

# Spatial interpolation (2/2): kriging

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**GE01015**

**Digital terrain modelling**

<https://3d.bk.tudelft.nl/courses/geo1015>



**3D geoinformation**

Department of Urbanism  
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What is kriging?

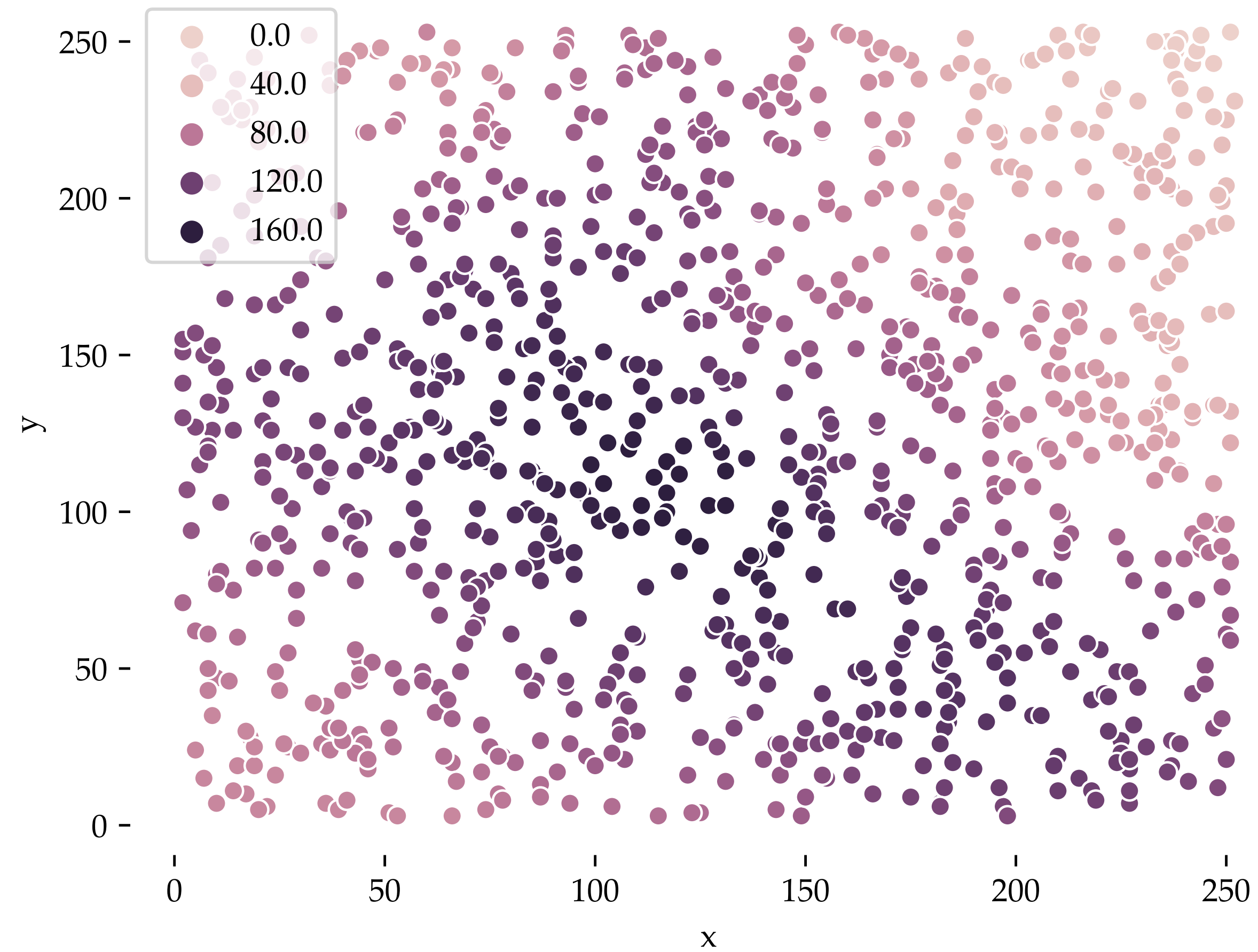
# What is kriging?

In short

- Weighted average interpolation method...
- where the weights are based on the spatial correlation between the points...
- which is given by a custom geostatistical model for each dataset...
- which can be created using a variogram.

