

Spatial Autocorrelation And Autoregressive Models In Ecology

Advanced Econometric Methods Spatial Econometrics Estimation of Multiequation Cross-section Models in the Presence of Spatial Autocorrelation Forest-Water Interactions Advanced Spatial Statistics Spatial Econometrics Using Microdata Perspectives on Spatial Data Analysis Spatial Autocorrelation Ecological Statistics Handbook of Applied Spatial Analysis Spatial AutoRegression (SAR) Model Advances in Spatial Econometrics Encyclopedia of GIS Parameter Estimation and Interpretation in Spatial Autoregression Models Estimation Methods for Spatial Autoregressive Structures Introduction to Spatial Econometrics Spatial Econometrics: Methods and Models Hedonic valuation of Dutch wetlands. Spatial Autocorrelation Geographically Weighted Regression Modelling Spatial Processes Spatial Regression Models Exploratory and explanatory statistical analysis of spatial data Spatial Autocorrelation and the Optimal Prediction of Assessed Values Location, Transport and Land-Use Spatial Autocorrelation Spatial Autocorrelation and Spatial Filtering A Casebook for Spatial Statistical Data Analysis Spatial Autocorrelation Spatial Econometrics using Microdata Combinatorial Data Analysis Introductory Econometrics A Primer for Spatial Econometrics Spatial Autocorrelation Spatial Econometrics and Spatial Statistics New Directions in Spatial Econometrics Statistics for Spatio-Temporal Data Autoregressive Models for Spatial-temporal Data Spatial Autocorrelation Practical Handbook of Spatial Statistics

Advanced Econometric Methods

Spatial Econometrics

-The objective of this book is to make a link between existing quantitative approaches and the manner in which we can generalize these approaches to cases where the available data for analysis have a spatial dimension.---

Estimation of Multiequation Cross-section Models in the Presence of Spatial Autocorrelation

In recent years there has been a growing interest in and concern for the development of a sound spatial statistical body of theory. This work has been undertaken by geographers, statisticians, regional scientists, econometricians, and others (e. g. , sociologists). It has led to the publication of a number of books, including Cliff and Ord's Spatial Processes (1981), Bartlett's The Statistical Analysis of Spatial Pattern (1975), Ripley's Spatial Statistics (1981), Paelinck and Klaassen's Spatial Econometrics (1979), Ahuja and Schachter's Pattern Models (1983), and Upton and Fingleton's Spatial Data Analysis by Example (1985). The first of these books presents a useful introduction to the topic of spatial autocorrelation, focusing on

autocorrelation indices and their sampling distributions. The second of these books is quite brief, but nevertheless furnishes an eloquent introduction to the relationship between spatial autoregressive and two-dimensional spectral models. Ripley's book virtually ignores autoregressive and trend surface modelling, and focuses almost solely on point pattern analysis. Paelinck and Klaassen's book closely follows an econometric textbook format, and as a result overlooks much of the important material necessary for successful spatial data analysis. It almost exclusively addresses distance and gravity models, with some treatment of autoregressive modelling. Pattern Models supplements Cliff and Ord's book, which in combination provide a good introduction to spatial data analysis. Its basic limitation is a preoccupation with the geometry of planar patterns, and hence is very narrow in scope.

Forest-Water Interactions

World-renowned experts in spatial statistics and spatial econometrics present the latest advances in specification and estimation of spatial econometric models. This includes information on the development of tools and software, and various applications. The text introduces new tests and estimators for spatial regression models, including discrete choice and simultaneous equation models. The performance of techniques is demonstrated through simulation results and a wide array of applications related to economic growth, international trade, knowledge externalities, population-employment dynamics, urban crime, land use, and environmental issues. An exciting new text for academics with a theoretical interest in spatial statistics and econometrics, and for practitioners looking for modern and up-to-date techniques.

Advanced Spatial Statistics

Some measures of autocorrelation in the plane; Distribution theory for the join count, I, and c statistics; Applications of the spatial autocorrelation measures to Geary's Irish data and in quadrat count analysis; Map comparison with application to diffusion processes; The analysis of regression residuals - theory; The analysis of regression residuals - some empirical examples; Comparisons of tests for spatial autocorrelation; Analysis using partial correlations.

Spatial Econometrics Using Microdata

Perspectives on Spatial Data Analysis

This book aims at meeting the growing demand in the field by introducing the basic spatial econometrics methodologies to a wide variety of researchers. It provides a practical guide that illustrates the potential of spatial econometric modelling,

discusses problems and solutions and interprets empirical results.

