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Geocomputation with R Robin Lovelace 2019-03-22 Geocomputation with R is for people who want to analyze, visualize and model geographic data with open source software. It is based on R, a statistical programming language that has powerful data processing, visualization, and geospatial capabilities. The book equips you with the knowledge and skills to tackle a wide range of issues manifested in geographic data, including those with scientific, societal, and environmental implications. This book will interest people from many backgrounds, especially Geographic Information Systems (GIS) users interested in applying their domain-specific knowledge in a powerful open source language for data science, and R users interested in extending their skills to handle spatial data. The book is divided into three parts: (I) Foundations, aimed at getting you up-to-speed with geographic data in R, (II) extensions, which covers advanced techniques, and (III) applications to real-world problems. The chapters cover progressively more advanced topics, with early chapters providing strong foundations on which the later chapters build. Part I describes the nature of spatial datasets in R and methods for manipulating them. It also covers geographic data import/export and transforming coordinate reference systems. Part II represents methods that build on these foundations. It covers advanced map making (including web mapping), "bridges" to GIS, sharing reproducible code, and how to do cross-validation in the presence of spatial autocorrelation. Part III applies the knowledge gained to tackle real-world problems, including representing and modeling transport systems, finding optimal locations for stores or services, and ecological modeling. Exercises at the end of each chapter give you the skills needed to tackle a range of geospatial problems. Solutions for each chapter and supplementary materials providing extended examples are available at https://geocompr.github.io/geocompkg/articles/. Dr. Robin Lovelace is a University Academic Fellow at the University of Leeds, where he has taught R for geographic research over many years, with a focus on transport systems. Dr. Jakub Nowosad is an Assistant Professor in the Department of Geoinformation at the Adam Mickiewicz University in Poznan, where his focus is on the analysis of large datasets to understand environmental processes. Dr. Jannes Muenchow is a Postdoctoral Researcher in the GIScience Department at the University of Jena, where he develops and teaches a range of geographic methods, with a focus on ecological modeling, statistical geocomputing, and predictive mapping. All three are active developers and work on a number of R packages, including stplanr, sabre, and RQGIS.

The ArcGIS Book Christian Harder 2017 This is a hands-on book about ArcGIS that you work with as much as read. By the end, using Learn ArcGIS lessons, you'll be able to say you made a story map, conducted geographic analysis, edited geographic data, worked in a 3D web scene, built a 3D model of Venice, and more.

Trends in Spatial Analysis and Modelling Martin Behnisch 2017-10-24 This book is a collection of original research papers that focus on recent developments in Spatial Analysis and Modelling with direct relevance to settlements and infrastructure. Topics include new types of data (such as simulation data), applications of methods to support decision-making, and investigations of human-environment data in order to recognize significance for structures, functions and processes of attributes. Research incorporated ranges from theoretical through methodological to applied work. It is subdivided into four main parts: the first focusing on the research of settlements and infrastructure, the second studies aspects of Geographic Data Mining, the third presents contributions in the field of Spatial Modelling, System Dynamics and Geosimulation, and the fourth part is dedicated to Multi-Scale Representation and Analysis. The book is valuable to those with a scholarly interest in spatial sciences, urban and spatial planning, as well as anyone interested in spatial analysis and the planning of human settlements and infrastructure. Most of the selected papers were originally presented at the “International Land Use Symposium (ILUS 2015): Trends in Spatial Analysis and Modelling of Settlements and Infrastructure” November 11-13 2015, in Dresden, Germany.

An Introduction to R for Spatial Analysis and Mapping Chris Brunsdon 2014-04-30 "In an age of big data, data journalism and with a wealth of quantitative information around us, it is not enough for students to be taught only 100 year old statistical methods using ?out of the box? software. They need to have 21st-century analytical skills too. This is an excellent and student-friendly text from two of the world leaders in the teaching and development of spatial analysis. It shows clearly why the open source software R is not just an alternative to commercial GIS, it may actually be the better choice for mapping, analysis and for replicable research. Providing practical tips as well as fully working code, this is a practical ?how to? guide ideal for undergraduates as well as those using R for the first time. It will be required reading on my own courses." - Richard Harris, Professor of Quantitative Social Science, University of Bristol R is a powerful open source

computing tool that supports geographical analysis and mapping for the many geography and ‘non-geography’ students and researchers interested in spatial analysis and mapping. This book provides an introduction to the use of R for spatial statistical analysis, geocomputation and the analysis of geographical information for researchers collecting and using data with location attached, largely through increased GPS functionality. Brunsdon and Comber take readers from ‘zero to hero’ in spatial analysis and mapping through functions they have developed and compiled into R packages. This enables practical R applications in GIS, spatial analyses, spatial statistics, mapping, and web-scraping. Each chapter includes: Example data and commands for exploring it Scripts and coding to exemplify specific functionality Advice for developing greater understanding - through functions such as locator(), View(), and alternative coding to achieve the same ends Self-contained exercises for students to work through Embedded code within the descriptive text. This is a definitive ?how to? that takes students - of any discipline - from coding to actual applications and uses of R.