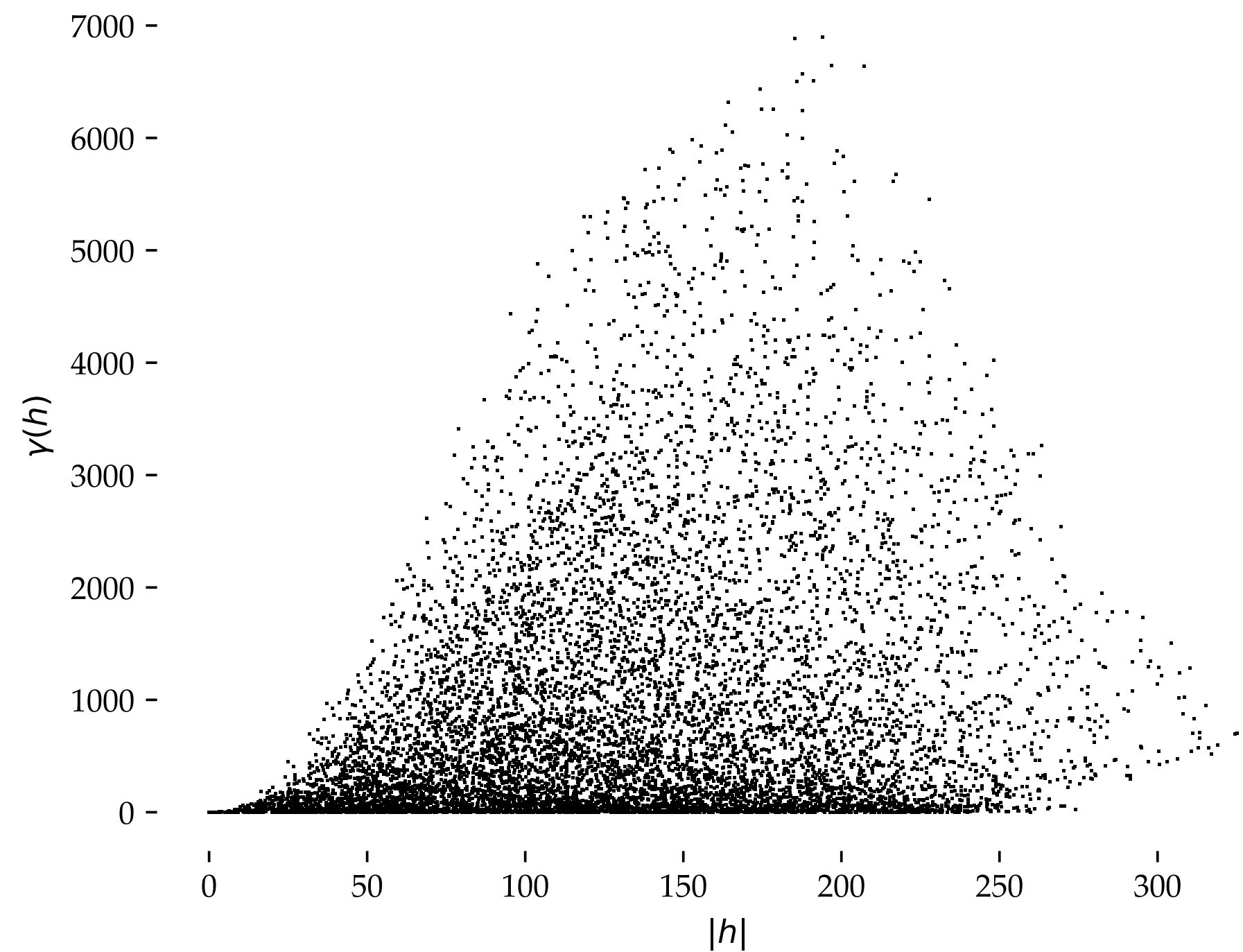
# What is kriging?