Spatial Autocorrelation

Ecological Statistics

Handbook of Applied Spatial Analysis

Although interest in spatial regression models has surged in recent years, a comprehensive, up-to-date text on these approaches does not exist. Filling this void, Introduction to Spatial Econometrics presents a variety of regression methods used to analyze spatial data samples that violate the traditional assumption of independence between observations. It explores a wide range of alternative topics, including maximum likelihood and Bayesian estimation, various types of spatial regression specifications, and applied modeling situations involving different circumstances. Leaders in this field, the authors clarify the often-mystifying phenomenon of simultaneous spatial dependence. By presenting new methods, they help with the interpretation of spatial regression models, especially ones that include spatial lags of the dependent variable. The authors also examine the relationship between spatiotemporal processes and long-run equilibrium states that are characterized by simultaneous spatial dependence. MATLAB® toolboxes useful for spatial econometric estimation are available on the authors' websites. This work covers spatial econometric modeling as well as numerous applied illustrations of the methods. It encompasses many recent advances in spatial econometric models—including some previously unpublished results.

Spatial AutoRegression (SAR) Model

The field of spatial econometrics has come to include the methods and models that deal with estimation and testing problems encountered when attempting to implement regional economic models. Those problems are often characterized by the difficulties associated with assessing the importance of spatial dependence and spatial heterogeneity. This book includes contributions on spatial proximity, spatial patterning and in particular the spatial association (dependence) contained in local map patterns.

Advances in Spatial Econometrics

Explosive growth in the size of spatial databases has highlighted the need for spatial data mining techniques to mine the interesting but implicit spatial patterns within these large databases. This book explores computational structure of the exact and approximate spatial autoregression (SAR) model solutions. Estimation of the parameters of the SAR model using Maximum Likelihood (ML) theory is computationally very expensive because of the need to compute the logarithm of the determinant (log-det) of a large matrix in the log-likelihood function. The second part of the book introduces theory on SAR model solutions. The third part of the book applies parallel processing techniques to the exact SAR model solutions. Parallel formulations of the SAR model parameter estimation procedure based on ML theory are probed using data parallelism with load-balancing techniques. Although this parallel implementation showed scalability up to eight processors, the exact SAR model solution still suffers from high computational complexity and memory requirements. These limitations have led the book to investigate serial and parallel approximate solutions for SAR model parameter estimation. In the fourth and fifth parts of the book, two candidate approximate-semi-sparse solutions of the SAR model based on Taylor's Series expansion and Chebyshev Polynomials are presented. Experiments show that the differences between exact and approximate SAR parameter estimates have no significant effect on the prediction accuracy. In the last part of the book, we developed a new ML based approximate SAR model solution and its variants in the next part of the thesis. The new approximate SAR model solution is called the Gauss-Lanczos approximated SAR model solution. We algebraically rank the error of the Chebyshev Polynomial approximation, Taylor's Series approximation and the Gauss-Lanczos approximation to the solution of the SAR model and its variants. In other words, we established a novel relationship between the error in the log-det term, which is the approximated term in the concentrated log-likelihood function and the error in estimating the SAR parameter for all of the approximate SAR model solutions.

Encyclopedia of GIS

Scientific visualization may be defined as the transformation of numerical scientific data into informative graphical displays. The text introduces a nonverbal model to subdisciplines that until now has mostly employed mathematical or verbal-conceptual models. The focus is on how scientific visualization can help revolutionize the manner in which the tendencies for (dis)similar numerical values to cluster together in location on a map are explored and analyzed. In doing so, the concept known as spatial autocorrelation - which characterizes these tendencies - is further demystified.

Parameter Estimation and Interpretation in Spatial Autoregression Models

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 textbooks 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 develop, from their particular perspective and insights, their own strategies for mapping 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.

