Preface

This book is a collection of selected works from popular "Beyond Mapping" columns by the author published in GeoWorld magazine from 1996 through 2006. The compilation presents a structured view of the important concepts, considerations and procedures involved in grid-based map analysis. The companion CD contains further readings and software for hands-on experience with the material presented.

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 this 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.

Map Analysis

Spatial considerations are fundamental to most human endeavors. The world we live in surrounds us with opportunities and challenges that are spatially dependent on "*Where is What*" tempered by "*Why and So What*" within cognitive contexts. In just three decades, GIS technology has radically changed our perspective on both what constitutes a map and the information it contains. Historically, maps emphasized accurate location of physical features; however modern maps have evolved from guides of physical space into systems for exploring spatial patterns and relationships.

This transition from drafted paper maps (analog) involving pens, rulers, shading and stippling to computer-based mapped data (digital) involving geo-query, intersection, address matching and map-*ematics* has spawned entirely new ways of conceptualizing and characterizing geographic space needed for effective decision-making. This new *"map analysis"* perspective marks a turning point in the use of maps— from one emphasizing physical descriptions of geographic space, to one of interpreting mapped data and successfully communicating influences of spatially based factors. This book investigates the context, conditions and procedures driving the transition from maps to mapped data, spatial analysis and beyond.

Intended Readership

This book is ideal for professionals and students interested in a basic understanding of the concepts, procedures and considerations in analyzing mapped data. The material is presented in an informal manner designed so the reader can grasp the broad issues and then delve into hands-on exercises for practical experience in applying the techniques.

In a classroom setting, portions of the book can be used for an exposure to grid-based map analysis in an introductory GIS course, or in its entirety for an intermediate course on map analysis with individual/group projects. An instructor's CD with all class materials (lecture slide sets, exercises, databases, exam questions and grading templates) for three levels of course presentations are available from the author.

Book Organization

Map Analysis: Understanding Spatial Patterns and Relationships is organized into ten topics that lead the reader from an understanding of the fundamental nature of mapped data through a series of basic procedures used in deriving, analyzing and applying spatial information. A case study approach is used with each topic area describing the application of a set of related analysis techniques. The discussion is followed by a series of hands-on exercises providing practical experience in applying the techniques. The exercises include step-by-step instructions that are thoroughly annotated.

The book is similar to two previous compilations of Beyond Mapping columns that are still in print—

- **Spatial Reasoning** *by J. K. Berry (Wiley,1995), covering columns from Oct 1993 to Aug1996*
  http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470236337.html
- **Beyond Mapping** *by J. K. Berry (Wiley, 1993), covering columns from Mar 1989 to Sep 1993*
  http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470236760.html

This newest compilation includes 43 columns in the hardcopy book plus online links to 83 other columns from Sep 1996 to Jan 2007. The *Further Reading* sections at the end of each Topic provide links on the CD to other Beyond Mapping columns, feature articles, papers and example applications extending each Topic's discussion. In addition, the CD contains full color images for all of the figures in the book.

The *Hands-on Experience* sections at the end of each Topic provide links on the CD to exercises using the supplied MapCalc Learner and Surfer software and databases. In addition, there are appendices containing a basic Quick Set of Exercises and Instructions for Creating Your Own Grid Database supporting custom exercises you develop.

The **MapCalc Learner** software included with the book is used for the hands-on exercises. The software includes the basic set of data and operations needed to complete the hands-on exercises. A cross-reference to ESRI Grid operations is provided. An Academic version of MapCalc is available for use in computer laboratory environments. For more information on MapCalc Learner and Academic software visit…
  http://www.redhensystems.com/mapcalc/.
For more information on the **Surfer Demo** software for contouring and 3D surface mapping visit …
  http://www.ssg-surfer.com/.

Case Study Data Sets

Six data sets are used in the exercises to provide experience with different application areas. The *Tutor25.rgs* is a hypothetical dataset used to quickly demonstrate map analysis operations. The other data sets provide experience with application-tailored data: the *Bighorn.rgs* is a natural resource data set located in southwestern Wyoming; the *GooseEgg.rgs* is a routing data set located in south central Wyoming; the *Agdata.rgs* precision agriculture data set for central-pivot field located in central Colorado; the *Island.rgs* is a land planning data set for the western tip of the island of St. Thomas; and the *Smallville.rgs* is a geo-business data set for a small northern Colorado city. All of the data sets contain both actual and hypothetical information to illustrate map analysis procedures.

Companion CD

The included CD contains sets of materials—

§ *Color Figures*: All of the text figures are included as full-color, enlarged graphics for enhanced viewing.

§ *Further Readings*: Hyperlinks to online materials for readers who want to delve into the topics in greater detail.

§ *Exercises*: Fully annotated exercises for each topic provide hands-on experience with the concepts and procedures discussed.

§ *Software*: *MapCalc Learner* software by Red Hen Systems (*www.redhensystems.com/mapcalc*) is used for grid-based map analysis exercises throughout the book. *Surfer Demo* software by Golden Software (*www.goldensoftware.com*) is used for spatial interpolation and advanced graphics. An electronic version of the User's Manual for MapCalc is included, as well as general tutorials for both MapCalc and Surfer. Both systems are licensed for educational use by a single-user.

§ *Databases*: Six tutorial databases are included to provide experience with natural resource, land planning, routing, agriculture, business and general applications. Users can export/import data with other software systems (e.g., MapInfo, ArcView) and/or create their own databases.

§   *Example Applications*: Hyperlinks to online example applications using the provided software and databases provide extended hands-on experience. Users can easily develop their own exercises and applications.

Book Website

A book website is available (*TBA*) for updated and revised material as well as sharing new databases and exercises.

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Many Thanks!

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