Maximum Likelihood And Non Linear Estimation In Stata By

This book provides a comprehensive study of nonlinear estimating equations and artificial likelihoods for statistical inference. It includes a variety of examples from practical applications and is ideal for research statisticians and advanced graduate students. 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.

The papers in this volume emphasize the numerical aspects of three main areas: optimization, linear algebra and partial differential equations. Held in January, 1989, in Yucatan, Mexico, the workshop was organized by the Institute for Research in Applied Mathematics of the National University of Mexico in collaboration with the mathematical Sciences Department at Rice University.

This book is intended for second year graduate students and professionals who have an interest in linear and nonlinear simultaneous equations mod els. It basically traces the evolution of econometrics beyond the general linear model (GLM), beginning with the general linear structural econo metric model (GLSEM) and ending with the generalized method of mo ments (GMM). Thus, it covers the identification problem (Chapter 3), maximum likelihood (ML) methods (Chapters 3 and 4), two and three stage least squares (2SLS, 3SLS) (Chapters 1 and 2), the general nonlinear model (GNLM) (Chapter 5), the general nonlinear simultaneous equations model (GNLSEM), the special ca'3e of GNLSEM with additive errors, non linear two and three stage least squares (NL2SLS, NL3SLS), the GMM for GNLSEIVI, and finally ends with a brief overview of causality and re lated issues, (Chapter 6). There is no discussion either of limited dependent variables, or of unit root related topics. It also contains a number of significant innovations. In a departure from the custom of the literature, identification and consistency for nonlinear models is handled through the Kullback information apparatus, as well as the theory of minimum contrast (MC) estimators. In fact, nearly all estimation problems handled in this volume can be approached through the theory of MC estimators. The power of this approach is demonstrated in Chapter 5, where the entire set of identification requirements for the GLSEM, in an ML context, is obtained almost effortlessly, through the apparatus of Kullback information.

Many relationships in economics, and also in other fields, are both dynamic and nonlinear. A major advance in econometrics over the last fifteen years has been the development of a theory of estimation and inference for dy namic nonlinear models. This advance was accompanied by improvements in computer technology that facilitate the practical implementation of such estimation methods. In two articles in Econometric Reviews, i.e., Pötscher and Prucha {1991a,b), we provided -an expository discussion of the basic structure of the asymptotic theory of M-estimators in dynamic nonlinear models and a review of the literature up to the beginning of this decade. Among others, the class of M-estimators contains least mean distance estimators (includ ing maximum likelihood estimators) and generalized method of moment estimators. The present book expands and revises the discussion in those articles. It is geared towards the professional econometrician or statistician. Besides reviewing the literature we also presented in the above men tioned articles a number of then new results. One example is a consis tency result for the case where the identifiable uniqueness condition fails.

A solution method and an estimation method for nonlinear rational expectations models are presented in this paper. The solution method can be used in forecasting and policy applications and can handle models with serial correlation and multiple viewpoint dates. When applied to linear models, the solution method yields the same results as those obtained from currently available methods that are designed specifically for linear models. It is, however, more flexible and general than these methods. For large nonlinear models the results in this paper indicate that the method works quite well. The estimation method is based on the maximum likelihood principal. It is, as far as we know, the only method available for obtaining maximum likelihood estimates for nonlinear rational expectations models. The method has the advantage of being applicable to a wide range of models, including, as a special case, linear , models. The method can also handle different assumptions about the expectations of the exogenous variables, something which is not true of currently available approaches to linear models.

This book gives a comprehensive introduction to exponential family nonlinear models, which are the natural extension of generalized linear models and normal nonlinear regression models. The differential geometric framework is presented for these models and geometric methods are widely used in this book. This book is ideally suited for researchers in statistical interfaces and graduate students with a basic knowledge of statistics.

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.

The advent of electronic computing permits the empirical analysis of economic models of far greater subtlety and rigour than before, when many interesting ideas were not followed up because the calculations involved made this impracticable. The estimation and testing of these more intricate models is usually based on the method of Maximum Likelihood, which is a well-established branch of mathematical statistics. Its use in econometrics has led to the development of a number of special techniques; the specific conditions of econometric research moreover demand certain changes in the interpretation of the basic argument. This book is a self-contained introduction to this field. It consists of three parts. The first deals with general features of Maximum Likelihood methods; the second with linear and nonlinear regression; and the third with discrete choice and related micro-economic models. Readers should already be familiar with elementary statistical theory, with applied econometric research papers, or with the literature on the mathematical basis of Maximum Likelihood theory. They can also try their hand at some advanced econometric research of their own.