Estimation Methods for Spatial Autoregressive Structures

1. Theme and focus Few books are available to integrate the models for facilities siting, transportation, and land-use. Employing state-of-the-art quantitative models and case-studies, this book would guide the siting of such facilities as transportation terminals, warehouses, nuclear power plants, military bases, landfills, emergency shelters, state parks, and industrial plants. The book also shows the use of statistical tools for forecasting and analyzing implications of land-use decisions. The idea is that land use on a map is necessarily a consequence of individual, and often conflicting, siting decisions over time. Since facilities often develop to form a community, these decisions are interrelated spatially—i. e. , they need to be accessible to one another via the transportation system. It is our thesis that a common methodological procedure exists to analyze all these spatial-temporal constructs. While there are several monographs and texts on subjects related to this book's, this volume is unique in that it integrates existing practical and theoretical works on facility-location, transportation, and land-use. Instead of dealing with individual facility-location, transportation, or the resulting land-use pattern individually, it provides the underlying principles that are behind these types of models. Particularly of interest is the emphasis on counter-intuitive decisions that often escape our minds unless deliberate steps of analysis are taken. Oriented toward the fundamental principles of infrastructure management, the book transcends the traditional engineering and planning disciplines, where the main concerns are often exclusively either physical design, fiscal, socioeconomic or political considerations.

Introduction to Spatial Econometrics

Spatial Econometrics: Methods and Models

Some measures of autocorrelation in the plane; Distribution theory for the join count, I, and c statistics; Applications of the

spatial autocorrelation measures to Geary's Irish data and in quadrat count analysis; Map comparison with application to diffusion processes; The analysis of regression residuals - theory; The analysis of regression residuals - some empirical examples; Comparisons of tests for spatial autocorrelation; Analysis using partial correlations.

Hedonic valuation of Dutch wetlands.

The application and interpretation of statistics are central to ecological study and practice. Ecologists are now asking more sophisticated questions than in the past. These new questions, together with the continued growth of computing power and the availability of new software, have created a new generation of statistical techniques. These have resulted in major recent developments in both our understanding and practice of ecological statistics. This novel book synthesizes a number of these changes, addressing key approaches and issues that tend to be overlooked in other books such as missing/censored data, correlation structure of data, heterogeneous data, and complex causal relationships. These issues characterize a large proportion of ecological data, but most ecologists' training in traditional statistics simply does not provide them with adequate preparation to handle the associated challenges. Uniquely, Ecological Statistics highlights the underlying links among many statistical approaches that attempt to tackle these issues. In particular, it gives readers an introduction to approaches to inference, likelihoods, generalized linear (mixed) models, spatially or phylogenetically-structured data, and data synthesis, with a strong emphasis on conceptual understanding and subsequent application to data analysis. Written by a team of practicing ecologists, mathematical explanations have been kept to the minimum necessary. This user-friendly textbook will be suitable for graduate students, researchers, and practitioners in the fields of ecology, evolution, environmental studies, and computational biology who are interested in updating their statistical tool kits. A companion web site provides example data sets and commented code in the R language.

Spatial Autocorrelation

The Encyclopedia of GIS provides a comprehensive and authoritative guide, contributed by experts and peer-reviewed for accuracy, and alphabetically arranged for convenient access. The entries explain key software and processes used by geographers and computational scientists. Major overviews are provided for nearly 200 topics: Geoinformatics, Spatial Cognition, and Location-Based Services and more. Shorter entries define specific terms and concepts. The reference will be published as a print volume with abundant black and white art, and simultaneously as an XML online reference with hyperlinked citations, cross-references, four-color art, links to web-based maps, and other interactive features.

Geographically Weighted Regression

Winner of the 2013 DeGroot Prize. A state-of-the-art presentation of spatio-temporal processes, bridging classic ideas with modern hierarchical statistical modeling concepts and the latest computational methods. Noel Cressie and Christopher K. Wikle, are also winners of the 2011 PROSE Award in the Mathematics category, for the book "Statistics for Spatio-Temporal Data" (2011), published by John Wiley and Sons. (The PROSE awards, for Professional and Scholarly Excellence, are given by the Association of American Publishers, the national trade association of the US book publishing industry.) Statistics for Spatio-Temporal Data has now been reprinted with small corrections to the text and the bibliography. The overall content and pagination of the new printing remains the same; the difference comes in the form of corrections to typographical errors, editing of incomplete and missing references, and some updated spatio-temporal interpretations. From understanding environmental processes and climate trends to developing new technologies for mapping public-health data and the spread of invasive-species, there is a high demand for statistical analyses of data that take spatial, temporal, and spatio-temporal information into account. Statistics for Spatio-Temporal Data presents a systematic approach to key quantitative techniques that incorporate the latest advances in statistical computing as well as hierarchical, particularly Bayesian, statistical modeling, with an emphasis on dynamical spatio-temporal models. Cressie and Wikle supply a unique presentation that incorporates ideas from the areas of time series and spatial statistics as well as stochastic processes. Beginning with separate treatments of temporal data and spatial data, the book combines these concepts to discuss spatio-temporal statistical methods for understanding complex processes. Topics of coverage include: Exploratory methods for spatio-temporal data, including visualization, spectral analysis, empirical orthogonal function analysis, and LISAs Spatio-temporal covariance functions, spatio-temporal kriging, and time series of spatial processes Development of hierarchical dynamical spatio-temporal models (DSTMs), with discussion of linear and nonlinear DSTMs and computational algorithms for their implementation Quantifying and exploring spatio-temporal variability in scientific applications, including case studies based on real-world environmental data Throughout the book, interesting applications demonstrate the relevance of the presented concepts. Vivid, full-color graphics emphasize the visual nature of the topic, and a related FTP site contains supplementary material. Statistics for Spatio-Temporal Data is an excellent book for a graduate-level course on spatio-temporal statistics. It is also a valuable reference for researchers and practitioners in the fields of applied mathematics, engineering, and the environmental and health sciences.