Epidemiology and Geography Marc Souris 2019-03-04 Localization is involved everywhere in epidemiology: health phenomena often involve spatial relationships among individuals and risk factors related to geography and environment. Therefore, the use of localization in the analysis and comprehension of health phenomena is essential. This book describes the objectives, principles, methods and tools of spatial analysis and geographic information systems applied to the field of health, and more specifically to the study of the spatial distribution of disease and health–environment relationships. It is a practical introduction to spatial and spatio-temporal analysis for epidemiology and health geography, and takes an educational approach illustrated with real-world examples. Epidemiology and Geography presents a complete and straightforward overview of the use of spatial analysis in epidemiology for students, public health professionals, epidemiologists, health geographers and specialists in health–environment studies.

Spatial Modeling in Forest Resources Management Pravat Kumar Shit 2020-10-08 This book demonstrates the measurement, monitoring, mapping, and modeling of forest resources. It explores state-of-the-art techniques based on open-source software & R statistical programming and modeling specifically, with a focus on the recent trends in data mining/machine learning techniques and robust modeling in forest resources. Discusses major topics such as forest health assessment, estimating forest biomass & carbon stock, land use forest cover (LUFC), dynamic vegetation modeling (DVM) approaches, forest-based rural livelihood, habitat suitability analysis, biodiversity and ecology, and biodiversity, the book presents novel advances and applications of RS-GIS and R in a precise and clear manner. By offering insights into various concepts and their importance for real-world applications, it equips researchers, professionals, and policy-makers with the knowledge and skills to tackle a wide range of issues related to geographic data, including those with scientific, societal, and environmental implications.

Spatial Analysis and Modeling in Geographical Transformation Process Yuji Murayama 2011-02-26 Currently, spatial analysis is becoming more important than ever because enormous volumes of spatial data are available from different sources, such as GPS, Remote Sensing, and others. This book deals with spatial analysis and modelling. It provides a comprehensive discussion of spatial analysis, methods, and approaches related to human settlements and associated environment. Key contributions with empirical case studies from Iran, Philippines, Vietnam, Thailand, Nepal, and Japan that apply spatial analysis including autocorrelation, fuzzy, voronoi, cellular automata, analytic hierarchy process, artificial neural network, spatial metrics, spatial statistics, regression, and remote sensing mapping techniques are compiled comprehensively. The core value of this book is a wide variety of results with state of the art discussion including empirical case studies. It provides a milestone reference to students, researchers, planners, and other practitioners dealing the spatial problems on urban and regional issues. We are pleased to announce that this book has been presented with the 2011 publishing award from the GIS Association of Japan. We would like to congratulate the authors!

Spatial Data Analysis Manfred M. Fischer 2011-08-05 The availability of spatial databases and widespread use of geographic information systems has stimulated increasing interest in the analysis and modelling of spatial data. Spatial data analysis focuses on detecting patterns, and on exploring and modelling relationships between them in order to understand the processes responsible for their emergence. In this way, the role of space is emphasised , and our understanding of the working and representation of space, spatial patterns, and processes is enhanced. In applied research, the recognition of the spatial dimension often yields different and more meaningful results and helps to avoid erroneous conclusions. This book aims to provide an introduction into spatial data analysis to graduates interested in applied statistical research. The text has been structured from a data-driven rather than a theory-based perspective, and focuses on those models, methods and techniques which are both accessible and of practical use for graduate students. Exploratory techniques as well as more formal model-based approaches are presented, and both area data and origin-destination flow data are considered.

Scale in Spatial Information and Analysis Jingxiong Zhang 2014-04-15 Now ubiquitous in modern life, spatial data present great opportunities to transform many of the processes on which we base our everyday lives. However, not only do these data depend on the scale of measurement, but also handling these data (e.g., to make suitable maps) requires that we account for the scale of measurement explicitly. Scale in Spatial Information and Analysis describes the scales of measurement and scales of spatial variation that exist in the measured data. It provides you with a series of tools for handling spatial data while accounting for scale. The authors detail a systematic strategy for handling scale issues from geographic reality, through measurements, to resultant spatial data and their analyses. They also explore a process-pattern paradigm in approaching scale issues. This is well reflected, for example, in chapters dealing with terrain analysis, in which scale in terrain derivatives is described in relation to the processing involved in the derivation of specific terrain variables from elevation data, and area classes, which are viewed as driven by class-forming covariates. Lastly, this book provides coverage of some of the issues related to scale that are relatively under-represented in the literature, such as the effects of scale on information content in remotely sensed images, and the interaction between scale and uncertainty that is increasingly important for spatial information and analysis. By taking a rigorous, scientific approach to scale and its various meanings in relation to the geographic world, the book alleviates some of the frustration caused by dealing with issues of scale. While past research has led to an increasing number of journal articles and a few books dedicated to scale modeling and change of scale, this book helps you to develop coherent strategies for scale modeling, highlighting applicability for a variety of fields, from geomatic engineering and geoinformatics to environmental modeling.