Start



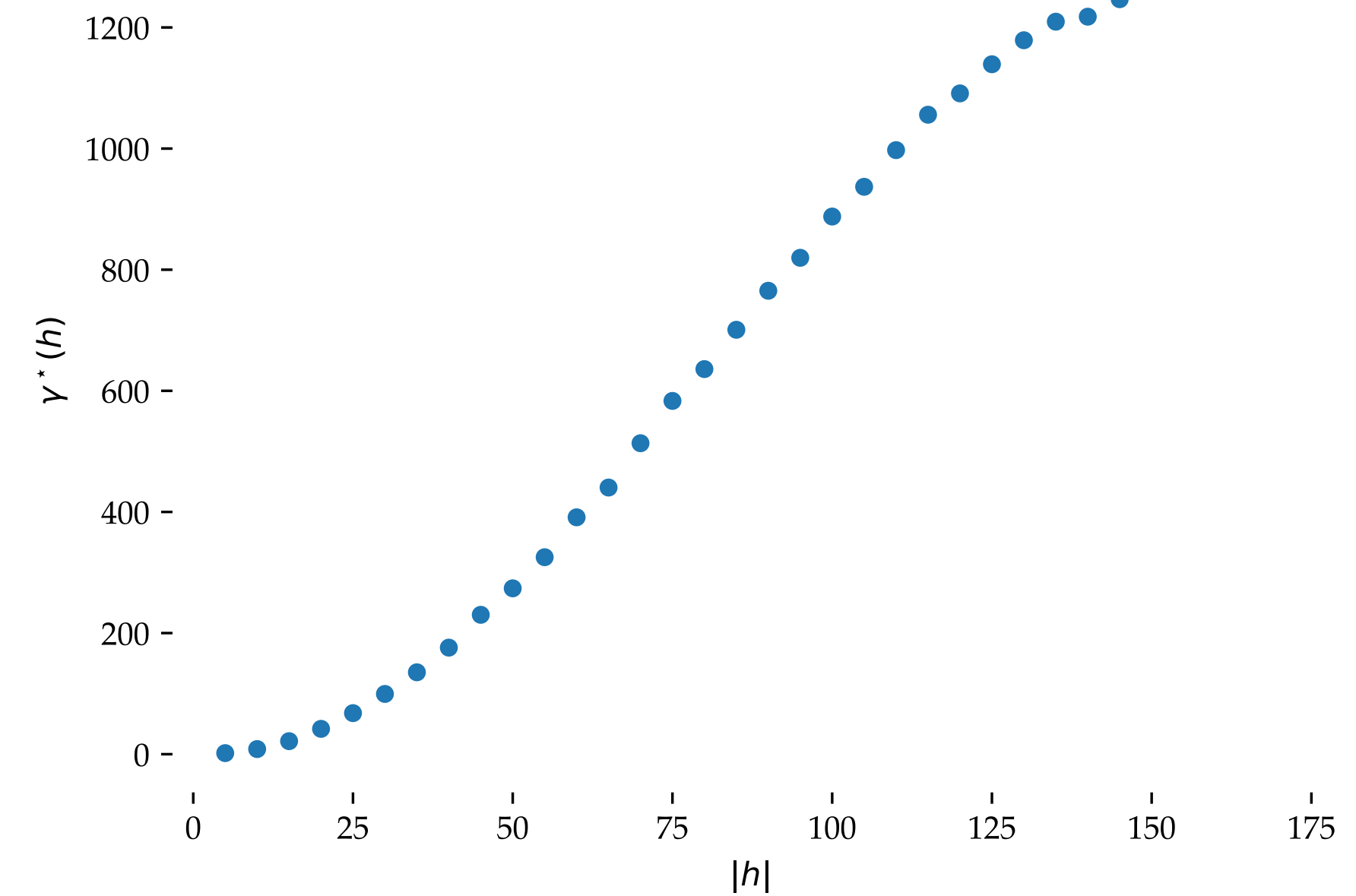
# What is kriging?

## Variogram



variogram cloud

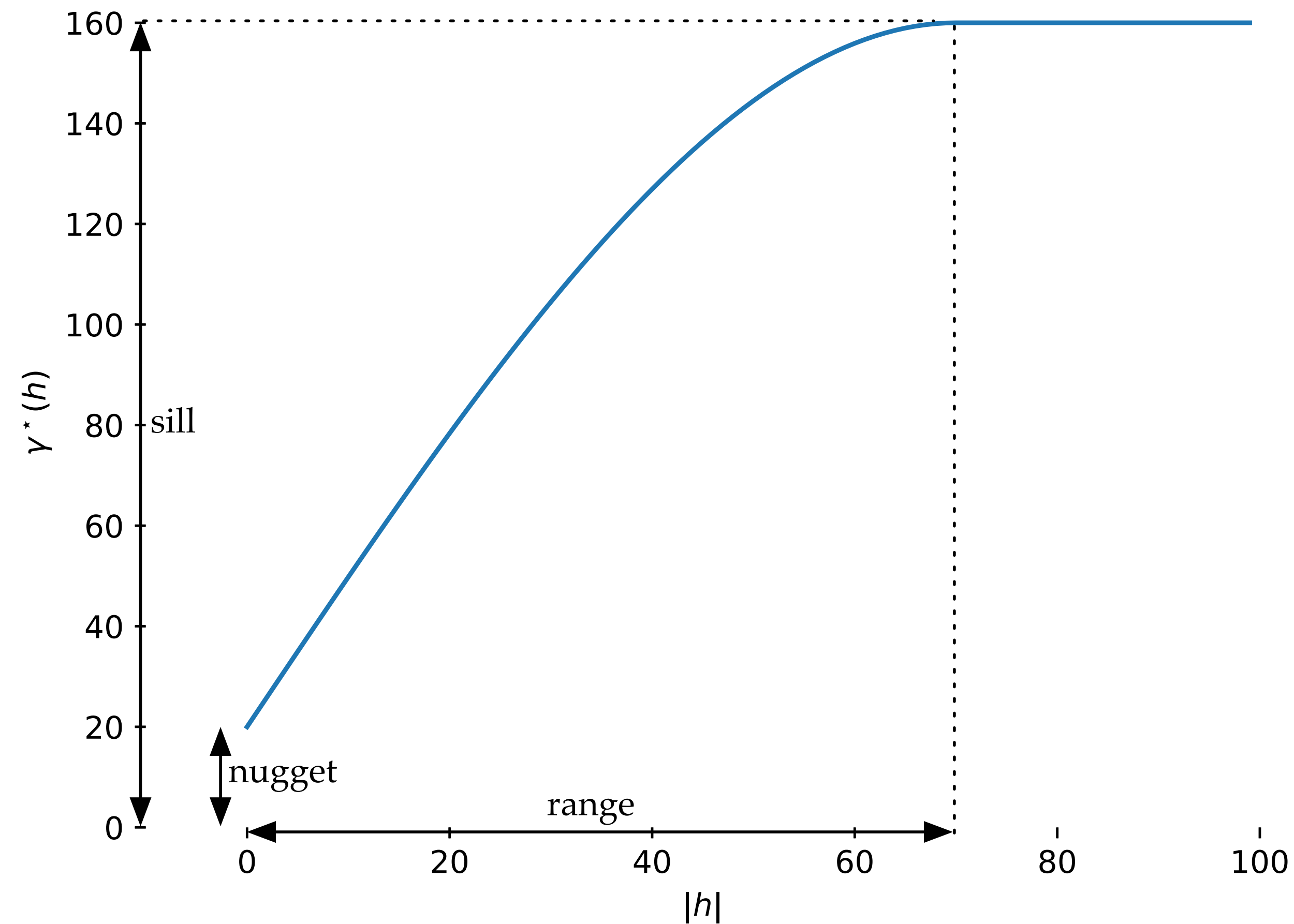
avg  
➔



experimental variogram

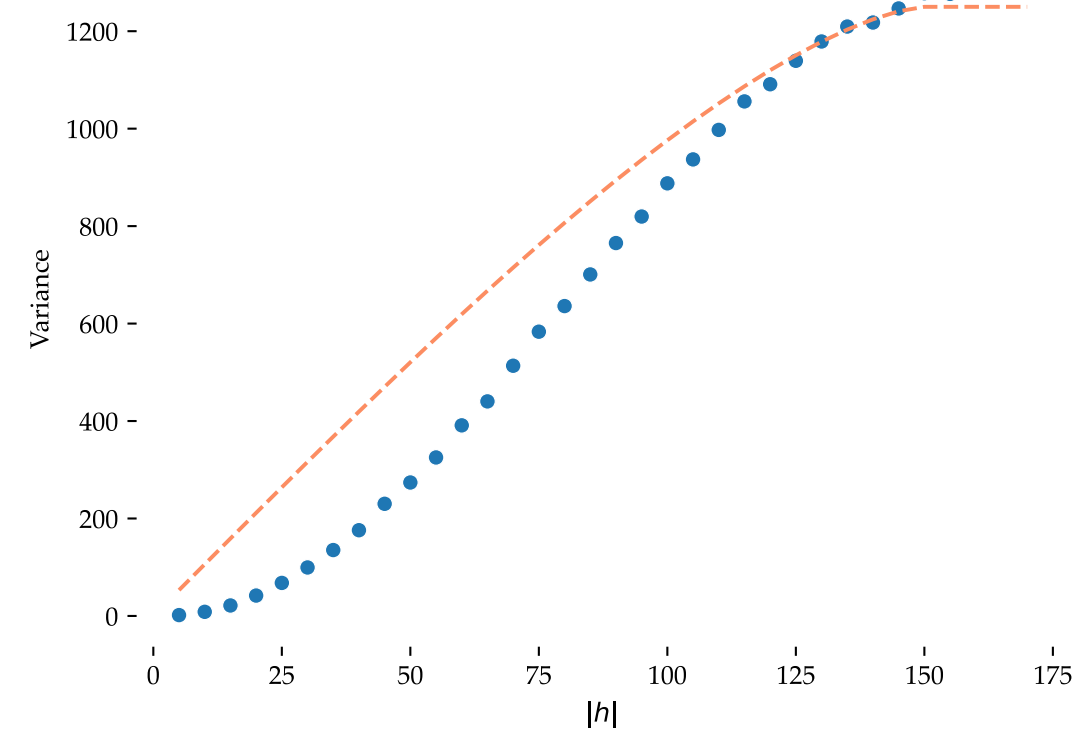
# What is kriging?