Modelling Spatial Processes

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).

Spatial Regression Models

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, exploratory spatial data analysis, working with regression models that have spatially dependent regressors, and estimating regression models with spatially correlated error structures. Using social sciences examples based on real data, Michael D. Ward and Kristian Skrede Gleditsch 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.

Exploratory and explanatory statistical analysis of spatial data

This book provides an introduction to spatial analyses concerning disaggregated (or micro) spatial data. Particular emphasis is put on spatial data compilation and the structuring of the connections between the observations. Descriptive analysis methods of spatial data are presented in order to identify and measure the spatial, global and local dependency. The authors then focus on autoregressive spatial models, to control the problem of spatial dependency between the residues of a basic linear statistical model, thereby contravening one of the basic hypotheses of the ordinary least squares approach. This book is a popularized reference for students looking to work with spatialized data, but who do not have the advanced statistical theoretical basics.

Spatial Autocorrelation and the Optimal Prediction of Assessed Values

The guidance and special techniques provided in this handbook will allow you to understand and use complex spatial statistical techniques. You will learn how to apply proper spatial analysis techniques and why they are generally different from conventional statistical analyses. Clear and concise information on weighting, aggregation effects, sampling, spatial

statistics and GIS, and visualization of spatial dependence is provided. Discussions on specific applications using actual data sets fill obvious gaps in the literature, and coverage of critical research frontiers allows readers to explore current areas of active research.

Location, Transport and Land-Use

The United Nations has declared 2018-2028 as the International Decade for Action on Water for Sustainable Development. This is a timely designation. In an increasingly thirsty world, the subject of forest-water interactions is of critical importance to the achievement of sustainability goals. The central underlying tenet of this book is that the hydrologic community can conduct better science and make a more meaningful impact to the world's water crisis if scientists are: (1) better equipped to utilize new methods and harness big data from either or both high-frequency sensors and long-term research watersheds; and (2) aware of new developments in our process-based understanding of the hydrological cycle in both natural and urban settings. Accordingly, this forward-looking book delves into forest-water interactions from multiple methodological, statistical, and process-based perspectives (with some chapters featuring data sets and open-source R code), concluding with a chapter on future forest hydrology under global change. Thus, this book describes the opportunities of convergence in high-frequency sensing, big data, and open source software to catalyze more comprehensive understanding of forest-water interactions. The book will be of interest to researchers, graduate students, and advanced undergraduates in an array of disciplines, including hydrology, forestry, ecology, botany, and environmental engineering.

Spatial Autocorrelation

This volume compiles geostatistical and spatial autoregressive data analyses involving georeferenced socioeconomic, natural resources, agricultural, pollution, and epidemiological variables. Benchmark analyses are followed by analyses of readily available data sets, emphasizing parallels between geostatistical and spatial autoregressive findings. Both SAS and SPSS code are presented for implementation purposes. This informative casebook will serve geographers, regional scientists, applied spatial statisticians, and spatial scientists from across disciplines.