Spatial Analysis and Modeling in Geographical Transformation Process Yuji Murayama 2011-03-07 Currently, spatial analysis is becoming more important than ever because enormous volumes of spatial data are available from different sources, such as GPS, Remote Sensing, and others. This book deals with spatial analysis and modelling. It provides a comprehensive discussion of spatial analysis, methods, and approaches related to human settlements and associated environment. Key contributions with empirical case studies from Iran, Philippines, Vietnam, Thailand,

Nepal, and Japan that apply spatial analysis including autocorrelation, fuzzy, voronoi, cellular automata, analytic hierarchy process, artificial neural network, spatial metrics, spatial statistics, regression, and remote sensing mapping techniques are compiled comprehensively. The core value of this book is a wide variety of results with state of the art discussion including empirical case studies. It provides a milestone reference to students, researchers, planners, and other practitioners dealing the spatial problems on urban and regional issues. We are pleased to announce that this book has been presented with the 2011 publishing award from the GIS Association of Japan. We would like to congratulate the authors!

Geomatic Approaches for Modeling Land Change Scenarios María Teresa Camacho Olmedo 2017-10-26 This book provides a detailed overview of the concepts, techniques, applications, and methodological approaches involved in land use and cover change (LUCC) modeling, also known simply as land change modeling. More than 40 international experts in this field have participated in this book, which illustrates recent advances in LUCC modeling with examples from North and South America, the Middle East, and Europe. Given the broad range of geomatic approaches available, it helps readers select the approach that best meets their needs. The book is structured into five parts preceded by a foreword written by Roger White and a general introduction. Part I consists of four chapters, each of which focuses on a specific stage in the modeling process: calibration, simulation, validation, and scenarios. It presents and explains the fundamental ideas and concepts underlying LUCC modeling. This is complemented by a comparative analysis of the selected software packages, practically applied in various case studies in Part II and Part III. Part II discusses recently proposed methodological developments that have enhanced modeling procedures and results while Part III offers case studies as well as interesting, innovative methodological proposals. Part IV revises different fundamental techniques used in LUCC modeling and finally Part V describes the best-known software packages used in the applications presented in Parts II and III.

Bridging the Geographic Information Sciences Jérôme Gensel 2012-04-02 For the sixth consecutive year, the AGILE conference promoted the publication a book collecting high-level scientific contributions from unpublished fundamental scientific research. The papers published in the AGILE 2012 LNG&C volume contribute substantially to Geographical Information Science developments and to the success of the 15th AGILE conference (Avignon, France, 24-27April, 2012) under the title ‘Bridging the Geographic Information Sciences’. This year’s conference emphasizes that geoinformation science, geomatics and spatial analysis are fields in which different disciplines, epistemologies and scientific cultures meet. Indeed, the scientific articles published in this volume cover a wide diversity of GIScience related themes, including: Spatio-temporal Data Modelling and Visualisation; Spatial Data Infrastructures; Geo Web Services and Geo Semantic Web; Modelling and Management of Uncertainty; Spatio-temporal Data Quality and Metadata; Mobility of Persons, Objects and Systems, Transports and Flows; Spatial Analysis, Geostatistics, and Geo Information Retrieval; Modelling and Spatial Analysis of Urban Dynamics, Urban GIS; GIS and Spatial Analysis for Global Change Modelling, Impact on Space; and Geographic Information Science: links with other disciplines and people.

Geospatial Analysis and Modelling of Urban Structure and Dynamics Bin Jiang 2010-06-16 A Coming of Age: Geospatial Analysis and Modelling in the Early Twenty First Century Forty years ago when spatial analysis first emerged as a distinct theme within geography’s quantitative revolution, the focus was largely on consistent methods for measuring spatial correlation. The concept of spatial au- correlation took pride of place, mirroring concerns in time-series analysis about similar kinds of dependence known to distort the standard probability theory used to derive appropriate statistics. Early applications of spatial correlation tended to reflect geographical patterns expressed as points. The perspective taken on such analytical thinking was founded on induction, the search for pattern in data with a view to suggesting appropriate hypotheses which could subsequently be tested. In parallel but using very different techniques came the development of a more deductive style of analysis based on modelling and thence simulation. Here the focus was on translating prior theory into forms for generating testable predictions whose outcomes could be compared with observations about some system or phenomenon of interest. In the intervening years, spatial analysis has broadened to embrace both inductive and deductive approaches, often combining both in different mixes for the variety of problems to which it is now applied.

