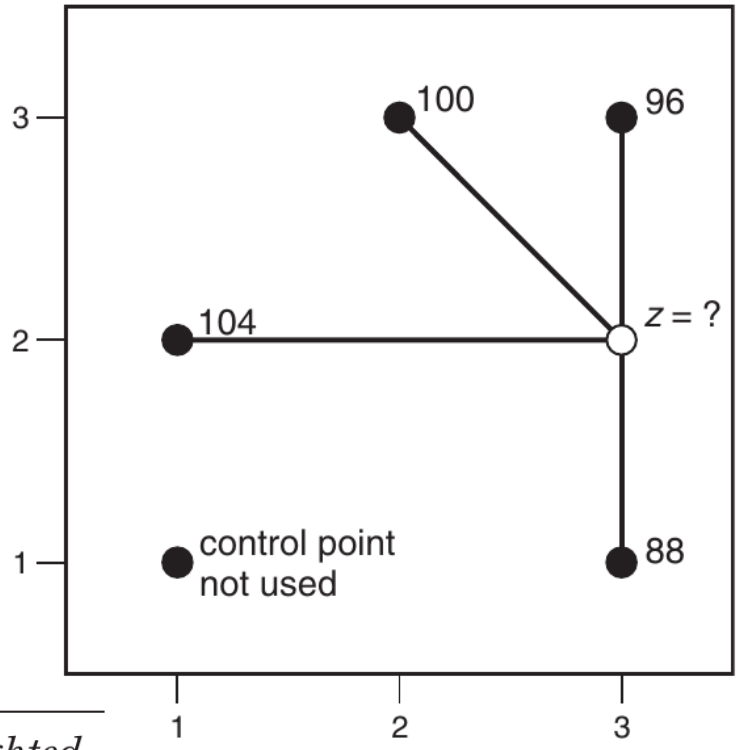
$$\hat{z}_j = \sum_{i=1}^{m} w_{ij} z_i$$



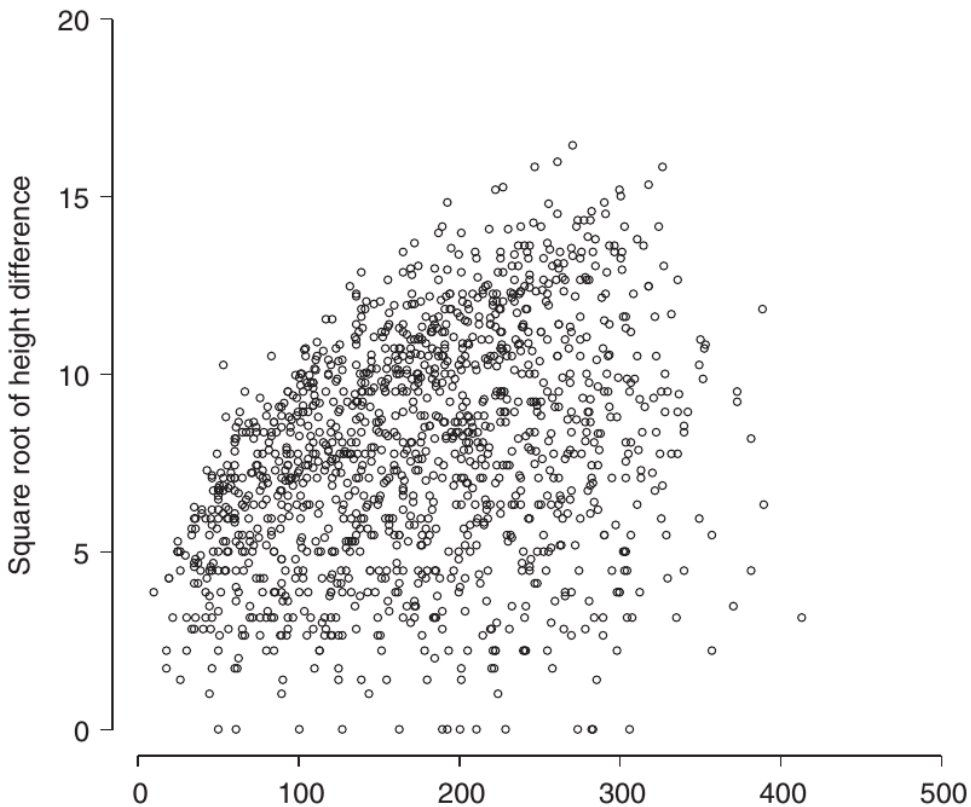
Control point	*Height* z_i	x_i	y_i	*Distance* d_{ij}	*Inverse distance* $1/d_{ij}$	*Weight* w_{ij}	*Weighted value* $w_{ij}z_i$
1	104	1	2	2.000	0.50	0.1559	16.21
2	100	2	3	1.414	0.71	0.2205	22.05
3	96	3	3	1.000	1.00	0.3118	29.93
4	88	3	1	1.000	1.00	0.3118	27.44
Totals					3.21	1.0000	95.63