Spatial Autocorrelation and Spatial Filtering

In September 1977 a "Regional Science Symposium" was held at the Faculty of Economics of the University of Goningen in the Netherlands. The impetus in organizing this symposium was the recent establishment at the Faculty of Economics of a group engaged in teaching and research within the field of regional science. The aim of the symposium was to familiarize

university members with regional science and to introduce the new group to both the national and international scene. Two separate topics of potential interest to both researchers and policy-makers were selected. The first theme, spatial inequalities and regional development, was chosen because of its central place in regional science. Authors from several disciplines were asked to approach this theme from a general, policy-oriented point of view. This ensured the spotlighting of the various dimensions of spatial inequality and its implications for regional policy. The results of their efforts have been collected in a volume entitled *Spatial Inequalities and Regional Development*. The second theme focussed on spatial statistical analysis. This branch of statistics is a relatively new one. It is receiving growing attention from researchers in the field of applied regional science. The conference dealing with this topic concentrated on recent research results related to the use of appropriate statistical and econometric methods for analyzing spatial data. The papers concerned have been collected in another volume, entitled *Exploratory and Explanatory Statistical Analysis of Spatial Data*.

A Casebook for Spatial Statistical Data Analysis

Combinatorial data analysis (CDA) refers to a wide class of methods for the study of relevant data sets in which the arrangement of a collection of objects is absolutely central. The focus of this monograph is on the identification of arrangements, which are then further restricted to where the combinatorial search is carried out by a recursive optimization process based on the general principles of dynamic programming (DP).

Spatial Autocorrelation

Spatial Econometrics using Microdata

The promising new directions for research and applications described here include alternative model specifications, estimators and tests for regression models and new perspectives on dealing with spatial effects in models with limited dependent variables and space-time data.

Combinatorial Data Analysis

Odland introduces spatial autocorrelation to the reader in a concise and readable fashion. He explains why it occurs, why it violates the basic assumptions of statistical inference, and how to tell when it occurs. He demonstrates how spatial statistics can be used in diagnosing and correcting problems which arise when common statistical methods such as regression analysis are applied to spatially arrayed measurements.

Introductory Econometrics

This book provides a rigorous introduction to the principles of econometrics and gives students and practitioners the tools they need to effectively and accurately analyze real data. Thoroughly updated to address the developments in the field that have occurred since the original publication of this classic text, the second edition has been expanded to include two chapters on time series analysis and one on nonparametric methods. Discussions on covariance (including GMM), partial identification, and empirical likelihood have also been added. The selection of topics and the level of discourse give sufficient variety so that the book can serve as the basis for several types of courses. This book is intended for upper undergraduate and first year graduate courses in economics and statistics and also has applications in mathematics and some social sciences where a reasonable knowledge of matrix algebra and probability theory is common. It is also ideally suited for practicing professionals who want to deepen their understanding of the methods they employ. Also available for the new edition is a solutions manual, containing answers to the end-of-chapter exercises.

A Primer for Spatial Econometrics

Spatial Econometrics provides a modern, powerful and flexible skillset to early career researchers interested in entering this rapidly expanding discipline. It articulates the principles and current practice of modern spatial econometrics and spatial statistics, combining rigorous depth of presentation with unusual depth of coverage. Introducing and formalizing the principles of, and 'need' for, models which define spatial interactions, the book provides a comprehensive framework for almost every major facet of modern science. Subjects covered at length include spatial regression models, weighting matrices, estimation procedures and the complications associated with their use. The work particularly focuses on models of uncertainty and estimation under various complications relating to model specifications, data problems, tests of hypotheses, along with systems and panel data extensions which are covered in exhaustive detail. Extensions discussing pre-test procedures and Bayesian methodologies are provided at length. Throughout, direct applications of spatial models are described in detail, with copious illustrative empirical examples demonstrating how readers might implement spatial analysis in research projects. Designed as a textbook and reference companion, every chapter concludes with a set of questions for formal or self--study. Finally, the book includes extensive supplementing information in a large sample theory in the R programming language that supports early career econometricians interested in the implementation of statistical procedures covered. Combines advanced theoretical foundations with cutting-edge computational developments in R Builds from solid foundations, to more sophisticated extensions that are intended to jumpstart research careers in spatial econometrics Written by two of the most accomplished and extensively published econometricians working in the discipline Describes fundamental principles intuitively, but without sacrificing rigor Provides empirical illustrations for many spatial methods across diverse field Emphasizes a modern treatment of the field using the generalized method of moments (GMM)

approach Explores sophisticated modern research methodologies, including pre-test procedures and Bayesian data analysis

Spatial Autocorrelation

Problem description; Spatial generalized method of moments; Monte Carlo simulations; Application to municipality growth in Brazil.