Spatial Analysis, Modelling and Planning Jorge Rocha 2018-11-28 New powerful technologies, such as geographic information systems (GIS), have been evolving and are quickly becoming part of a worldwide emergent digital infrastructure. Spatial analysis is becoming more important than ever because enormous volumes of spatial data are available from different sources, such as social media and mobile phones. When locational information is provided, spatial analysis researchers can use it to calculate statistical and mathematical relationships through time and space. This book aims to demonstrate how computer methods of spatial analysis and modeling, integrated in a GIS environment, can be used to better understand reality and give rise to more informed and, thus, improved planning. It provides a comprehensive discussion of spatial analysis, methods, and approaches related to planning.

Models in Spatial Analysis Lena Sanders 2013-03-01 This title provides a broad overview of the different types of models used in advanced spatial analysis. The models concern spatial organization, location factors and spatial interaction patterns from both static and dynamic perspectives. Each chapter gives a broad overview of the subject, covering both theoretical developments and practical applications. The advantages of an interdisciplinary approach are illustrated in the way that the viewpoint of each of the individual disciplines are brought together when considering questions relevant to spatial analysis. The authors of the chapters come from a range of different disciplines (geography, economy, hydrology, ecology, etc.) and are specialists in their field. They use a range of methods and modeling tools developed in mathematics, statistics, artificial intelligence and physics.

Progress in Geospatial Analysis Yuji Murayama 2012-07-06 This book examines current trends and developments in the methods and applications of geospatial analysis and highlights future development prospects. It provides a comprehensive discussion of remote sensing- and geographical information system (GIS)-based data processing techniques, current practices, theories, models, and applications of geospatial analysis. Data acquisition and processing techniques such as remote sensing image selections, classifications, accuracy assessments, models of GIS data, and spatial modeling processes are the focus of the first part of the book. In the second part, theories and methods related to fuzzy sets, spatial weights and prominence, geographically weighted regression, weight of evidence, Markov-cellular automata, artificial neural network, agent-based simulation, multi-criteria evaluation, analytic hierarchy process, and a GIS network model are included. Part three presents selected best practices in geospatial analysis. The chapters, all by expert authors, are arranged so that readers who are new to the field will gain an overview and important insights. Those readers who are already practitioners will gain from the advanced and updated materials and state-of-the-art developments in geospatial analysis.

Scale in Spatial Information and Analysis Jingxiong Zhang 2017-04-06 Now ubiquitous in modern life, spatial data present great opportunities to transform many of the processes on which we

base our everyday lives. However, not only do these data depend on the scale of measurement, but also handling these data (e.g., to make suitable maps) requires that we account for the scale of measurement explicitly. Scale in Spatial Information and Analysis describes the scales of measurement and scales of spatial variation that exist in the measured data. It provides you with a series of tools for handling spatial data while accounting for scale. The authors detail a systematic strategy for handling scale issues from geographic reality, through measurements, to resultant spatial data and their analyses. They also explore a process-pattern paradigm in approaching scale issues. This is well reflected, for example, in chapters dealing with terrain analysis, in which scale in terrain derivatives is described in relation to the processing involved in the derivation of specific terrain variables from elevation data, and area classes, which are viewed as driven by class-forming covariates. Lastly, this book provides coverage of some of the issues related to scale that are relatively under-represented in the literature, such as the effects of scale on information content in remotely sensed images, and the interaction between scale and uncertainty that is increasingly important for spatial information and analysis. By taking a rigorous, scientific approach to scale and its various meanings in relation to the geographic world, the book alleviates some of the frustration caused by dealing with issues of scale. While past research has led to an increasing number of journal articles and a few books dedicated to scale modeling and change of scale, this book helps you to develop coherent strategies for scale modeling, highlighting applicability for a variety of fields, from geomatic engineering and geoinformatics to environmental modeling.

Geographic Information Science Jennifer A. Miller 2016-09-13 This book constitutes the refereed proceedings of the 9th International Conference on Geographic Information Science, GIScience 2016, held in Montreal, QC, Canada, in September 2016. The 21 full papers presented were carefully reviewed and selected from 63 submissions. The papers are organized in topical sections such as spatial algorithms; network analysis; spatial analysis; spatial methods; user-generated data and linked data; automated cartography and geovisualization.