This book provides a detailed survey of the methods that were recently developed to handle advanced versions of the blind source separation problem, which involve several types of nonlinear mixtures. Another attractive feature of the book is that it is based on a coherent framework. More precisely, the authors first present a general procedure for developing blind source separation methods. Then, all reported methods are defined with respect to this procedure. This allows the reader not only to more easily follow the description of each method but also to see how these methods relate to one another. The coherence of this book also results from the fact that the same notations are used throughout the chapters for the quantities (source signals and so on) that are used in various methods. Finally, among the quite varied types of processing methods that are presented in this book, a significant part of this description is dedicated to methods based on artificial neural networks, especially recurrent ones, which are currently of high interest to the data analysis and machine learning community in general, beyond the more specific signal processing and blind source separation communities. Presents advanced configurations of the blind source separation problem, involving bilinear, linear-quadratic and polynomial mixing models; Provides a detailed and coherent description of the methods reported in the literature for handling these types of mixing phenomena; Focuses on complex configurations involving nonlinear mixing transforms.

Numerical Methods of StatisticsCambridge University Press

Non-Linear Estimation is a handbook for the practical statistician or modeller interested in fitting and interpreting non-linear models with the aid of a computer. A major theme of the book is the use of 'stable parameter systems'; these provide rapid convergence of optimization algorithms, more reliable dispersion matrices and confidence regions for parameters, and easier comparison of rival models. The book provides insights into why some models are difficult to fit, how to combine fits over different data sets, how to improve data collection to reduce prediction variance, and how to program particular models to handle a full range of data sets. The book combines an algebraic, a geometric and a computational approach, and is illustrated with practical examples. A final chapter shows how this approach is implemented in the author's Maximum Likelihood Program, MLP.

This book presents some of the more recent developments in nonlinear time series, including Bayesian analysis and cointegration tests.

A method is given for determining the system state using noise-corrupted observations of a non-linear dynamic invector process, with a numerical application to radar observation of a reentry body. The study examined the feasibility of numerically solving the vector-differential equations satisfied by the maximum-likelihood estimator. The maximum-likelihood estimate is that initial condition which minimizes a certain functional on itself, on the observation, and on the a priori statistics.

A computer program has been developed for the Maximum Likelihood estimation of parameters in general non-linear systems. Sensitivity matrix elements are calculated numerically, overcoming the need for explicit sensitivity equations. Parameters such as break points and time shifts are successfully determined using both simulated and actual test data. Keywords: Non linear systems, Time lag, Drop tests, Parameter estimation, Maximum likelihood, Landing gear.

The collection investigates parametric, semiparametric, nonparametric, and nonlinear estimation techniques in statistical modeling.

WILEY-INTERSCIENCE PAPERBACK SERIES The Wiley-Interscience Paperback Series consists of selected books that have been made more accessible to consumers in an effort to increase global appeal and general circulation. With these new unabridged softcover volumes, Wiley hopes to extend the lives of these works by making them available to future generations of statisticians, mathematicians, and scientists. From the Reviews of Nonlinear Regression "A very good book and an important one in that it is likely to become a standard reference for all interested in nonlinear regression; and I would imagine that any statistician concerned with nonlinear regression would want a copy on his shelves." –The Statistician "Nonlinear Regression also includes a reference list of over 700 entries. The compilation of this material and cross-referencing of it is one of the most valuable aspects of the book. Nonlinear Regression can provide the researcher unfamiliar with a particular specialty area of nonlinear regression an introduction to that area of nonlinear regression and access to the appropriate references . . . Nonlinear Regression provides by far the broadest discussion of nonlinear regression models currently available and will be a valuable addition to the library of anyone

interested in understanding and using such models including the statistical researcher." –Mathematical Reviews
Five methods of parameter estimation for the two parameter Weibull distribution are investigated using simulation. They are: Non-Linear Regression, Log-Linearization, Weighted Least Squares, Generalized Least Squares, and Method of Moments. Effects of contamination and censoring of data as well as robustness of the methods were investigated. Weighted Least Squares seemed to be the most cost-effective method and Nonlinear Regression was the most robust. (Author).

