

GeoStatistics Syllabus

March 5, 2014

1 Chapter 1 - Geo-statistical computing

1. What is geostatistics?
2. The added value of geostatistics
3. Feature and geographic spaces
4. Geostatistical computing: inventory of packages
5. The R Project for Statistical Computing: what and why?
6. Exercise: Introduction to the R environment and S language

2 Chapter 2 - Exploring and visualizing spatial data

1. Visualizing spatial structure: point distribution, postplots, quantile plots
2. Visualizing regional trends
3. Visualizing local spatial dependence: h-scatterplots, variogram cloud, experimental variogram
4. Visualizing anisotropy: variogram surfaces, directional variograms

3 Chapter 3 - Modelling spatial structure from point samples)

1. Trend surfaces
2. Theory of random fields
3. Models of spatial covariance
4. Variogram analysis; variogram model fitting

4 Chapter 4 - Spatial prediction from point samples (Part 1)

1. A taxonomy of spatial prediction methods
2. Non-geostatistical prediction
3. Introduction to Ordinary Kriging
4. Note: the derivation of the kriging equations is deferred to the next lecture.

5 Chapter 5 - Spatial prediction from point samples (Part 2)

1. Derivation of the Ordinary Kriging (OK) system: (1) regression (2) minimization
2. Simple Kriging (SK)
3. Block Kriging
4. Universal Kriging (UK)
5. Derivation of the Universal Kriging system: (1) regression (2) minimization
6. Kriging transformed variables
7. Kriging with External Drift (KED) and Regression Kriging (RK)
8. Stratified Kriging (StK)

6 Chapter 6 - Assessing the quality of spatial predictions

1. Assessment of model quality: overview
2. Model evaluation with an independent data set
3. Cross-validation
4. Kriging prediction variance
5. Spatial simulation

7 Chapter 7 - Geostatistical risk mapping

1. Uncertainty, hazard and risk
2. Indicator variables
3. Indicator variograms
4. Probability kriging with indicator variables