Geostatistical methods for spatial aggregation and disaggregation

Submitted by g.heuvelink on Tue, 03/06/2012 - 23:15

Location: IfGI CIP pool

Objective: Learn about theory and application of geostatistical methods for spatial aggregation and disaggregation

General description: In geostatistics we build statistical models that characterise the spatial variability of environmental variables. These models typically treat the variable of interest as the sum of a deterministic trend and a stochastic residual. The trend is often taken as a linear combination of exhaustively known 'covariates' (e.g. remote sensing imagery, a DEM, existing geologic, land cover or soil maps), while the stochastic residual is characterised by a semivariogram. Once the model is built it can next be used in kriging to create high-resolution gridded maps of the target variable from point observations and covariates. Theory and application of these basic geostatistical methods will be reviewed in the first part of this module. Next in the second part more detailed attention is given to block-kriging, which allows prediction of averages for spatial blocks within the area of interest. Note that these 'blocks' may have arbitrary shape and size and can indeed be as large as the entire study area. Block kriging achieves spatial aggregation in a way that respects the spatial correlation structure of the variable of interest and in addition quantifies the accuracy of the aggregated predictions. The third part of this module addresses spatial disaggregation, which is achieved using a fairly recent method known as area-to-point kriging. The requirements and properties of area-to-point kriging are discussed and the method is applied to real-world data sets, and results are compared to alternative spatial aggregation methods.

Required back-ground knowledge: Intermediate level of statistics and statistical modelling, familiarity with geostatistics is helpful but not essential.

Software / R packages required: All analyses are done in R, in particular the base and gstat packages.

Time schedule (note: this workshop is given on Saturday 8 September):

9:00?10:30 Lecture with review of basic geostatistics: geostatistical modelling, variogram estimation, ordinary and regression kriging
10:30?11:00 Coffee/tea break
11:00?12:00 Computer practical basic geostatistics
12:00?12:30 Lecture block kriging
12:30?14:00 Lunch
14:00?14:45
Computer practical block kriging
14:45?15:30 Lecture area-to-point kriging
15:30?16:00 Coffee/tea break
16:00?17:00 Computer practical area-to-point kriging
17:00?17:30 Feedback computer practicals

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Links