This volume corresponds to the invited lectures and advanced research papers presented at the NATD Advanced Study Institute on Nonlinear Stochastic Problems with emphasis on Identification, Signal Processing, Control and Nonlinear Filtering held in Algarve (Portugal), on May 1982. The book is a blend of theoretical issues, algorithmic implementation aspects, and application examples. In many areas of science and engineering, there are problems which are intrinsically nonlinear 3nd stochastic in nature. Clear examples arise in identification and mOdeling, signal processing, nonlinear filtering, stochastic and adaptive conLrol. The meeting was organized because it was felt that there is a need for discussion of the methods and philosophy underlying these different areas, and in order to communicate those approaches that have proven to be effective. As the computational technology progresses, more general approaches to a number of problems which have been treated previously by linearization and perturbation methods become feasible and rewarding.

This 2001 book provides a basic background in numerical analysis and its applications in statistics.

Statistical Tools for Nonlinear Regression presents methods for analyzing data. It has been expanded to include binomial, multinomial and Poisson non-linear models. The examples are analyzed with the free software nls2 updated to deal with the new models included in the second edition. The nls2 package is implemented in S-PLUS and R. Several additional tools are included in the package for calculating confidence regions for functions of parameters or calibration intervals, using classical methodology or bootstrap.

Block-oriented Nonlinear System Identification deals with an area of research that has been very active since the turn of the millennium. The book makes a pedagogical and cohesive presentation of the methods developed in that time. These include: iterative and over-parameterization techniques; stochastic and frequency approaches; support-vector-machine, subspace, and separable-least-squares methods; blind identification method; bounded-error method; and decoupling inputs approach. The identification methods are presented by authors who have either invented them or contributed significantly to their development. All the important issues e.g., input design, persistent excitation, and consistency analysis, are discussed. The practical relevance of block-oriented models is illustrated through biomedical/physiological system modelling. The book will be of major interest to all those who are concerned with nonlinear system identification whatever their activity areas. This is particularly the case for educators in electrical, mechanical, chemical and biomedical engineering and for practising engineers in process, aeronautic, aerospace, robotics and vehicles control. Block-oriented Nonlinear System Identification serves as a reference for active researchers, new comers, industrial and education practitioners and graduate students alike.

This book explains how computer software is designed to perform the tasks required for sophisticated statistical analysis. For statisticians, it examines the nitty-gritty computational problems behind statistical methods. For mathematicians and computer scientists, it looks at the application of mathematical tools to statistical problems. The first half of the book offers a basic background in numerical analysis that emphasizes issues important to statisticians. The next several chapters cover a broad array of statistical tools, such as maximum likelihood and nonlinear regression. The author also treats the application of numerical tools; numerical integration and random number generation are explained in a unified manner reflecting complementary views of Monte Carlo methods. Each chapter contains exercises that range from simple questions to research problems. Most of the examples are accompanied by demonstration and source code available from the author's website. New in this second edition are demonstrations coded in R, as well as new sections on linear programming and the Nelder–Mead search algorithm.

This intriguing book constitutes the thoroughly refereed postproceedings of the International Conference on Non-Linear Speech Processing, NOLISP 2007, held in Paris, France, in May 2007. The 24 revised full papers presented were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections on nonlinear and non-conventional techniques, speech synthesis, speaker recognition, speech recognition, and many other subjects.

The topics of maximum likelihood estimation and nonlinear programming are developed thoroughly with emphasis on the numerical details of obtaining estimates from highly nonlinear models. Parametric estimation is discussed with the three parameter Weibull family of densities serving as an example. A general nonlinear programming method is discussed for both first and second order representations of the maximum likelihood estimaton, as well as a hybrid of both approaches. A new class of constrained parametric estimators is introduced with numerical methods for their determination. Structural estimation with maximum likelihood is examined, and a Bernoulli regression technique is presented.

The relationship between the (generalized) mean Kullback-Leibler's information and the (generalized) maximum likelihood principle is exploited in this report to analyze the state estimation problems of both discrete-time and continuous-time uncertain non-linear systems. (Author).