

Inference for Stochastic Processes

2. Gaussian Processes

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Basic Setup:

- Observe $Z(s_i), \{s_i \in S\}, i = 1 : n$
- Model $Z(s) \sim \text{No}(\mu(s), C(s_1, s_2))$
- Stationary Assumption: $\mu(s) \equiv \mu = 0,$
 $C(s_1, s_2) \equiv C(s_1 - s_2, 0) = C(s_1 - s_2)$
- SemiVarioqram: $\gamma(s) \equiv \frac{1}{2}\text{V}[Z(s) - Z(0)] = [C(0) - C(s)]$
- Bad Estimate:

$$2\hat{\gamma}(h) = \frac{1}{N(h)} \sum_{s_i - s_j = h} (Z(s_i) - Z(s_j))^2$$

where $N(h) = \text{Number of pairs } i, j \text{ with } s_i - s_j = h$

Parametric Inference: