

Maximum Likelihood Estimation Logic And Practice Quantitative Applications In The Social Sciences

Trying to determine when to use a logistic regression and how to interpret the coefficients? Frustrated by the technical writing in other books on the topic? Pampel's book offers readers the first "nuts and bolts" approach to doing logist

This book examines the consequences of misspecifications for the interpretation of likelihood-based methods of statistical estimation and inference. The analysis concludes with an examination of methods by which the possibility of misspecification can be empirically investigated.

1. Introduction 1 2. Identification Analysis and F.I.M.L. Estimation for the K-Mode1 10 3. Identification Analysis and F.I.M.L. Estimation for the C-Model 23 4. Identification Analysis and F.I.M.L. Estimation for the AB-Model 32 5. Impulse Response Analysis and Forecast Error Variance Decomposition in SVAR Modeling 44 5 .a Impulse Response Analysis 44 5.b Variance Decomposition (by Antonio Lanzaarotti) 51 6. Long-run A-priori Information. Deterministic Components. Cointegration 58 6.a Long-run A-priori Information 58 6.b Deterministic Components 62 6.c Cointegration 65 7. The Working of an AB-Model 71 Annex 1: The Notions of Reduced Form and Structure in Structural VAR Modeling 83 Annex 2: Some Considerations on the Semantics, Choice and Management of the K, C and AB-Models 87 Appendix A 93 Appendix B 96 Appendix C (by Antonio Lanzaarotti and Mario Seghelini) 99 Appendix D (by Antonio Lanzaarotti and Mario Seghelini) 109 References 128 Foreword In recent years a growing interest in the structural VAR approach (SVAR) has followed the path-breaking works by Blanchard and Watson (1986), Bemanke (1986) and Sims (1986), especially in U.S. applied macroeconometric literature. The approach can be used in two different, partially overlapping directions: the interpretation of business cycle fluctuations of a small number of significant macroeconomic variables and the identification of the effects of different policies.

This book is a comprehensive treatment of inference for hidden Markov models, including both algorithms and statistical theory. Topics range from filtering and smoothing of the hidden Markov chain to parameter estimation, Bayesian methods and estimation of the number of states. In a unified way the book covers both models with finite state spaces and models with continuous state spaces (also called state-space models) requiring approximate simulation-based algorithms that are also described in detail. Many examples illustrate the algorithms and theory. This book builds on recent developments to present a self-contained view.

Maximum Likelihood Estimation with Stata, Fourth Edition is written for researchers in all disciplines who need to compute maximum likelihood estimators that are not available as prepackaged routines. Readers are presumed to be familiar with Stata, but no special programming skills are assumed except in the last few chapters, which detail how to add a new estimation command to Stata. The book begins with an introduction to the theory of maximum likelihood estimation with particular attention on the practical implications for applied work. Individual chapters then describe in detail each of the four types of likelihood evaluator programs and provide numerous examples, such as logit and probit regression, Weibull regression, random-effects linear regression, and the Cox proportional hazards model. Later chapters and appendixes provide additional details about the ml command, provide checklists to follow when writing evaluators, and show how to write your own estimation commands.

Research in learning and behavioral disabilities, employing a variety of methods and techniques, has provided information relevant to practitioners. This volume discusses, applies and evaluates different methodological approaches to learning and behavioral disorder research; and serves as a reference to educators, researchers, and others.

An Update of the Most Popular Graduate-Level Introductions to Bayesian Statistics for Social Scientists Now that Bayesian modeling has become standard, MCMC is well understood and trusted, and computing power continues to increase, Bayesian Methods: A Social and Behavioral Sciences Approach, Third Edition focuses more on implementation details of the procedures and less on justifying procedures. The expanded examples reflect this updated approach. New to the Third Edition A chapter on Bayesian decision theory, covering Bayesian and frequentist decision theory as well as the connection of empirical Bayes with James–Stein estimation A chapter on the practical implementation of MCMC methods using the BUGS software Greatly expanded chapter on hierarchical models that shows how this area is well suited to the Bayesian paradigm Many new applications from a variety of social science disciplines Double the number of exercises, with 20 now in each chapter Updated BaM package in R, including new datasets, code, and procedures for calling BUGS packages from R This bestselling, highly praised text continues to be suitable for a range of courses, including an introductory course or a computing-centered course. It shows students in the social and behavioral sciences how to use Bayesian methods in practice, preparing them for sophisticated, real-world work in the field.

