Spatial Analysis: Statistics, Visualization, and Computational Methods

By Tonny J. Oyana, Florence Margai

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An introductory text for the next generation of geospatial analysts and data scientists, **Spatial Analysis: Statistics, Visualization, and Computational Methods** focuses on the fundamentals of spatial analysis using traditional, contemporary, and computational methods. Outlining both non-spatial and spatial statistical concepts, the authors present practical applications of geospatial data tools, techniques, and strategies in geographic studies. They offer a problem-based learning (PBL) approach to spatial analysis—containing hands-on problem-sets that can be worked out in MS Excel or ArcGIS—as well as detailed illustrations and numerous case studies.

The book enables readers to:

- Identify types and characterize non-spatial and spatial data
- Demonstrate their competence to explore, visualize, summarize, analyze, optimize, and clearly present statistical data and results
- Construct testable hypotheses that require inferential statistical analysis
- Process spatial data, extract explanatory variables, conduct statistical tests, and explain results
- Understand and interpret spatial data summaries and statistical tests

Spatial Analysis: Statistics, Visualization, and Computational Methods incorporates traditional statistical methods, spatial statistics, visualization, and computational methods and algorithms to provide a concept-based problem-solving learning approach to mastering practical spatial analysis. Topics covered include: spatial descriptive methods, hypothesis testing, spatial regression, hot spot analysis, geostatistics, spatial modeling, and data science.

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Editorial Review

Review

"Spatial analysis is at the core of quantitative geography and geographic information systems (GIS). Oyana and Margai effectively explain the foundation of spatial analysis and progressively lead readers ways to apply fundamental and advanced methods for geographic problem solving. The book provides a good balance between concepts and practicums of spatial statistics with a comprehensive coverage of the most important approaches to understand spatial data, analyze spatial relationships and spatial patterns, and predict spatial processes. The book will be an excellent textbook for undergraduate courses in quantitative geography or spatial analysis. Graduate students new to geospatial sciences will also find the book useful for self-study."
?May Yuan, University of Texas at Dallas

"Right from the first page this book reads differently. It's not only the writing style which is so different from your run-of-the-mill dry statistical textbook but also the combination of theoretical presentations with study questions and challenge assignments, making the reading so much more enjoyable while forcing the reader to pause and reflect on the content of each Chapter. Another feature of this book is its breadth, encompassing the analysis of point, areal and geostatistical data before ending with a short chapter devoted to the hot topic of Big data, including data management and data mining. The illustration of different concepts using data from environmental and social sciences adds to the general appeal of the presentation. Tonny and Florence must be commended for writing a textbook that should make spatial analysis more accessible to geographers!"
?Pierre Goovaerts, BioMedware, Inc, PGeostat, LLC, University of Florida

About the Author

Dr. Tonny J. Oyana received his Ph.D and his postdoctoral training from the University of Buffalo, New York, USA. He is currently the director of spatial analytics and informatics, Research Center for Health Disparities, Equity, and the Exposome; and a professor of spatial information systems in the Department of Preventive Medicine at the University of Tennessee Health Science Center, Knoxville, USA. His research focuses on establishing the relationship between environmental health and exposure; advancing GIS methods, algorithm design, and spatial analytical methods; and understanding the factors that contribute toward land systems change. In addition, he has authored more than 80 scientific works.

Dr. Florence M. Margai (now deceased) was a professor in the Department of Geography at Binghamton University, New York, USA, where she taught courses that reflected her areas of specialization: advanced statistics, environmental health hazards, health disparities, and environmental analysis using geospatial and visualization technologies. She also served as the associate dean of Harpur College of Arts and Sciences, Vestal, New York, USA. Margai obtained her Ph.D from Kent State University, Ohio, USA, and worked with nonprofit organizations to assist in the geographic targeting of vulnerable population groups for disease intervention and health promotional campaigns, sustainability, and capacity development initiatives.

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