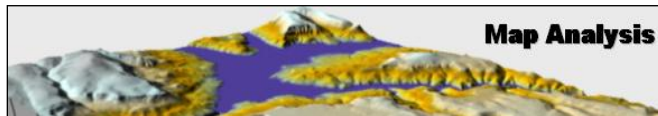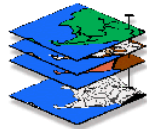# Beyond Mapping III — Map Analysis

Compilation of Beyond Mapping columns appearing in
GIS World magazine September 1996 to January 2007

Map Analysis

written by   Joseph K. Berry

posted by BASIS Press

Chronological and additional listings
with links to all Beyond Mapping columns

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Table of Contents

(click links below to access topics)

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(Click for a printer-friendly .pdf version of this document)
(Click for Table of Contents for all four books in the series)

Map Analysis: *Understanding Spatial Patterns and Relationships*

Description and Annotated Table of Contents

Map Analysis: Understanding Spatial Patterns and Relationships is a collection of selected works from of Joe Berry's popular "Beyond Mapping" columns published in GeoWorld magazine from 1996 through 2007. This compilation develops a structured view of the important concepts, considerations and procedures involved in grid-based map analysis.

While numerous books focus on Geographic Information Systems (GIS) capabilities of computer mapping and spatial database management, few provide an understanding of its analytical potential and practical realities in a non-technical manner. The unique character of the Map Analysis book draws from the author's ability to convey seemingly complex concepts of spatial data and GIS operations in words that resonant with others less technically versed.

The result is a book that engages the reader to "think spatially" and formulate new and innovative solutions to complex spatial problems. Key to this process is a paradigm shift that extends the traditional paper map perspective of "where is what" to the modern perspective of "why and so what." Within this context, maps become data and map analysis becomes the means to derive information about spatial patterns and relationships within and among map layers.

Introduction **The GIS Evolution —** As GIS moves from graphical inventories and spatial databases to map analysis, an entirely new paradigm of mapping is emerging. This topic discusses the relatively short history, evolutionary trajectory and probable future of geotechnology.

Topic 1 **Data Structure Implications —** GIS technology is as different as it is similar to traditional mapping. These differences are due in large part to the structure and nature of digital mapped data. This topic describes the various data and display types and their impacts on the appropriate characterization of discrete and continuous geographic distributions/patterns.

Topic 2 **Fundamental Map Analysis Approaches —** Map Analysis exploits the digital nature of modern maps to investigate the patterns and relationships within and among mapped data. This topic uses a series of examples to introduce the concept of a map-ematics and the similarities/differences *in Spatial Analysis* and *Spatial Statistics* that form the two primary compartments of the map analysis toolbox.

Topic 3 **Basic Techniques in Spatial Analysis —** Spatial Analysis investigates the "spatial context" of mapped data resulting from the relative positioning and coincidence of the map values. This topic discusses the *Reclassify* and *Overlay* grouping of operators that form the basic techniques used in most spatial models.

Topic 4 **Calculating Effective Distance —** Traditional "as the crow flies" distance measured with a ruler is rarely an effective in establishing separation between two points as the reality of intervening barriers play a significant role that bends and twists actual movement. This topic discusses the advanced *Distance Measurement* grouping of operators and expands the concept of simple distance to effective proximity considering relative and absolute barriers to movement.

Topic 5 Calculating Visual Exposure — Visual analysis is an extension of effective distance measurement that considers line-of-sight connectivity among map locations. This topic discusses the procedures, considerations and applications of derived viewshed and visual exposure maps.

Topic 6 Summarizing Neighbors — Values surrounding a location can be used to investigate localized variation, anomalies, and trends in mapped data. This topic discusses the advanced Neighbors grouping of operators that characterize map values occurring within a roving window centered at a location by either the surface configuration implied or a simple statistical summary.

Topic 7 Basic Spatial Modeling Approaches — Spatial Modeling involves "thinking with maps" to solve a problem by deriving a solution map through a logical series of map analysis operations applied to base maps in a manner analogous to a cooking recipe. This topic describes a progression of models that demonstrate the procedures and considerations in deriving areas of suitable wildlife habitat.

Topic 8 Spatial Modeling Example — Successful spatial models require the integration human judgment and analytical processing. This topic describes the spatial reasoning and processing considerations surrounding a routing model that considers preferences for a variety of map criteria in determining the best path and optimal corridor for a proposed power line.

Topic 9 Basis Techniques in Spatial Statistics — *Spatial Statistics* utilizes information about the spatial arrangement inherent in a data set to help explain variation and is based on the assumption that "nearby things are more alike than distant things." This topic focuses on surface modeling techniques used to generate and evaluate the geographic distribution implied by a set of discrete point samples.

Topic 10 Spatial Data Mining — Spatial Data Mining investigates the relationships within and among mapped data to characterize, compare, segment and map-ematically model spatial dependency. This topic focuses on basic techniques for comparing maps, assessing similarity and clustering as means to understand and utilize spatial relationships in decision-making.

Epilog The Many Faces of GIS — GIS in general and map analysis in particular is radically changing how we perceive and utilize maps. This topic discusses different GIS adoption paths, their driving factors and impacts on the current and future dynamics within the GIS community.

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