(O'Sullivan & Unwin, 2010)

Interpolation

1. Describing spatial variation

Square root differences cloud



(O'Sullivan & Unwin, 2010)

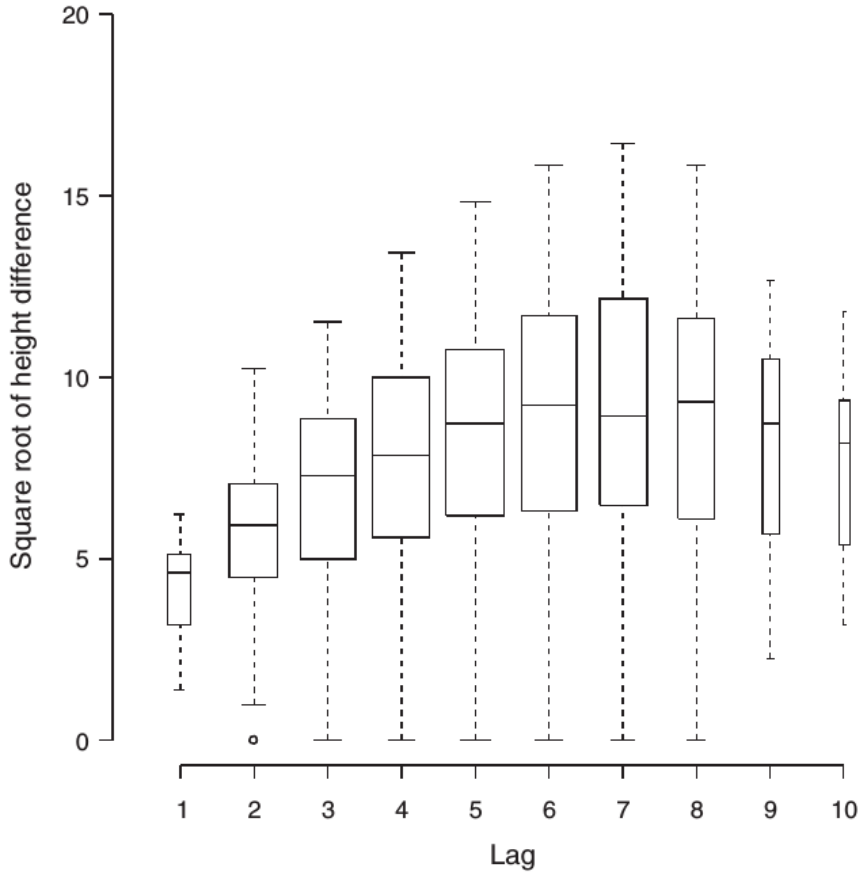
Interpolation

1. Describing spatial variation

Square root differences cloud

↓

Distance classes → lags
and summary statistics

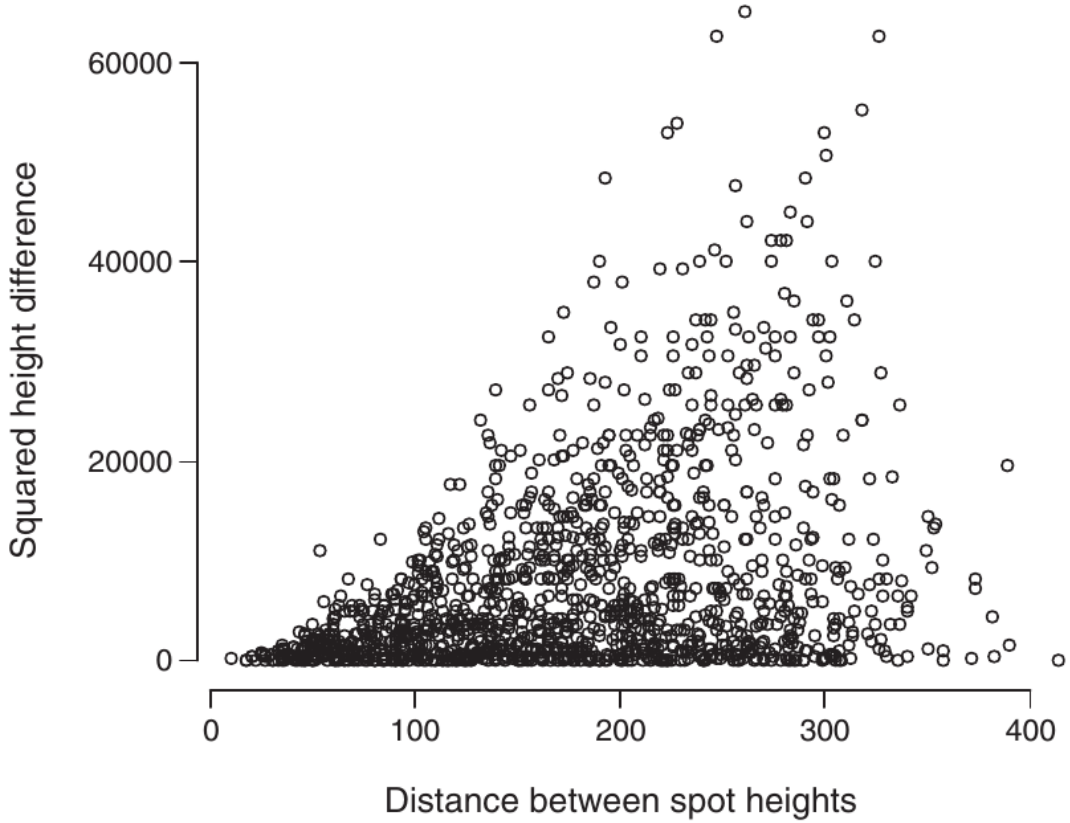


(O'Sullivan & Unwin, 2010)

Interpolation

1. Describing spatial variation

Square differences, i.e. semivariogram cloud



(O'Sullivan & Unwin, 2010)