Analyzing and Modeling Spatial and Temporal Dynamics of Infectious Diseases Dongmei Chen 2014-12-08 Features modern research and methodology on the spread of infectious diseases and showcases a broad range of multi-disciplinary and state-of-the-art techniques on geo-simulation, geo-visualization, remote sensing, metapopulation modeling, cloud computing, and pattern analysis Given the ongoing risk of infectious diseases worldwide, it is crucial to develop appropriate analysis methods, models, and tools to assess and predict the spread of disease and evaluate the risk. Analyzing and Modeling Spatial and Temporal Dynamics of Infectious Diseases features mathematical and spatial modeling approaches that integrate applications from various fields such as geo-computation and simulation, spatial analytics, mathematics, statistics, epidemiology, and health policy. In addition, the book captures the latest advances in the use of geographic information system (GIS), global positioning system (GPS), and other location-based technologies in the spatial and temporal study of infectious diseases. Highlighting the current practices and methodology via various infectious disease studies, Analyzing and Modeling Spatial and Temporal Dynamics of Infectious Diseases features: Approaches to better use infectious disease data collected from various sources for analysis and modeling purposes Examples of disease spreading dynamics, including West Nile virus, bird flu, Lyme disease, pandemic influenza (H1N1), and schistosomiasis Modern techniques such as Smartphone use in spatio-temporal usage data, cloud computing-enabled cluster detection, and communicable disease geo-simulation based on human mobility An overview of different mathematical, statistical, spatial modeling, and geo-simulation techniques Analyzing and Modeling Spatial and Temporal Dynamics of Infectious Diseases is an excellent resource for researchers and scientists who use, manage, or analyze infectious disease data, need to learn various traditional and advanced analytical methods and modeling techniques, and become aware of different issues and challenges related to infectious disease modeling and simulation. The book is also a useful textbook and/or supplement for upper-undergraduate and graduate-level courses in bioinformatics, biostatistics, public health and policy, and epidemiology.

Agent-Based Models of Geographical Systems Alison J. Heppenstall 2011-11-24 This unique book brings together a comprehensive set of papers on the background, theory, technical issues and applications of agent-based modelling (ABM) within geographical systems. This collection of papers is an invaluable reference point for the experienced agent-based modeller as well those new to the area. Specific geographical issues such as handling scale and space are dealt with as well as practical advice from leading experts about designing and creating ABMs, handling complexity, visualising and validating model outputs. With contributions from many of the world's leading research institutions, the latest applied research (micro and macro applications) from around the globe exemplify what can be achieved in geographical context. This book is relevant to researchers, postgraduate and advanced undergraduate students, and professionals in the areas of quantitative geography, spatial analysis, spatial modelling, social simulation modelling and geographical information sciences.

Spatial Data Modelling for 3D GIS Alias Abdul-Rahman 2007-09-23 This book covers fundamental aspects of spatial data modelling specifically on the aspect of three-dimensional (3D) modelling and structuring. Realisation of "true" 3D GIS spatial system needs a lot of effort, and the process is taking place in various research centres and universities in some countries. The development of spatial data modelling for 3D objects is the focus of this book.

Spatial Modeling and Assessment of Urban Form Biswajeet Pradhan 2017-05-08 This book discusses the application of Geospatial data, Geographic Information System (GIS) and Remote Sensing (RS) technologies in analysis and modeling of urban growth process, and its pattern, with special focus on sprawl and compact form of urban development. The book explains these two kinds of urban forms (sprawl and compact urban development) in detail regarding their advantages, disadvantages, indicators, assessment, modeling, implementation and their relationship with urban sustainability. It confirms that the proposed modeling approaches, geospatial data and GIS are very practical for identifying urban growth, land use change patterns and their general trends in future. The analyses and modeling approaches presented in this book can be employed to guide the identification and measurements of the changes and growth likely to happen in urban areas. In addition, this book can be helpful for town planning and development in order to design urban areas in a compact form and eventually sustainable manner.

