

Empirical Bayesian Kriging and EBK Regression

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What is interpolation?

- Predict values at unknown locations using values at measured locations
- Many interpolation methods: kriging, IDW, LPI, etc





Semivariogram Modeling



Empirical Bayesian Kriging

Advantages

- Requires minimal interactive modeling, spatial relationships are modeled automatically
- Usually more accurate, especially for small or nonstationary datasets
- Uses local models to capture small scale effects
 - Doesn't assume one model fits the entire data
- Standard errors of prediction are more accurate than other kriging methods
- Disadvantages
 - Processing is slower than other kriging methods
 - Limited customization

How does EBK work?

- 1. Divide the data into subsets of a given size
 - Controlled by "Subset Size" parameter
 - Subsets can overlap, controlled by "Overlap Factor"
- 2. For each subset, estimate the semivariogram
- 3. Simulate data at input point locations and estimate new semivariogram from the simulated data
- 4. Repeat step 3 many times. This results in a distribution of semivariograms
 - Controlled by "Number of Simulations"
- 5. Mix the local surfaces together to get the final surface.

EBK Regression Prediction

- New tool available in ArcGIS Pro 1.2
- Allows you to use explanatory variable rasters to improve predictions
- Automatically extracts useful information from explanatory variables
- Uses Principle Components to handle multicollinearity

Transformations

Two available transformations

- Empirical Fits a smooth distribution to the data, then transforms to normal distribution.
 Useful for data that is not bell-shaped
- Log Empirical Takes logarithm of data before performing Empirical transformation.
 Useful for data that cannot be negative (eg, rainfall)

Data in Geographic Coordinate Systems

- Euclidean distance for geographic coordinates is very inaccurate, particularly far from the equator
- EBK uses chordal distances
 - Chordal distance is the 3D straight-line distance between points on a spheroid
 - Accurate approximation to geodesic distance up to 30 degrees



Demo

EBK and EBK Regression Prediction