This sophisticated package of statistical methods is for advanced master's (MPH) and PhD students in public health and epidemiology who are involved in the analysis of data. It makes the link from statistical theory to data analysis, focusing on the methods and data types most common in public health and related fields. Like most toolboxes, the statistical tools in this book are organized into sections with similar objectives. Unlike most toolboxes, however, these tools are accompanied by complete instructions, explanations, detailed examples, and advice on relevant issues and potential pitfalls - conveying skills, intuition, and experience. The only prerequisite is a first-year statistics course and familiarity with a computing package such as R, Stata, SPSS, or SAS. Though the book is not tied to a particular computing language, its figures and analyses were all created using R. Relevant R code, data sets, and links to public data sets are available from www.cambridge.org/9781107113084.

"This book covers the basics of traditional educational testing, measurement, and evaluation theory and methodology, as well as sociopolitical issues and trends influencing the future of that research and practice"--Publisher's description.

Maximum Likelihood Estimation Logic and Practice SAGE Publications

In his seminal 1982 paper, Robert F. Engle described a time series model with a time-varying volatility. Engle showed that this model, which he called ARCH (autoregressive conditionally heteroscedastic), is well-suited for the description of economic and financial price. Nowadays ARCH has been replaced by more general and more sophisticated models, such as GARCH (generalized autoregressive heteroscedastic). This monograph concentrates on mathematical statistical problems associated with fitting conditionally

heteroscedastic time series models to data. This includes the classical statistical issues of consistency and limiting distribution of estimators. Particular attention is addressed to (quasi) maximum likelihood estimation and misspecified models, along to phenomena due to heavy-tailed innovations. The used methods are based on techniques applied to the analysis of stochastic recurrence equations. Proofs and arguments are given wherever possible in full mathematical rigour. Moreover, the theory is illustrated by examples and simulation studies.

Walking readers step by step through complex concepts, this book translates missing data techniques into something that applied researchers and graduate students can understand and utilize in their own research. Enders explains the rationale and procedural details for maximum likelihood estimation, Bayesian estimation, multiple imputation, and models for handling missing not at random (MNAR) data. Easy-to-follow examples and small simulated data sets illustrate the techniques and clarify the underlying principles. The companion website (www.appliedmissingdata.com) includes data files and syntax for the examples in the book as well as up-to-date information on software. The book is accessible to substantive researchers while providing a level of detail that will satisfy quantitative specialists.

Probability is the bedrock of machine learning. You cannot develop a deep understanding and application of machine learning without it. Cut through the equations, Greek letters, and confusion, and discover the topics in probability that you need to know. Using clear explanations, standard Python libraries, and step-by-step tutorial lessons, you will discover the importance of probability to machine learning, Bayesian probability, entropy, density estimation, maximum likelihood, and much more.

In designing the Handbook of the History of Logic, the Editors have taken the view that the history of logic holds more than an antiquarian interest, and that a knowledge of logic's rich and sophisticated development is, in various respects, relevant to the research programmes of the present day. Ancient logic is no exception. The present volume attests to the distant origins of some of modern logic's most important features, such as can be found in the claim by the authors of the chapter on Aristotle's early logic that, from its infancy, the theory of the syllogism is an example of an intuitionistic, non-monotonic, relevantly paraconsistent logic. Similarly, in addition to its comparative earliness, what is striking about the best of the Megarian and Stoic traditions is their sophistication and originality.

