Geostatistics

Course Outline

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- **INTRODUCTION**

1. Basic Examples of Spatial Data
2. A Taxonomy for Spatial Statistics
3. Further Examples of Geostatistical Problems
4. Characteristic Features of Geostatistical Problems
5. Some History
6. Core Geostatistical Problems
7. Model Based Geostatistics

- **SPATIAL PREDICTION AND GAUSSIAN MODELS**

1. Stochastic Process Prediction
2. Linear Geostatistics
3. The Gaussian Model
4. Specification of the Correlation Function
5. Prediction under the Gaussian Model
6. What does Kriging Actually do to the Data
7. Prediction of Functionals
8. Directional Effects
9. Non-stationary Gaussian Models

- **PARAMETRIC ESTIMATION**

1. Second-Moment Properties
2. Variogram Analysis
3. Likelihood Inference
4. Plug-in Prediction
5. Gaussian Transformed Models
6. A Case Study
7. Anisotropic Models
8. Model Validation

- **BAYESIAN INFERENCE FOR THE GAUSSIAN MODEL**

    1. Basic Concepts
    2. Bayesian Analysis of the Gaussian Model
    3. A Case Study

- **GENERALISED LINEAR SPATIAL MODELS**

    1. Generalized linear mixed models
    2. Inference for the generalized linear geostatistical model
    3. Application of MCMC to Generalized Linear Prediction
    4. Case-study: Rongelap Island
    5. Case-study: Gambia Malaria

- **FURTHER TOPICS**

    1. Multivariate models
    2. Non-linear differential equations
    3. Space time models
    4. Marked point processes
    5. Closing remarks