Interpolation

1. Describing spatial variation

Square differences, i.e. semivariogram cloud

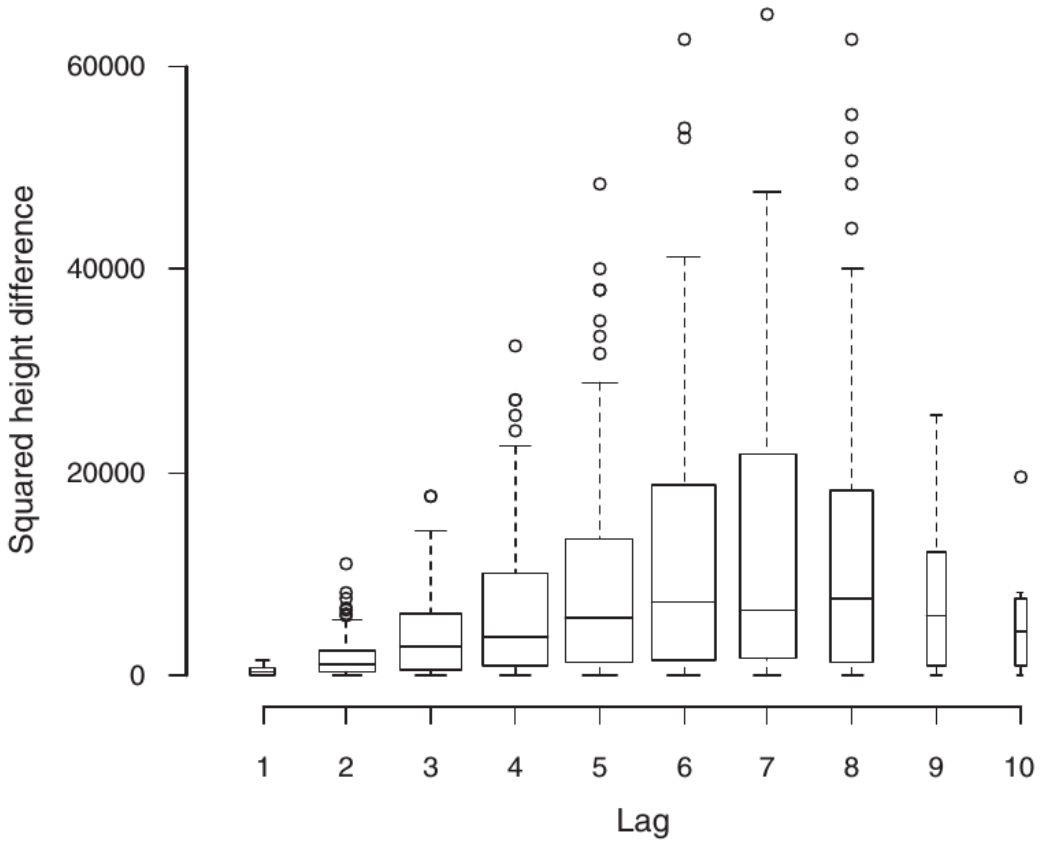
↓

Distance classes → lags
and summary statistics
→ *experimental semivariogram*
[or short variogram]

↓

Semivariance

$$2\hat{\gamma}(d) = \frac{1}{n(d)} \sum_{d_{ii}=d} (z_i - z_j)^2$$