This book describes the new generation of discrete choice methods, focusing on the many advances that are made possible by simulation. Researchers use these statistical methods to examine the choices that consumers, households, firms, and other agents make. Each of the major models is covered: logit, generalized extreme value, or GEV (including nested and cross-nested logits), probit, and mixed logit, plus a variety of specifications that build on these basics. Simulation-assisted estimation procedures are investigated and compared, including maximum simulated likelihood, method of simulated moments, and method of simulated scores. Procedures for drawing from densities are described, including variance reduction techniques such as antithetics and Halton draws. Recent advances in Bayesian procedures are explored, including the use of the Metropolis-Hastings algorithm and its variant Gibbs sampling. The second edition adds chapters on endogeneity and expectation-maximization (EM) algorithms. No other book incorporates all these fields, which have arisen in the past 25 years. The procedures are applicable in many fields, including energy, transportation, environmental studies, health, labor, and marketing.

Many problems in the social sciences are amenable to analysis using the analytical tools of logit and probit models. Within this genre an important class of models are those of ordered and of multinomial models. This book explains what ordered and multinomial models are and also shows how to apply them to analyzing issues in the social sciences. In this two-volume set, Larry D. Barnett delves into the macrosociological sources of law concerned with society-important social activities in a structurally complex, democratically governed nation. Barnett explores why, when, and where particular proscriptions and prescriptions of law on key social activities arise, persist, and change. The first volume, *Societal Agents in Law: A Macrosociological Approach*, puts relevant doctrines of law into a macrosociological framework, uses the findings of quantitative research to formulate theorems that identify the impact of several society-level agents on doctrines of law, and takes the reader through a number of case analyses. The second volume, *Societal Agents in Law: Quantitative Research*, reports original multivariate statistical studies of sociological determinants of law on specific types of key social activities. Taken together, the two volumes offer an alternative to the almost-total monopoly of theory and descriptive scholarship in the macrosociology of law, comparative law, and history of law, and underscore the value of a mixed empirical/theoretical approach.

The linear regression model is the most commonly used statistical method in the social sciences. This book considers regression models that are appropriate when the dependent variable is censored, truncated, binary, ordinal, nominal, or count. I refer to these variables as categorical and limited dependent variables (hereafter CLDVs). Until recently, the greatest obstacle in using models for CLDVs was the lack of software that was flexible, stable, and easy to use. This limitation no longer applies since these models can be estimated routinely with standard software. Now, the greatest impediment is the complexity of the models and the difficulty in interpreting the results. The difficulties arise because most models for CLDVs are nonlinear.

This comprehensive edited volume is the first of its kind, designed to serve as a textbook for long-duration business analytics programs. It can also be used as a guide to the field by practitioners. The book has contributions from experts in top universities and industry. The editors have taken extreme care to ensure continuity across the chapters. The material is organized into three parts: A) Tools, B) Models and C) Applications. In Part A, the tools used by business analysts are described in detail. In Part B, these tools are applied to construct models used to solve business problems. Part C contains detailed applications in various functional areas of business and several case studies. Supporting material can be found in the appendices that develop the pre-requisites for the main text. Every chapter has a business orientation. Typically, each chapter begins with the description of business problems that are transformed into data questions; and methodology is developed to solve these questions. Data analysis is conducted using widely used software, the output and results are clearly explained at each stage of development. These are finally transformed into a business solution. The companion website provides examples, data sets and sample code for each chapter.

This is a short introduction to Maximum Likelihood (ML) Estimation. It provides a general modeling framework that utilizes the tools of ML methods to outline a flexible modeling strategy that accommodates cases from the simplest linear models (such as the normal error regression model) to the most complex nonlinear models linking endogenous and exogenous variables with non-normal distributions. Using examples to illustrate the techniques of finding ML estimators and estimates, the author discusses what properties are desirable in an estimator, basic techniques for finding maximum likelihood solutions, the general form of the covariance matrix for ML estimates, the sampling distribution of ML estimators; the use of ML in the normal as well as other distributions, and some useful illustrations of likelihoods.

