

Intermediate workshop on
Grid-based Map Analysis and Modeling

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Short Workshop Description:

8:00 am - 5:00 pm

Joseph K. Berry, *University of Denver and Berry & Associates*

Intermediate Level Workshop

This workshop provides experience with the concepts, underlying theory, data considerations, procedures, and practical considerations in applying advanced grid-based map analysis techniques. It investigates spatial analysis and spatial data mining approaches using numerous hands-on examples of analytical techniques and applications from natural resources management, environmental assessment, precision agriculture and geo-business. Specific topics include the Nature of Grid-based Data (discrete spatial objects vs. continuous map surfaces), Spatial Analysis Operations (operators for assessing “geographical context” within and among map layers; Reclassify, Overlay, Distance and Neighbors), Spatial Statistics Operations (operators for assessing “numerical context” within and among map layers; Surface Modeling and Spatial Data Mining) and Future Directions (alternative data structures; GeoExploration vs. GeoScience). The workshop follows the organization of the instructor’s new book on Map Analysis: Understanding Spatial Patterns and Relationships (GeoTec Media, 2007; US\$ 45). Each participant receives a workbook with CD containing lecture materials, related readings and software/exercises for hands-on experience as homework. Attendees should be comfortable with the basic concepts in GIS and math/stat procedures and have an interest in map analysis/modeling. Workshop attendees should be comfortable with the basic concepts in GIS and math/stat procedures as well as having a keen interest in map analysis and modeling.

Detailed Workshop Description:

This full-day intermediate workshop provides experience with the concepts, underlying theory, data considerations, procedures, and practical considerations in applying advanced grid-based map analysis techniques. It investigates spatial analysis and spatial data mining approaches using numerous hands-on examples of analytical techniques and applications from natural resources management, environmental assessment, precision agriculture and geo-business.

The first portion of the workshop focuses on the **Nature of Grid-based Data and Spatial Analysis Operations** (5 hours). Discussion first establishes the difference between analytical potential of maps composed of discrete spatial objects (points, lines, and polygons; mapping and geo-query) and those organized as continuous map surfaces (spatial analysis and statistics). Discussion of *Spatial Analysis* operators for assessing geographical context within and among map layers include underlying theory, data considerations and advanced applications for such grid-based techniques as shape/pattern indices, effective distance, optimal path/corridor connectivity, visual exposure, and roving windows. Specific topics and hands-on examples include:

- Exercise #1 – **Map Analysis Framework** (*MapCalc*)
- Exercise #2 – **Example of a Simple Erosion Potential Model** (*MapCalc*)
- Exercise #3 – **Reclassify and Overlay Techniques** (*MapCalc*)
- Exercise #4 – **Measuring Distance and Connectivity** (*MapCalc*)
- Exercise #5 – **Characterizing Spatial Neighborhoods** (*MapCalc*)

The second portion of the workshop focuses on **Spatial Statistics Operations and Future Directions** (3 hours). Discussion of *Spatial Statistics* operators for assessing numerical context within and among

map layers include underlying theory, data considerations and advanced applications for such grid-based techniques as density analysis, spatial interpolation, residual analysis of interpolation performance, map generalization, linking data space and geographic space, level slicing, map similarity, spatial clustering and predictive modeling. Discussion of *Future Directions* investigates alternative data structure implications, as well as the interaction and impact of GeoExploration and GeoScience paradigms guiding geotechnology. Specific topics and hands-on examples include:

- Exercise #6 – **Surface Modeling** (*Surfer and MapCalc*)
- Exercise #7 – **Spatial Data Mining** (*MapCalc*)
- Exercise #8 – **Gaining GIS Modeling Experience** (*MapCalc*)
- Optional Exercise – **Data Exchange Procedures** (*MapCalc*)

The workshop follows the organization of the instructor's book ***Map Analysis: Understanding Spatial Patterns and Relationships*** (GeoTec Media, 2007; US\$45 from www.geoplaces.com/books/mapanalysis). Each participant receives a workbook containing the PowerPoints and short set of exercises used in workshop plus an additional Workshop CD containing lecture materials, related readings and software/exercises for hands-on experience as homework.



Dr. Berry has presented numerous workshops on grid-based map analysis and modeling for professionals and is the author of many papers, book chapters and books on the topic. He is the Principal of Berry and Associates // Spatial Information Systems, consultants and software developers in Geographic Information Systems (GIS) technology. He has taught courses and workshops in GIS modeling for more than 30 years and serves as the Keck Visiting Scholar in Geosciences at the University of Denver and Adjunct Faculty member at Colorado State University. Prior to these assignments he was an Associate Professor and the Associate Dean at Yale University's School of Forestry and Environmental Science. He has written the "Beyond Mapping" column for GeoWorld for nearly 20 years and has written over two hundred papers on the analytic capabilities of GIS and authored the popular books *Beyond Mapping* (Wiley, 1993), *Spatial Reasoning* (Wiley, 1995) and *Map Analysis* (GeoTec Media, 2007). Dr. Berry holds a B.S. degree in Forestry, a M.S. degree in business management, and a Ph.D. emphasizing remote sensing and land use planning.

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