Geostatistical model: parameters

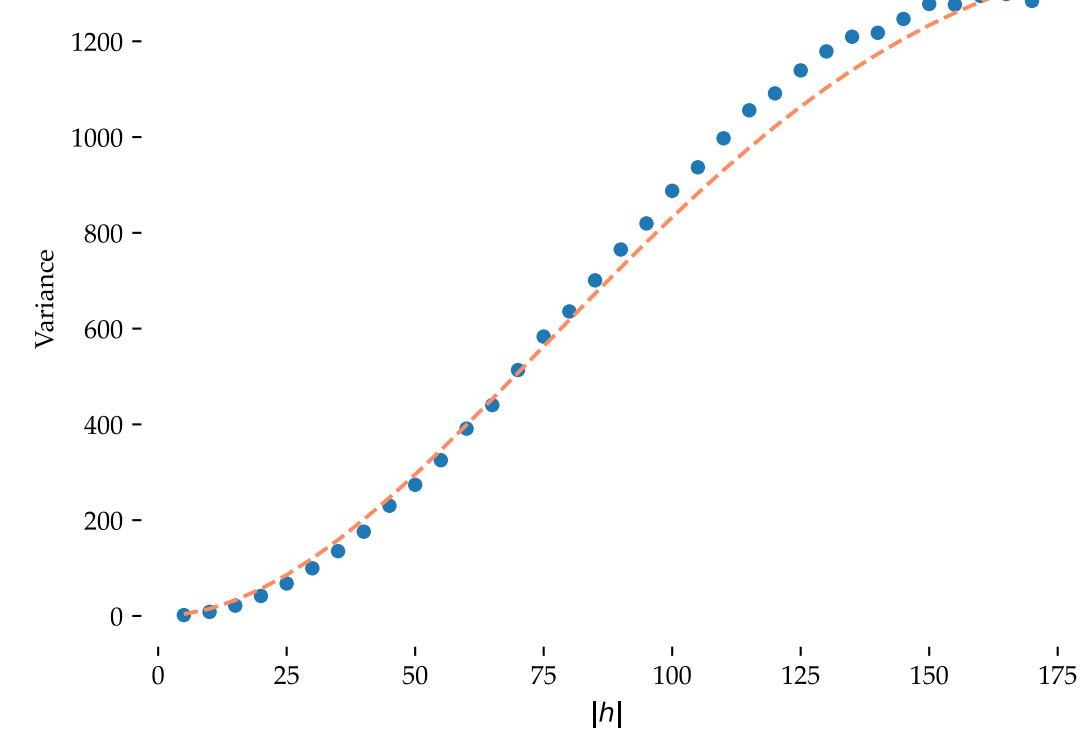


# What is kriging?

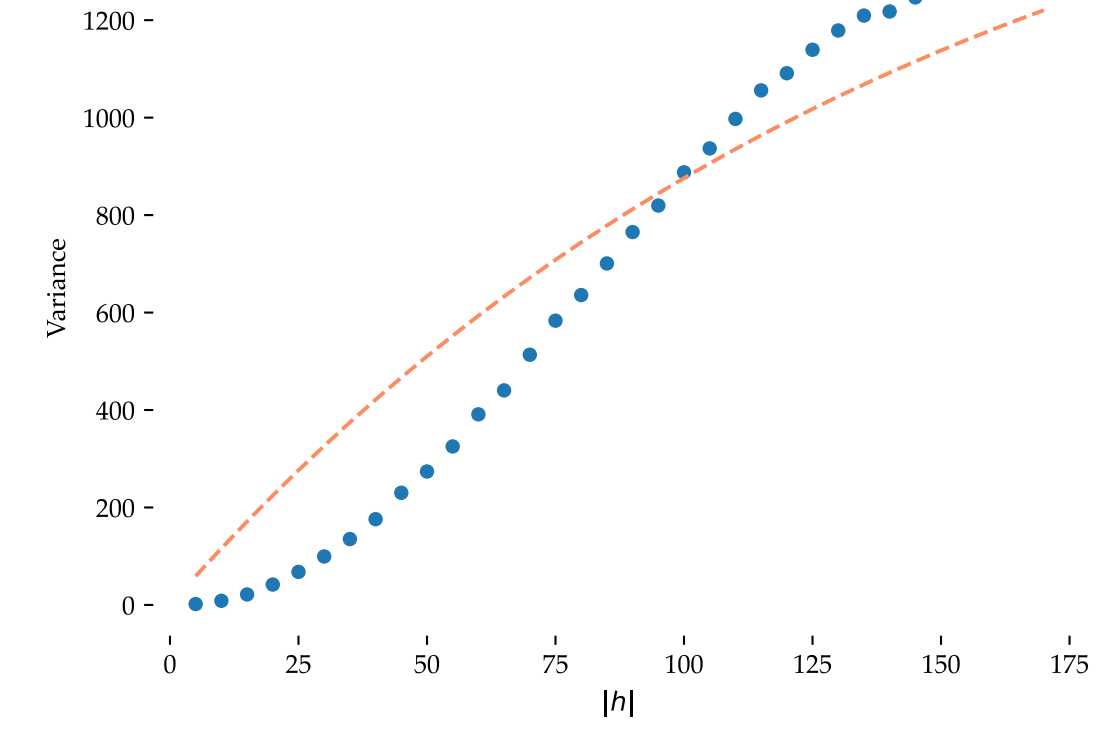
## Geostatistical model: functions



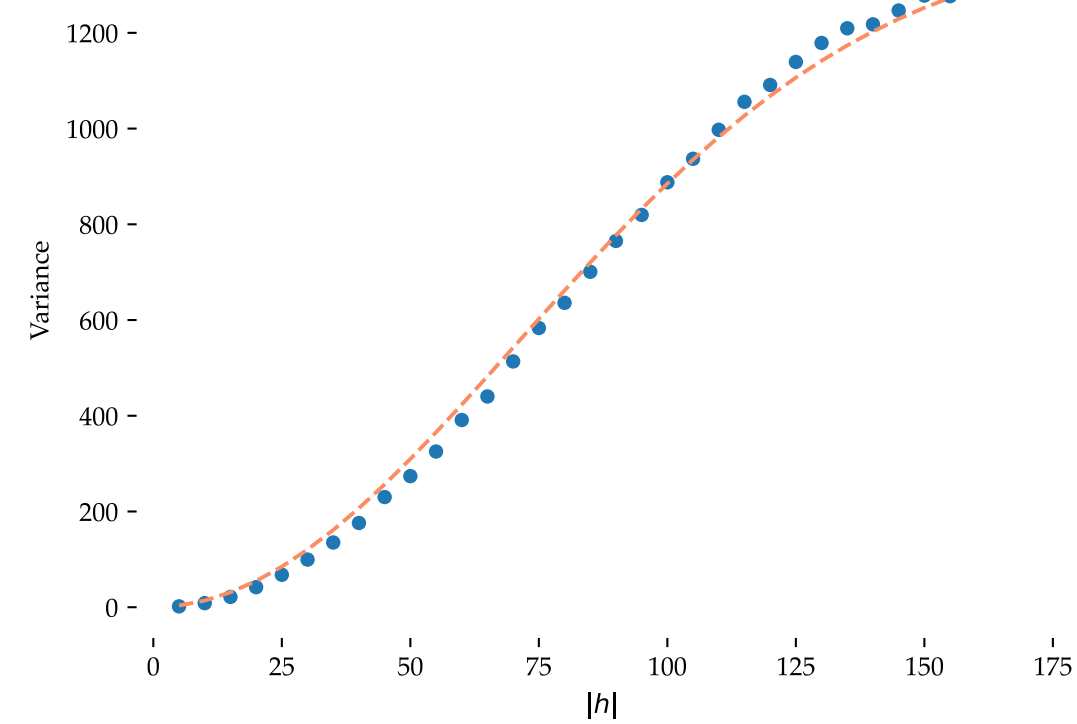
**(a)** Circular



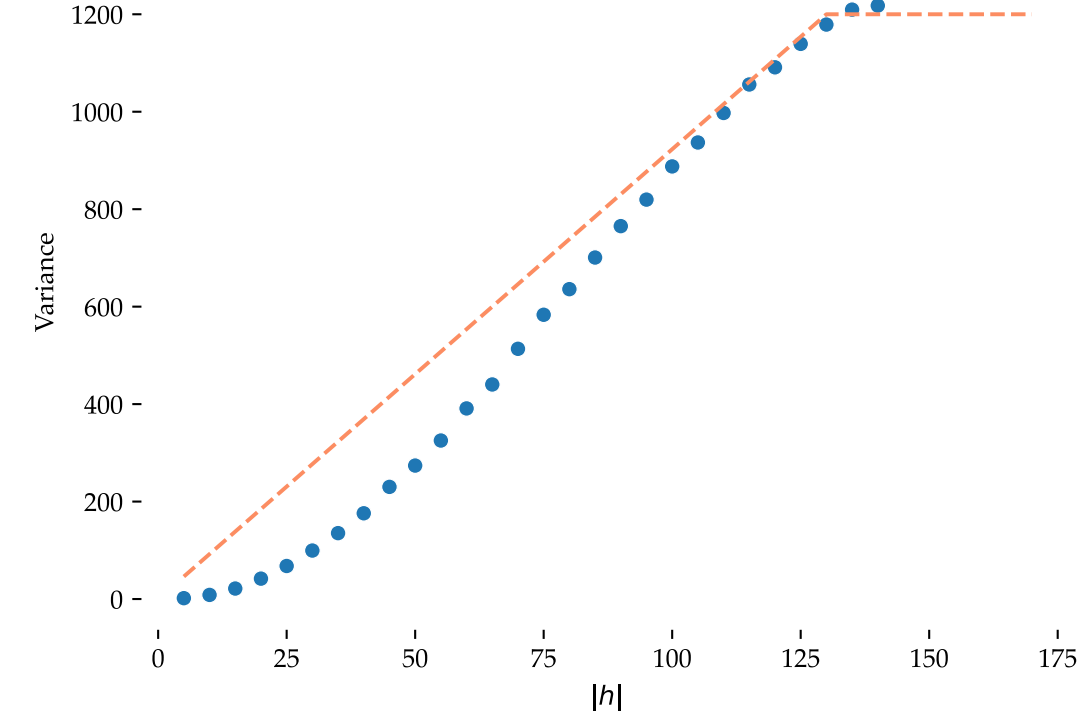
**(b)** Cubic



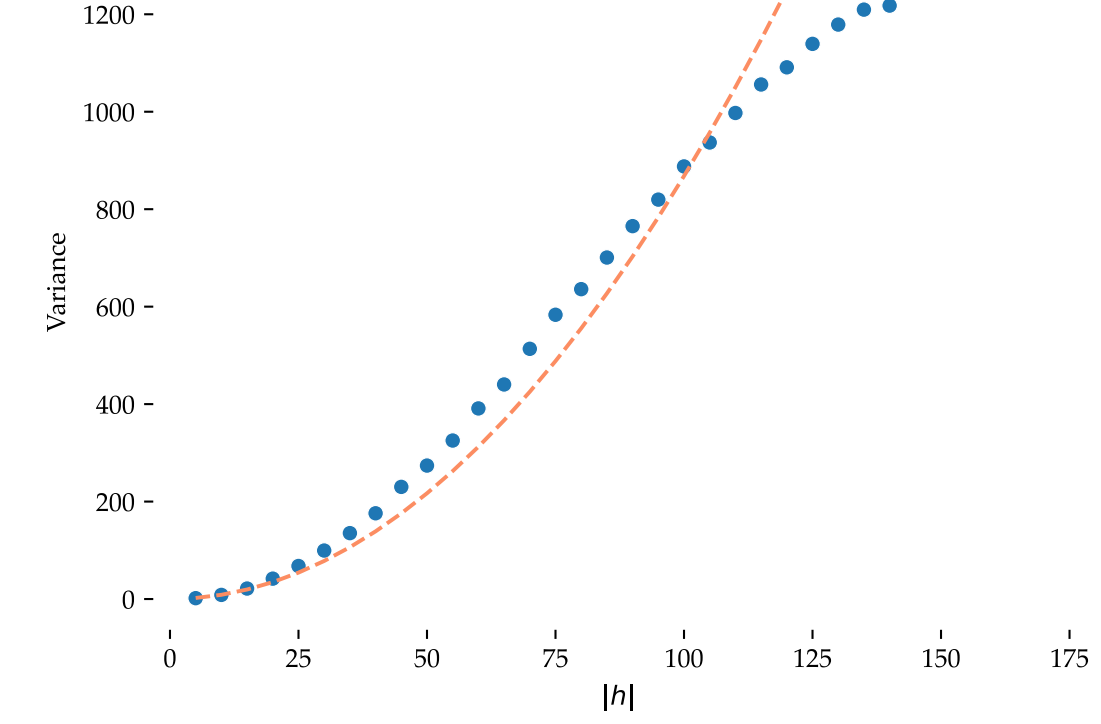