"This is a solid text that walks students through the entire process of empirical, quantitative research methods in political science without being too math-heavy. Students will be able to read this book and come away with an increased understanding of how we use research methods in political science." —Amanda M. Rosen, Webster University Understand the "how" and the "why" behind research in political science. Political Science Research Methods helps students to understand the logic behind research design by guiding them through a step-by-step process that explains when and why a researcher would pursue different kinds of methods. The highly anticipated Ninth Edition of this trusted resource provides more international examples, an increased focus on the role ethics play in the research process, increased attention to qualitative research methods, and expanded coverage on the role of the internet in research and analysis. A Complete Teaching & Learning Package SAGE coursepacks FREE! Easily import our quality instructor and student resource content into your school's learning management system (LMS) and save time. Learn more. SAGE edge FREE online resources for students that make learning easier. See how your students benefit. Bundle with the accompanying workbook for only \$15 more! Working with Political Science Research Methods, Fifth Edition offers students multiple opportunities to practice each of the methods presented in the core text. This helpful supplement breaks each aspect of the research process into manageable parts and features new exercises and updated data sets. A solutions manual with answers to the workbook is available to adopters. Your students save when you order the workbook bundled with the text. Use bundle ISBN 978-1-5443-3157-7.

'The editors of the new SAGE Handbook of Regression Analysis and Causal Inference have assembled a wide-ranging, high-quality, and timely collection of articles on topics of central importance to quantitative social research, many written by leaders in the field. Everyone engaged in statistical analysis of social-science data will find something of interest in this book.' - John Fox, Professor, Department of Sociology, McMaster University 'The authors do a great job in explaining the various statistical methods in a clear and simple way - focussing on fundamental understanding, interpretation of results, and practical application - yet being precise in their exposition.' - Ben Jann, Executive Director, Institute of Sociology, University of Bern 'Best and Wolf have put together a powerful collection, especially valuable in its separate discussions of uses for both cross-sectional and panel data analysis.' -Tom Smith, Senior Fellow, NORC, University of Chicago Edited and written by a team of leading international social scientists, this Handbook provides a comprehensive introduction to multivariate methods. The Handbook focuses on regression analysis of cross-sectional and longitudinal data with an emphasis on causal analysis, thereby covering a large number of different techniques including selection models, complex samples, and regression discontinuities. Each Part starts with a non-mathematical introduction to the method covered in that section, giving readers a basic knowledge of the method's logic, scope and unique features. Next, the mathematical and statistical basis of each method is presented along with advanced aspects. Using real-world data from the European Social Survey (ESS) and the Socio-Economic Panel (GSOEP), the book provides a comprehensive discussion of each method's application, making this an ideal text for PhD students and researchers embarking on their own data analysis.

Research today demands the application of sophisticated and powerful research tools. Fulfilling this need, The Oxford Handbook of Quantitative Methods is the complete tool box to deliver the most valid and generalizable answers to today's complex research questions. It is a one-stop source for learning and reviewing current best-practices in quantitative methods as practiced in the social, behavioral, and educational sciences. Comprising two volumes, this handbook covers a wealth of topics related to quantitative research methods. It begins with essential philosophical and ethical issues related to science and quantitative research. It then addresses core measurement topics before delving into the design of studies. Principal issues related to modern estimation and mathematical modeling are also detailed. Topics in the handbook then segway into the realm of statistical inference and modeling with chapters dedicated to classical approaches as well as modern latent variable approaches. Numerous chapters associated with longitudinal data and more specialized techniques round out this broad selection of topics. Comprehensive, authoritative, and user-friendly, this two-volume set will be an indispensable resource for serious researchers across the social, behavioral, and educational sciences.

"The first encyclopedia to cover inclusively both quantitative and qualitative research approaches, this set provides clear explanations of 1,000 methodologies, avoiding mathematical equations when possible with liberal cross-referencing and bibliographies. Each volume includes a list of works cited, and the third contains a comprehensive index and lists of person names, organizations, books, tests, software, major concepts, surveys, and methodologies."--"Reference that rocks," American Libraries, May 2005.