Spatial Regression Models Michael D. Ward 2018-04-10 Spatial Regression Models illustrates the use of spatial analysis in the social sciences within a regression framework and is accessible to readers with no prior background in spatial analysis. The text covers different modeling-related topics for continuous dependent variables, including mapping data on spatial units, creating data from maps, analyzing exploratory spatial data, working with regression models that have spatially dependent regressors, and estimating regression models with spatially correlated error structures. Using social science examples based on real data, the authors illustrate the concepts discussed, and show how to obtain and interpret relevant results. The examples are presented along with the relevant code to replicate all the analysis using the R package for statistical computing. Users can download both the data and computer code to work through all the examples found in the text. New to the Second Edition is a chapter on mapping as data exploration and its role in the research process, updates to all chapters based on substantive and methodological

work, as well as software updates, and information on estimation of time-series, cross-sectional spatial models. Available with Perusall—an eBook that makes it easier to prepare for class Perusall is an award-winning eBook platform featuring social annotation tools that allow students and instructors to collaboratively mark up and discuss their SAGE textbook. Backed by research and supported by technological innovations developed at Harvard University, this process of learning through collaborative annotation keeps your students engaged and makes teaching easier and more effective. Learn more.

Rediscovering Geography Rediscovering Geography Committee 1997-04-11 As political, economic, and environmental issues increasingly spread across the globe, the science of geography is being rediscovered by scientists, policymakers, and educators alike. Geography has been made a core subject in U.S. schools, and scientists from a variety of disciplines are using analytical tools originally developed by geographers. Rediscovering Geography presents a broad overview of geography's renewed importance in a changing world. Through discussions and highlighted case studies, this book illustrates geography's impact on international trade, environmental change, population growth, information infrastructure, the condition of cities, the spread of AIDS, and much more. The committee examines some of the more significant tools for data collection, storage, analysis, and display, with examples of major contributions made by geographers. Rediscovering Geography provides a blueprint for the future of the discipline, recommending how to strengthen its intellectual and institutional foundation and meet the demand for geographic expertise among professionals and the public.

Handbook of Applied Spatial Analysis Manfred M. Fischer 2009-12-24 The Handbook is written for academics, researchers, practitioners and advanced graduate students. It has been designed to be read by those new or starting out in the field of spatial analysis as well as by those who are already familiar with the field. The chapters have been written in such a way that readers who are new to the field will gain important overview and insight. At the same time, those readers who are already practitioners in the field will gain through the advanced and/or updated tools and new materials and state-of-the-art developments included. This volume provides an accounting of the diversity of current and emergent approaches, not available elsewhere despite the many excellent journals and te- books that exist. Most of the chapters are original, some few are reprints from the Journal of Geographical Systems, Geographical Analysis, The Review of Regional Studies and Letters of Spatial and Resource Sciences. We let our contributors - velop, from their particular perspective and insights, their own strategies for m- ping the part of terrain for which they were responsible. As the chapters were submitted, we became the first consumers of the project we had initiated. We gained from depth, breadth and distinctiveness of our contributors' insights and, in particular, the presence of links between them.

Geographically Weighted Regression A. Stewart Fotheringham 2003-02-21 Geographical Weighted Regression (GWR) is a new local modelling technique for analysing spatial analysis. This technique allows local as opposed to global models of relationships to be measured and mapped. This is the first and only book on this technique, offering comprehensive coverage on this new 'hot' topic in spatial analysis. * Provides step-by-step examples of how to use the GWR model using data sets and examples on issues such as house price determinants, educational attainment levels and school performance statistics * Contains a broad discussion of and basic concepts on GWR through to ideas on statistical inference for GWR models * uniquely features accompanying author-written software that allows users to undertake sophisticated and complex forms of GWR within a user-friendly, Windows-based, front-end (see book for details).

Agent-Based Modelling and Geographical Information Systems Andrew Crooks 2018-12-13 This is the era of Big Data and computational social science. It is an era that requires tools which can do more than visualise data but also model the complex relation between data and human action and interaction. Agent-Based Models (ABM) - computational models which simulate human action and interaction – do just that. This textbook explains how to design and build ABM and how to link the models to Geographical Information Systems. It guides you from the basics through to constructing more complex models which work with data and human behaviour in a spatial context. All of the fundamental concepts are explained and related to practical examples to facilitate learning (with models developed in NetLogo with all code examples available on the accompanying website). You will be able to use these models to develop your own applications and link, where appropriate, to Geographical Information Systems. All of the key ideas and methods are explained in detail: geographical modelling; an introduction to ABM; the fundamentals of Geographical Information Science; why ABM and GIS; using QGIS; designing and building an ABM; calibration and validation; modelling human behaviour; visualisation and 3D ABM; using Big Geosocial Data, GIS and ABM. An applied primer, that provides fundamental knowledge and practical skills, it will provide you with the skills to build and run your own models, and to begin your own research projects.

GIS - An Overview of Applications Ana Cláudia Teodoro 2018-04-02 GIS - An Overview of Applications is a compilation of reviews that give an overview of the latest advances in Geographic Information System (GIS) technology. The multidisciplinary nature of the book gives readers perspectives in research fields as diverse as forest management, land use and cover, tourism, environment impact assessment, climate change studies, biodiversity and health care and mobility studies. The book is a suitable reference for graduates involved in data engineering and GIS courses as well as working professionals in the field of data engineering, analysis and management.