= mean of sum of squared differences at distance d

(O'Sullivan & Unwin, 2010)

Interpolation

1. Describing spatial variation

Square differences, i.e. semivariogram cloud

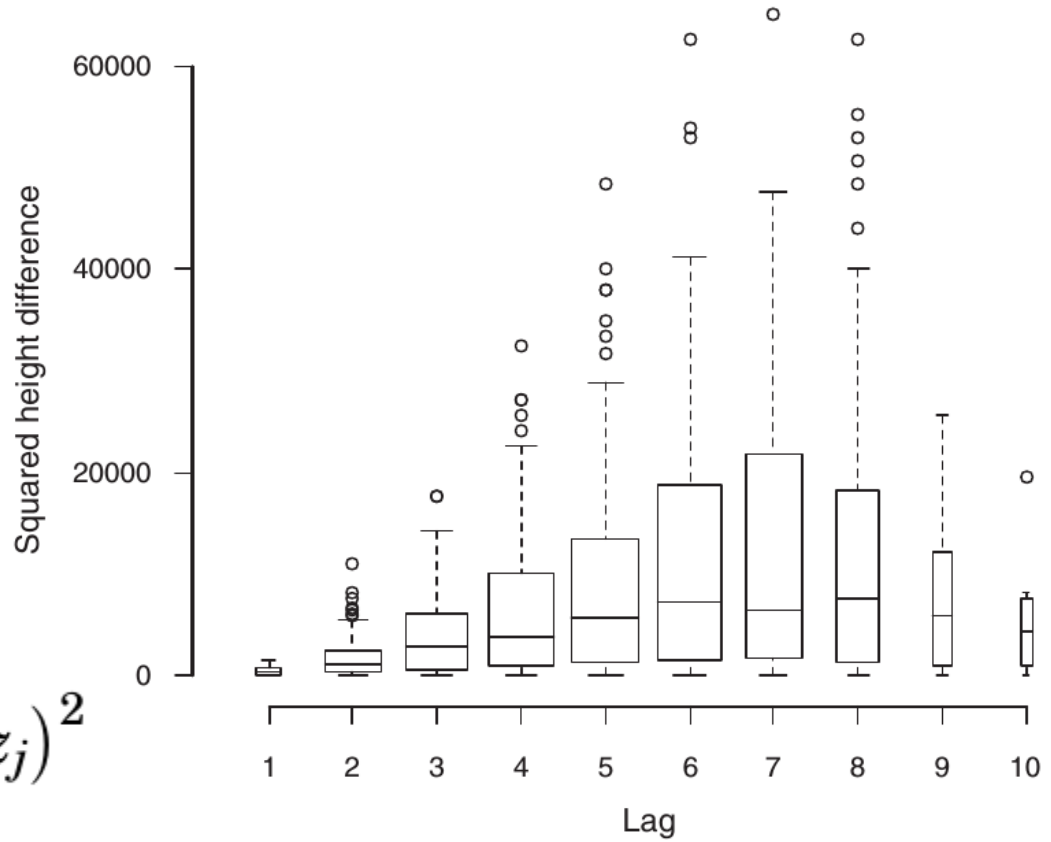
↓

Distance classes → lags
and summary statistics
→ *experimental semivariogram*
[or short variogram]