This first textbook on multi-relational data mining and inductive logic programming provides a complete overview of the field. It is self-contained and easily accessible for graduate students and practitioners of data mining and machine learning.

Research in social and behavioral sciences has benefited from linear regression models (LRMs) for decades to identify and understand the associations among a set of explanatory variables and an outcome variable. Linear Regression Models: Applications in R provides you with a comprehensive treatment of these models and indispensable guidance about how to estimate them using the R software environment. After furnishing some background material, the author explains how to estimate simple and multiple LRMs in R, including how to interpret their coefficients and understand their assumptions. Several chapters thoroughly describe these assumptions and explain how to determine whether they are satisfied and how to modify the regression model if they are not. The book also includes chapters on specifying the correct model, adjusting for measurement error, understanding the effects of influential observations, and using the model with multilevel data. The concluding chapter presents an alternative model—logistic regression—designed for binary or two-category outcome variables. The book includes appendices that discuss data management and missing data and provides simulations in R to test model assumptions. Features Furnishes a thorough introduction and detailed information about the linear regression model, including how to understand and interpret its results, test assumptions, and adapt the model when assumptions are not satisfied. Uses numerous graphs in R to illustrate the model's

results, assumptions, and other features. Does not assume a background in calculus or linear algebra, rather, an introductory statistics course and familiarity with elementary algebra are sufficient. Provides many examples using real-world datasets relevant to various academic disciplines. Fully integrates the R software environment in its numerous examples. The book is aimed primarily at advanced undergraduate and graduate students in social, behavioral, health sciences, and related disciplines, taking a first course in linear regression. It could also be used for self-study and would make an excellent reference for any researcher in these fields. The R code and detailed examples provided throughout the book equip the reader with an excellent set of tools for conducting research on numerous social and behavioral phenomena. John P. Hoffmann is a professor of sociology at Brigham Young University where he teaches research methods and applied statistics courses and conducts research on substance use and criminal behavior.

Practical, example-driven introduction to maximum likelihood for the social sciences. Emphasizes computation in R, model selection and interpretation.

Contributions to Statistics focuses on the processes, methodologies, and approaches involved in statistics. The book is presented to Professor P. C. Mahalanobis on the occasion of his 70th birthday. The selection first offers information on the recovery of ancillary information and combinatorial properties of partially balanced designs and association schemes. Discussions focus on combinatorial applications of the algebra of association matrices, sample size analogy, association matrices and the algebra of association schemes, and conceptual statistical experiments. The book then examines lattice sampling by means of Lahiri's sampling scheme; contributions of interpenetrating networks of samples; and apparently unconnected problems encountered in sampling work. The publication takes a look at screening processes, place of the design of experiments in the logic of scientific inference, and rarefaction. Topics include mathematical probability, scientific experience, combinatorial progress, gains and losses, criterion and scores, simple drug screening process, and screening of crop varieties. The manuscript then reviews the estimation and interpretation of gross differences and the simple response variance; partially balanced asymmetrical factorial designs; and approximation of distributions of sums of independent summands by infinitely divisible distributions. The selection is a dependable reference for statisticians and researchers interested in the processes, methodologies, and approaches employed in statistics.

Paleodemography is the field of enquiry that attempts to identify demographic parameters from past populations (usually skeletal samples) derived from archaeological contexts, and then to make interpretations regarding the health and well-being of those populations. However, paleodemographic theory relies on several assumptions that cannot easily be validated by the researcher, and if incorrect, can lead to large errors or biases. In this book, physical anthropologists, mathematical demographers and statisticians tackle these methodological issues for reconstructing demographic structure for skeletal samples. Topics discussed include how skeletal morphology is linked to chronological age, assessment of age from the skeleton, demographic models of mortality and their interpretation, and biostatistical approaches to age structure estimation from archaeological samples. This work will be of immense importance to anyone interested in paleodemography, including biological and physical anthropologists, demographers, geographers, evolutionary biologists and statisticians.