Geospatial Analysis Michael John De Smith 2007 Addresses a range of analytical techniques that are provided within modern Geographic Information Systems and related geospatial software products. This guide covers: the principal concepts of geospatial analysis; core components of geospatial analysis; and, surface analysis, including surface form analysis, gridding and interpolation methods.

Principles of Modeling Uncertainties in Spatial Data and Spatial Analyses Wenzhong Shi 2009-09-30 When compared to classical sciences such as math, with roots in prehistory, and physics, with roots in antiquity, geographical information science (GISci) is the new kid on the block. Its theoretical foundations are therefore still developing and data quality and uncertainty modeling for spatial data and spatial analysis is an important branch of t

Spatial Modeling in GIS and R for Earth and Environmental Sciences Hamid Reza Pourghasemi 2019-01-18 Spatial Modeling in GIS and R for Earth and Environmental Sciences offers an integrated approach to spatial modelling using both GIS and R. Given the importance of Geographical Information Systems and geostatistics across a variety of applications in Earth and Environmental Science, a clear link between GIS and open source software is essential for the study of spatial objects or phenomena that occur in the real world and facilitate problem-solving. Organized into clear sections on applications and using case studies, the book helps researchers to more quickly understand GIS data and formulate more complex conclusions. The book is the

first reference to provide methods and applications for combining the use of R and GIS in modeling spatial processes. It is an essential tool for students and researchers in earth and environmental science, especially those looking to better utilize GIS and spatial modeling. Offers a clear, interdisciplinary guide to serve researchers in a variety of fields, including hazards, land surveying, remote sensing, cartography, geophysics, geology, natural resources, environment and geography Provides an overview, methods and case studies for each application Expresses concepts and methods at an appropriate level for both students and new users to learn by example

Spatial Analysis Theory and Practice George Grekousis 2020-05-31 An introductory overview of spatial analysis and statistics through GIS, including worked examples and critical analysis of results.

The Modeling Process in Geography Yves Guermond 2013-03-01 This title focuses on the evolution of the modeling process and on new research perspectives in theoretical and applied geography, as well as spatial planning. In the last 50 years, the achievements of spatial analysis models opened the way to a new understanding of the relationship between society and geographical space. In this book, these models are confronted by the real conditions of territorial prospect, regional dynamism, cultural policy, HMO, and spatial segregation. This confrontation takes into account the instability of social behavior and the permanence of partial determinist trajectories.

Comprehensive Geographic Information Systems 2017-07-21 Geographical Information Systems is a computer system used to capture, store, analyze and display information related to positions on the Earth’s surface. It has the ability to show multiple types of information on multiple geographical locations in a single map, enabling users to assess patterns and relationships between different information points, a crucial component for multiple aspects of modern life and industry. This 3-volumes reference provides an up-to date account of this growing discipline through in-depth reviews authored by leading experts in the field. VOLUME EDITORS Thomas J. Cova The University of Utah, Salt Lake City, UT, United States Ming-Hsiang Tsou San Diego State University, San Diego, CA, United States Georg Bareth University of Cologne, Cologne, Germany Chunqiao Song University of California, Los Angeles, CA, United States Yan Song University of North Carolina at Chapel Hill, Chapel Hill, NC, United States Kai Cao National University of Singapore, Singapore Elisabete A. Silva University of Cambridge, Cambridge, United Kingdom Covers a rapidly expanding discipline, providing readers with a detailed overview of all aspects of geographic information systems, principles and applications Emphasizes the practical, socioeconomic applications of GIS Provides readers with a reliable, one-stop comprehensive guide, saving them time in searching for the information they need from different sources

Geographic Information Science Martin Raubal 2006-09-21 This book constitutes the refereed proceedings of the 4th International Conference on Geographic Information Science, GIScience 2006. The book presents 26 revised full papers. Among traditional topics addressed are spatial representations and data structures, spatial and temporal reasoning, computational geometry, spatial analysis, and databases. Many papers deal with navigation, interoperability, dynamic modeling, ontology, and semantics. Geosensors, location privacy, social issues and GI research networks rank among the new directions covered.

Advanced Spatial Analysis Paul Longley 2003 "Describing the latest developments in GIS applications at the Centre for Advanced Spatial Analysis (CASA) at the University College, London, this book demonstrates how CASA is advancing spatial decision systems and spatial analysis, which are essential to solving problems and better understanding how people live. How these systems and analyses are drawn from archaeology, architecture, cartography, computer science, environmental science, geography, planning, remote sensing, geomatic engineering, and transport studies is explained. Highlighted are projects such as Digital Egypt, which describes virtual reality reconstructions for Egyptian archaeological finds, and Virtual cities, which explores the concepts and nature of virtual cities, from early CAD models to the newly emerging data-rich cities that merge GIS with three-dimensional visualization."