↓

Semivariance

$$2\hat{\gamma}(d) = \frac{1}{n(d \pm \Delta/2)} \sum_{d \pm \Delta/2} (z_i - z_j)^2$$



= mean of sum of squared differences at distance lags

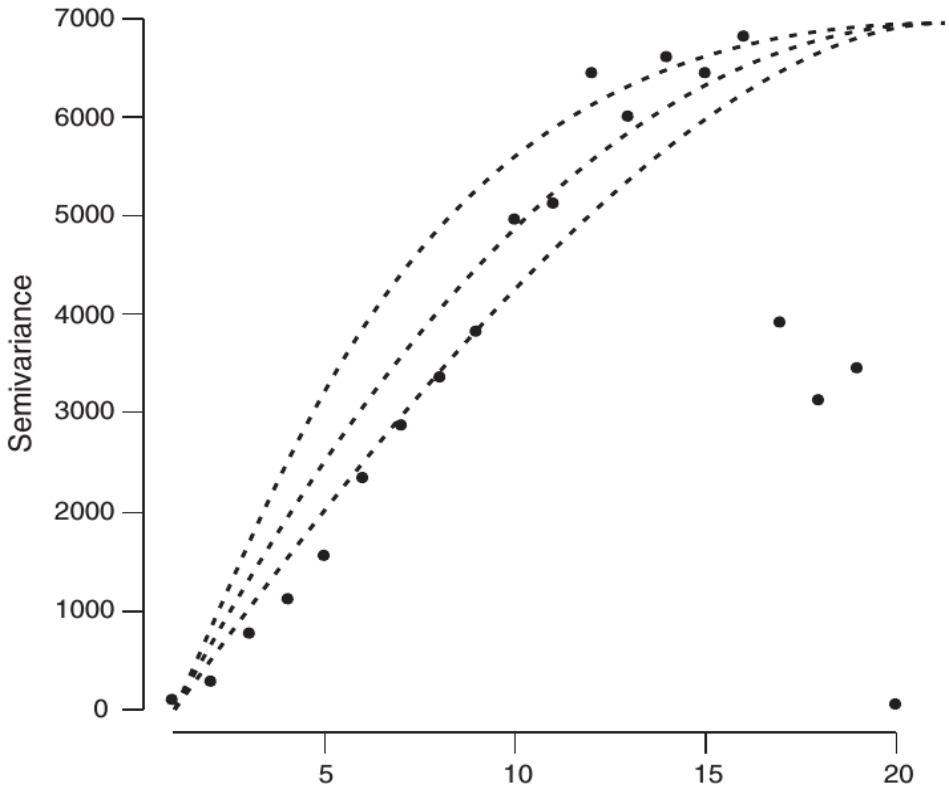
(O'Sullivan & Unwin, 2010)

Interpolation

2. Summarizing spatial variation

Fitting a function to the experimental estimates from the semivariogram

Any function? No. Function has to be authorized
→ function can only be positive
→ intercept at zero