In this revised second edition, Baggio and Klobas build upon the work of their previous volume, offering a presentation of quantitative research methods for tourism researchers. This accessible and rigorous guide goes beyond the approaches usually covered in introductory textbooks on quantitative methods to consider useful techniques for statistical inquiry into tourism matters of all but the most econometrically complex kind. The first part of the book concerns common issues in statistical analysis of data and the most widely-used techniques, while the second part describes and discusses several newer and less common approaches to data analysis that are valuable for tourism researchers and analysts. Updates to the second edition include: • a new chapter on "Big Data" • consideration of data screening and cleaning • the use of similarity and diversity indexes for comparing samples • observations about the partial least squares (PLS) approach to path modelling • a new section on multi-group structural equation modelling • a new section on common method variance and its treatment • revised and updated section on software • fully updated references and examples

The book explores object and situation fusion processes with an appropriate handling of uncertainties, and applies cutting-edge artificial intelligence and emerging technologies like particle filtering, spatiotemporal clustering, net-centricity, agent formalism, and distributed fusion together with essential Level 1 techniques and Level 1/2 interactions.

In this volume the underlying logic and practice of maximum likelihood (ML) estimation is made clear by providing a general modeling framework that utilizes the tools of ML methods. This framework offers readers a flexible modeling strategy since it accommodates cases from the simplest linear models to the most complex nonlinear models that link a system of endogenous and exogenous variables with non-normal distributions. Using examples to illustrate the techniques of finding ML estimators and estimates, Eliason discusses: what properties are desirable in an estimator; basic techniques for finding ML solutions; the general form of the covariance matrix for ML estimates; the sampling distribution of ML estimators; the application of ML in the normal distribution as well as in other useful distributions; and some helpful illustrations of likelihoods.

Methods of Statistical Model Estimation examines the most important and popular methods used to estimate parameters for statistical models and provide informative model summary statistics. Designed for R users, the book is also ideal for anyone wanting to better understand the algorithms used for statistical model fitting. The text presents algorithm This book provides an introduction to probabilistic inductive logic programming. It places emphasis on the methods based on logic programming principles and covers formalisms and systems, implementations and applications, as well as theory.

Item response theory (IRT) has moved beyond the confines of educational measurement into assessment domains such as personality, psychopathology, and patient-reported outcomes. Classic and emerging IRT methods and applications that are revolutionizing psychological measurement, particularly for health assessments used to demonstrate treatment effectiveness, are reviewed in this new volume. World renowned contributors present the latest research and methodologies about these models along with their applications and related challenges. Examples using real data, some from NIH-PROMIS, show how to apply these models in actual research situations. Chapters review fundamental issues of IRT, modern estimation methods, testing assumptions, evaluating fit, item banking, scoring in multidimensional models, and advanced IRT methods. New

multidimensional models are provided along with suggestions for deciding among the family of IRT models available. Each chapter provides an introduction, describes state-of-the-art research methods, demonstrates an application, and provides a summary. The book addresses the most critical IRT conceptual and statistical issues confronting researchers and advanced students in psychology, education, and medicine today. Although the chapters highlight health outcomes data the issues addressed are relevant to any content domain. The book addresses: IRT models applied to non-educational data especially patient reported outcomes Differences between cognitive and non-cognitive constructs and the challenges these bring to modeling. The application of multidimensional IRT models designed to capture typical performance data. Cutting-edge methods for deriving a single latent dimension from multidimensional data A new model designed for the measurement of constructs that are defined on one end of a continuum such as substance abuse Scoring individuals under different multidimensional IRT models and item banking for patient-reported health outcomes How to evaluate measurement invariance, diagnose problems with response categories, and assess growth and change. Part 1 reviews fundamental topics such as assumption testing, parameter estimation, and the assessment of model and person fit. New, emerging, and classic IRT models including modeling multidimensional data and the use of new IRT models in typical performance measurement contexts are examined in Part 2. Part 3 reviews the major applications of IRT models such as scoring, item banking for patient-reported health outcomes, evaluating measurement invariance, linking scales to a common metric, and measuring growth and change. The book concludes with a look at future IRT applications in health outcomes measurement. The book summarizes the latest advances and critiques foundational topics such a multidimensionality, assessment of fit, handling non-normality, as well as applied topics such as differential item functioning and multidimensional linking. Intended for researchers, advanced students, and practitioners in psychology, education, and medicine interested in applying IRT methods, this book also serves as a text in advanced graduate courses on IRT or measurement. Familiarity with factor analysis, latent variables, IRT, and basic measurement theory is assumed.