Spatial Econometrics and Spatial Statistics

A novel methodology is put forward in this book, which empowers researchers to investigate and identify potential spatial processes among a set of regions. Spatial processes and their underlying functional spatial relationships are commonly observed in the geosciences and related disciplines. Examples are spatially autocorrelated random variables manifesting themselves in distinct global patterns as well as local clusters and hot spots, or spatial interaction leading to stochastic ties among the regions. An example from observational epidemiology demonstrates the flexibility of Moran's approach by analyzing the spatial distribution of cancer data from several perspectives. Recent advances in computing technology, computer algorithms, statistical techniques and global and local spatial patterns by means of Moran's I feasibility. Moran's I is an extremely versatile tool for exploring and analyzing spatial data and testing spatial hypotheses.

New Directions in Spatial Econometrics

Statistics for Spatio-Temporal Data

Spatial econometrics deals with spatial dependence and spatial heterogeneity, critical aspects of the data used by regional scientists. These characteristics may cause standard econometric techniques to become inappropriate. In this book, I combine several recent research results to construct a comprehensive approach to the incorporation of spatial effects in econometrics. My primary focus is to demonstrate how these spatial effects can be considered as special cases of general frameworks in standard econometrics, and to outline how they necessitate a separate set of methods and techniques, encompassed within the field of spatial econometrics. My viewpoint differs from that taken in the discussion of spatial autocorrelation in spatial statistics - e.g., most recently by Cliff and Ord (1981) and Upton and Fingleton (1985) - in that I am mostly concerned with the relevance of spatial effects on model specification, estimation and other inference, in what I call a model-driven approach, as opposed to a data-driven approach in spatial statistics. I attempt to combine a rigorous econometric perspective with a comprehensive treatment of methodological issues in spatial analysis.

Autoregressive Models for Spatial-temporal Data

Odland introduces spatial autocorrelation to the reader in a concise and readable fashion. He explains why it occurs, why it violates the basic assumptions of statistical inference, and how to tell when it occurs. He demonstrates how spatial statistics can be used in diagnosing and correcting problems which arise when common statistical methods such as regression analysis are applied to spatially arrayed measurements.

Spatial Autocorrelation

This book had its conception in 1975 in a friendly tavern near the School of Business and Public Administration at the University of Missouri-Columbia. Two of the authors (Fomby and Hill) were graduate students of the third (Johnson), and were (and are) concerned about teaching econometrics effectively at the graduate level. We decided then to write a book to serve as a comprehensive text for graduate econometrics. Generally, the material included in the book and its organization have been governed by the question, "How could the subject be best presented in a graduate class?" For content, this has meant that we have tried to cover "all the bases" and yet have not attempted to be encyclopedic. The intended purpose has also affected the level of mathematical rigor. We have tended to prove only those results that are basic and/or relatively straightforward. Proofs that would demand inordinant amounts of class time have simply been referenced. The book is intended for a two-semester course and paced to admit more extensive treatment of areas of specific interest to the instructor and students. We have great confidence in the ability, industry, and persistence of graduate students in ferreting out and understanding the omitted proofs and results. In the end, this is how one gains maturity and a fuller appreciation for the subject in any case. It is assumed that the readers of the book will have had an econometric methods course, using texts like J. Johnston's *Econometric Methods*, 2nd ed.

Practical Handbook of Spatial Statistics

Spatial data analysis has seen explosive growth in recent years. Both in mainstream statistics and econometrics as well as in many applied fields, the attention to space, location, and interaction has become an important feature of scholarly work. The methods developed to deal with problems of spatial pattern recognition, spatial autocorrelation, and spatial heterogeneity have seen greatly increased adoption, in part due to the availability of user friendly desktop software. Through his theoretical and applied work, Arthur Getis has been a major contributing figure in this development. In this volume, we take both a retrospective and a prospective view of the field. We use the occasion of the retirement and move to emeritus status of Arthur Getis to highlight the contributions of his work. In addition, we aim to place it into perspective in light of the current state of the art and future directions in spatial data analysis. To this end, we elected to combine reprints of selected classic

contributions by Getis with chapters written by key spatial scientists. These scholars were specifically invited to react to the earlier work by Getis with an eye toward assessing its impact, tracing out the evolution of related research, and to reflect on the future broadening of spatial analysis. The organization of the book follows four main themes in Getis' contributions: • Spatial analysis • Pattern analysis • Local statistics • Applications For each of these themes, the chapters provide a historical perspective on early methodological developments and theoretical insights, assessments of these contributions in light of the current state of the art, as well as descriptions of new techniques and applications.

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