**(c)** Exponential



**(d)** Gaussian



**(e)** Linear (bounded)



**(f)** Power (bounded)

# What is kriging?

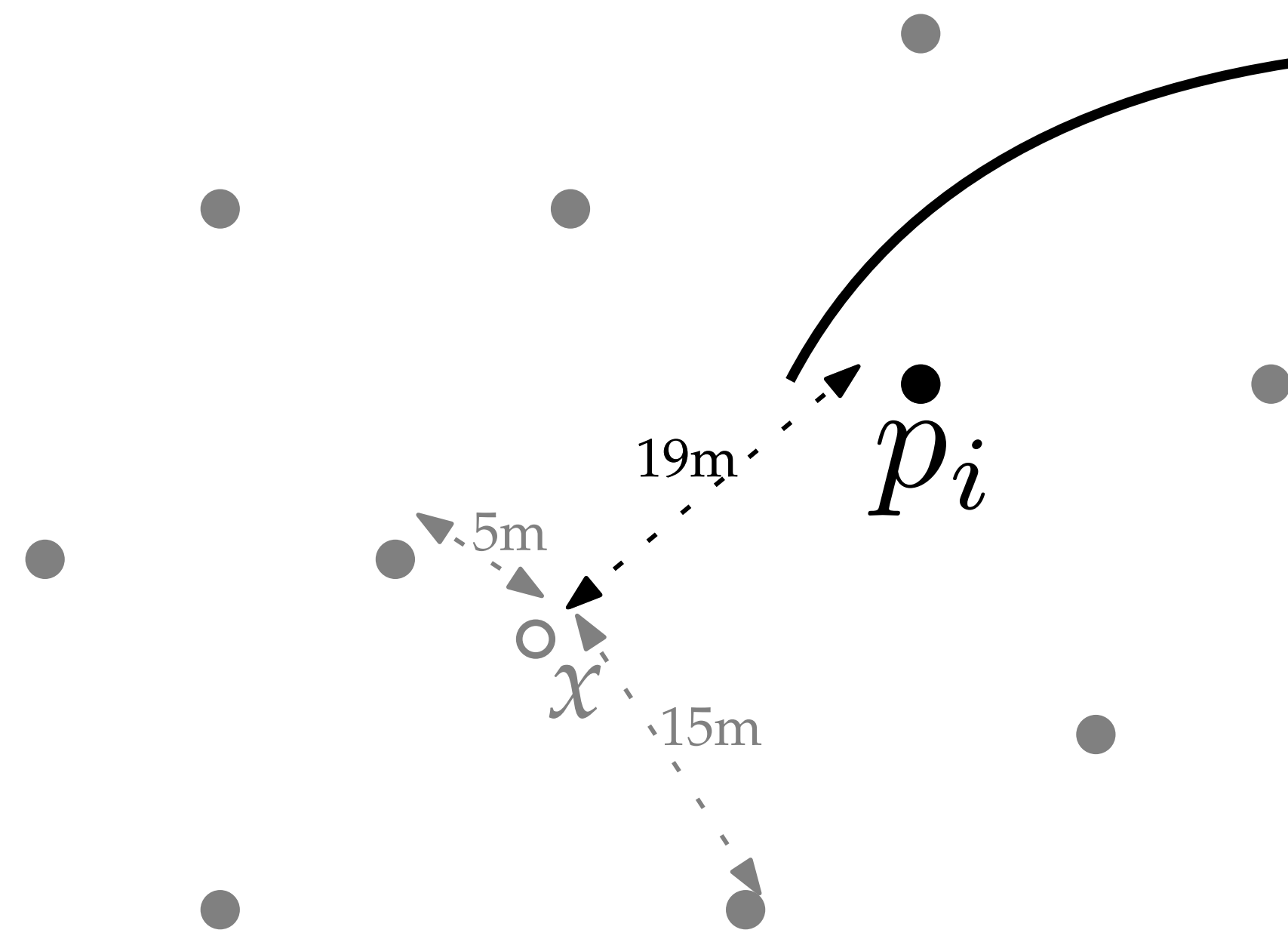
Weighted average method

$$f(x) = \hat{a} = \frac{\sum_{i=1}^n w_i(x) a_i}{\sum_{i=1}^n w_i(x)}$$



# What is kriging?

Spatial correlation



$$f(x) = \hat{a} = \frac{\sum_{i=1}^n w_i(x) a_i}{\sum_{i=1}^n w_i(x)}$$