Hayduk is equally at ease explaining the simplest and most advanced applications of the program . . . Hayduk has written more than just a solid text for use in advanced graduate courses on statistical modeling. Those with a firm mathematical background who wish to learn about the approach, or those who know a little about the program and want to know more, will find this an excellent reference.

This book takes a fresh look at the popular and well-established method of maximum likelihood for statistical estimation and inference. It begins with an intuitive introduction to the concepts and background of likelihood, and moves through to the latest developments in maximum likelihood methodology, including general latent variable models and new material for the practical implementation of integrated likelihood using the free ADMB software. Fundamental issues of statistical inference are also examined, with a presentation of some of the philosophical debates underlying the choice of statistical paradigm. Key features: Provides an accessible introduction to pragmatic maximum likelihood modelling. Covers more advanced topics, including general forms of latent variable models (including non-linear and non-normal mixed-effects and state-space models) and the use of maximum likelihood variants, such as estimating equations, conditional likelihood, restricted likelihood and integrated likelihood. Adopts a practical approach, with a focus on providing the relevant tools required by researchers and practitioners who collect and analyze real data. Presents numerous examples and case studies across a wide range of applications including medicine, biology and ecology. Features applications from a range of disciplines, with implementation in R, SAS and/or ADMB. Provides all program code and software extensions on a supporting website. Confines supporting theory to the final chapters to maintain a readable and pragmatic focus of the preceding chapters. This book is not just an accessible and practical text about maximum likelihood, it is a comprehensive guide to modern maximum likelihood estimation and inference. It will be of interest to readers of all levels, from novice to expert. It will be of great benefit to researchers, and to students of statistics from senior undergraduate to graduate level. For use as a course text, exercises are provided at the end of each chapter.

Talks about Logic Programming, Uncertainty Reasoning and Machine Learning. This book includes definitions that circumscribe the area formed by extending Inductive Logic Programming to cases annotated with probability values. It investigates the approach of Learning from proofs and the issue of upgrading Fisher Kernels to Relational Fisher Kernels.

Researchers across the natural and social sciences find themselves navigating tremendous amounts of new data. Making sense of this flood of information requires more than the rote application of formulaic statistical methods. The premise of *Statistical Thinking from Scratch* is that students who want to become confident data analysts are better served by a deep introduction to a single statistical method than by a cursory overview of many methods. In particular, this book focuses on simple linear regression—a method with close connections to the most important tools in applied statistics—using it as a detailed case study for teaching resampling-based, likelihood-based, and Bayesian approaches to statistical inference. Considering simple linear regression in depth imparts an idea of how statistical procedures are designed, a flavour for the philosophical positions one assumes when applying statistics, and tools to probe the strengths of one's statistical approach. Key to the book's novel approach is its mathematical level, which is gentler than most texts for statisticians but more rigorous than most introductory texts for non-statisticians. *Statistical Thinking from Scratch* is suitable for senior undergraduate and beginning graduate students, professional researchers, and practitioners seeking to improve their understanding of statistical methods across the natural and social sciences, medicine, psychology, public health, business, and other fields.

Provides an introduction to modern statistical theory for social and health scientists while invoking minimal modeling assumptions.

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