Applied Spatial Data Analysis with R Roger S. Bivand 2013-06-21 Applied Spatial Data Analysis with R, second edition, is divided into two basic parts, the first presenting R packages, functions, classes and methods for handling spatial data. This part is of interest to users who need to access and visualise spatial data. Data import and export for many file formats for spatial data are covered in detail, as is the interface between R and the open source GRASS GIS and the handling of spatio-temporal data. The second part showcases more specialised kinds of spatial data analysis, including spatial point pattern analysis, interpolation and geostatistics, areal data analysis and disease mapping. The coverage of methods of spatial data analysis ranges from standard techniques to new developments, and the examples used are largely taken from the spatial statistics literature. All the examples can be run using R contributed packages available from the CRAN website, with code and additional data sets from the book's own website. Compared to the first edition, the second edition covers the more systematic approach towards handling spatial data in R, as well as a number of important and widely used CRAN packages that have appeared since the first edition. This book will be of interest to researchers who intend to use R to handle, visualise, and analyse spatial data. It will also be of interest to spatial data analysts who do not use R, but who are interested in practical aspects of implementing software for spatial data analysis. It is a suitable companion book for introductory spatial statistics courses and for applied methods courses in a wide range of subjects using spatial data, including human and physical geography, geographical information science and geoinformatics, the environmental sciences, ecology, public health and disease control, economics, public administration and political science. The book has a website where complete code examples, data sets, and other support material may be found: http://www.asdar-book.org. The authors have taken part in writing and maintaining software for spatial data handling and analysis with R in concert since 2003.

Urban Development in Asia and Africa Yuji Murayama 2017-03-29 This book examines the urban growth trends and patterns of various rapidly growing metropolitan regions in developing Asian and African nations from the perspective of geography. State-of-the-art geospatial tools and techniques, including geographic information system/science and remote sensing, were used to facilitate the analysis. In addition to the empirical results, the methodological approaches employed and discussed in this book showcase the potential of geospatial analysis, e.g. land-change modeling for improving our understanding of the trends and patterns of urban growth in Asia and Africa. Furthermore, given the complexity of the urban growth process across the world, issues raised in this book will contribute to the improvement of future geospatial analysis of urban growth in the developing regions. This book is written for researchers, academicians, practitioners, and graduate students. The inclusion of the origin and brief history of each of the selected metropolitan regions, including the analysis of their urban primacy, spatiotemporal patterns of urban land-use changes, driving forces of urban development, and implications for future sustainable development, makes the book an important reference for various related studies.

Spationomy Vít Pászto 2019-11-06 This open access book is based on "Spationomy – Spatial Exploration of Economic Data", an interdisciplinary and international project in the frame of

ERASMUS+ funded by the European Union. The project aims to exchange interdisciplinary knowledge in the fields of economics and geomatics. For the newly introduced courses, interdisciplinary learning materials have been developed by a team of lecturers from four different universities in three countries. In a first study block, students were taught methods from the two main research fields. Afterwards, the knowledge gained had to be applied in a project. For this international project, teams were formed, consisting of one student from each university participating in the project. The achieved results were presented in a summer school a few months later. At this event, more methodological knowledge was imparted to prepare students for a final simulation game about spatial and economic decision making. In a broader sense, the chapters will present the methodological background of the project, give case studies and show how visualisation and the simulation game works.

Geographic Information Analysis David O'Sullivan 2014-07-30 Clear, up-to-date coverage of methods for analyzing geographicalinformation in a GIS context Geographic Information Analysis, Second Edition is fullyupdated to keep pace with the most recent developments of spatialanalysis in a geographic information systems (GIS) environment.Still focusing on the universal aspects of this science, thisrevised edition includes new coverage on geovisualization andmapping as well as recent developments using local statistics. Building on the fundamentals, this book explores such keyconcepts as spatial processes, point patterns, and autocorrelationin area data, as well as in continuous fields. Also addressed aremethods for combining maps and performing computationally intensiveanalysis. New chapters tackle mapping, geovisualization, and localstatistics, including the Moran Scatterplot and GeographicallyWeighted Regression (GWR). An appendix provides a primer on linearalgebra using matrices. Complete with chapter objectives, summaries, "thoughtexercises," explanatory diagrams, and a chapter-by-chapterbibliography, Geographic Information Analysis is a practicalbook for students, as well as a valuable resource for researchersand professionals in the industry.