# What is kriging?

## Differences with other methods

- Model correlation based on specific characteristics of each dataset
- Mathematically minimises interpolation error
- Handles complex data with noise, irregular point spacing or regular patterns

# Kriging basics

geostatistical model

$$Z = E[Z] + R.$$



expectation

(trend)



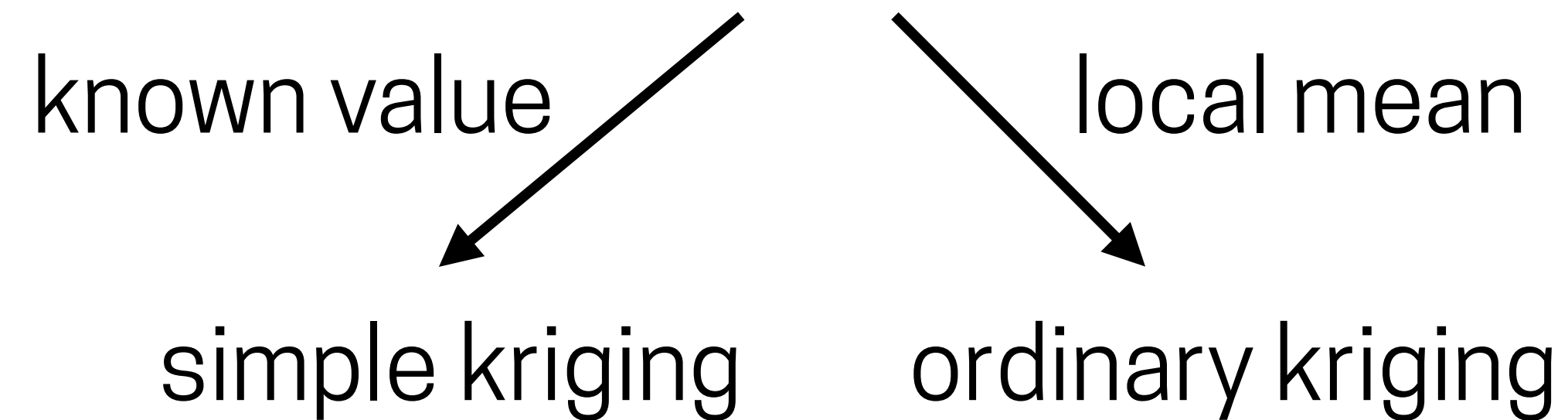
residual

(deviation from trend)

# Kriging basics

geostatistical model

$$Z = E[Z] + R.$$



# kriging in practice (pyinterpolate)

# What is pyinterpolate?

- Python library for geostatistics
- IDW, simple kriging and ordinary kriging among others
- Various operations on variograms

[pyinterpolate.readthedocs.io](https://pyinterpolate.readthedocs.io)

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