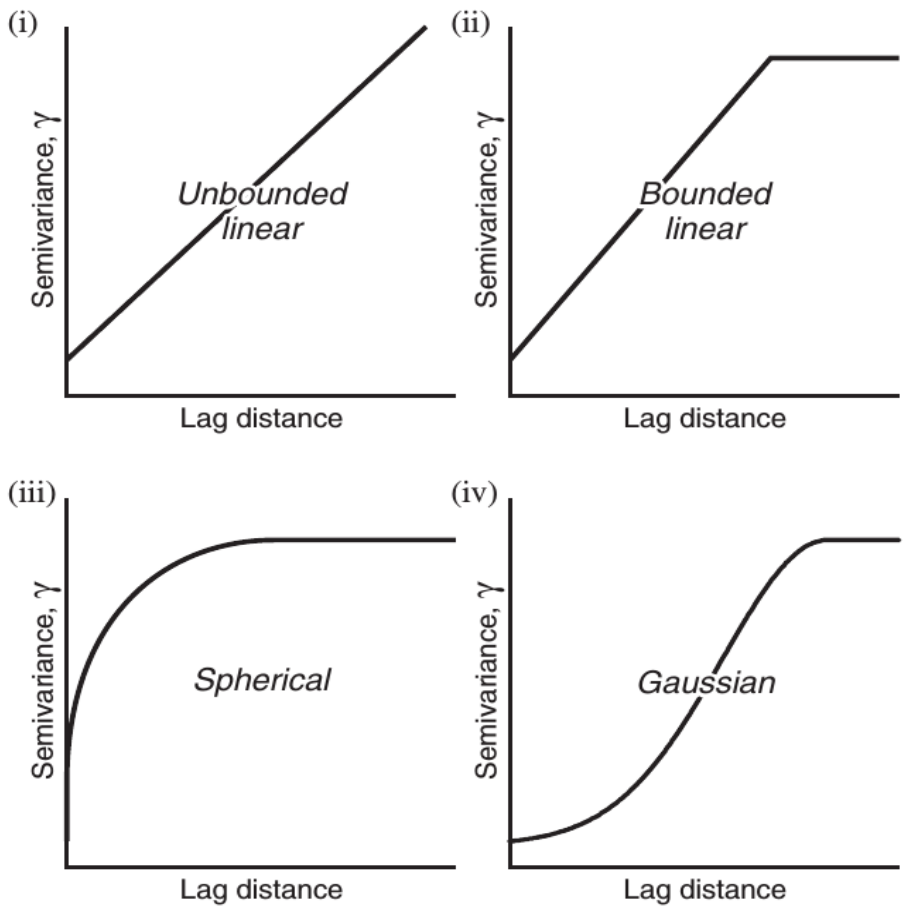


(O'Sullivan & Unwin, 2010)

Interpolation

Fitting a function to the experimental estimates from the semivariogram

Exemplary functions to fit



(O'Sullivan & Unwin, 2010)

Interpolation

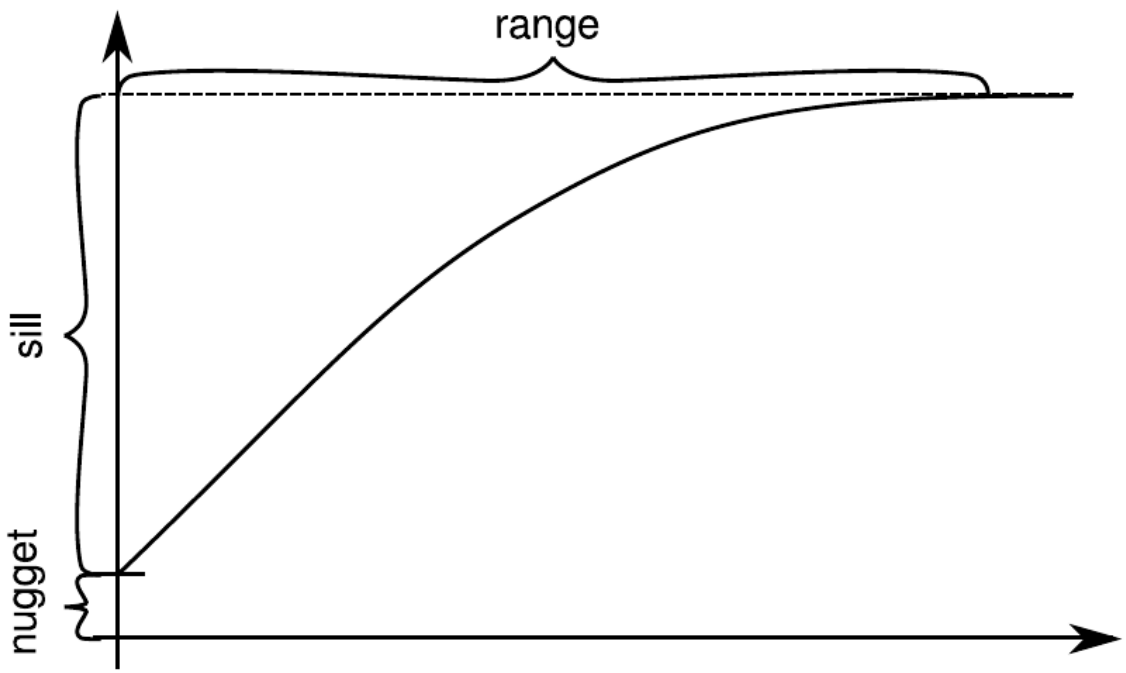
2. Summarizing spatial variation

"Elements" of a semivariogram

Nugget effect
→ measurement error
→ variation below shortest sampling interval

Sill
→ where range of semivariance

Range
→ distance at which semivariance reaches maximal value



(Nakoinz & Knitter forthcoming)