The Laplace Distribution And Generalizations A Revisit With Applications To Communications Economics Engineering And Finance Progress In Mathematics S

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Trends and Perspectives in Linear Statistical Inference - Müjgan Tez 2018-02-01
This volume features selected contributions on a variety of topics related to linear statistical inference. The peer-reviewed papers from the International Conference on Trends and Perspectives in Linear Statistical Inference (LinStat 2016) held in Istanbul, Turkey, 22-25 August 2016, cover topics in both theoretical and applied statistics, such as linear models, high-dimensional statistics, computational statistics, the design of experiments, and multivariate analysis. The book is intended for statisticians, Ph.D. students, and professionals who are interested in statistical inference.

Topics in Identification, Limited Dependent Variables, Partial Observability, Experimentation, and Flexible Modeling - Ivan Jeliazkov 2019-10-18
Volume 40B of Advances in Econometrics examines innovations in stochastic frontier analysis, nonparametric and semiparametric modeling and estimation, A/B experiments, big-data analysis, and quantile regression.

Causal Inference in Econometrics - Van-Nam Huynh 2015-12-28
This book is devoted to the analysis of causal inference which is one of the most difficult tasks in data analysis: when two phenomena are observed to be related, it is often difficult to decide whether one of them causally influences the other one, or whether these two phenomena have a common cause. This analysis is the main focus of this volume. To get a good understanding of the causal inference, it is important to have models of economic phenomena which are as accurate as possible. Because of this need, this volume also contains papers that use non-traditional economic models, such as fuzzy models and models obtained by using neural networks and data mining techniques. It also contains papers that apply different econometric models to analyze real-life economic dependencies.

Discrete Wavelet Transforms - Hannu Olkkonen 2011-08-29
The discrete wavelet transform (DWT) algorithms have a firm position in processing of signals in several areas of research and industry. As DWT provides both octave-scale frequency and spatial timing of the analyzed signal, it is constantly used to solve and treat more and more advanced problems. The present book: Discrete Wavelet Transforms: Algorithms and Applications reviews the recent progress in discrete wavelet transform algorithms and applications. The book covers a wide range of methods (e.g. lifting, shift invariance, multi-scale analysis) for constructing DWTs. The book chapters are organized into four major parts. Part I describes the progress in hardware implementations of the DWT algorithms. Applications include multitone modulation for ADSL and equalization techniques, a scalable architecture for FPGA-implementation, lifting based algorithm for VLSI implementation, comparison between DWT and FFT based OFDM and modified SPIHT codec. Part II addresses image processing algorithms such as multiresolution approach for edge detection, low bit rate image compression, low complexity implementation of CQF wavelets and compression of multi-component images. Part III focuses watermaking DWT algorithms. Finally, Part IV describes shift invariant DWTs, DC lossless property, DWT based analysis and estimation of colored noise and an application of the wavelet Galerkin method. The chapters of the present book consist of both tutorial and highly advanced material. Therefore, the book is intended to be a reference text for graduate students and researchers to obtain state-of-the-art knowledge on specific applications.

The Laplace Distribution and Generalizations - Samuel Kotz 2012-12-06
This book describes the inferential and modeling advantages that this distribution, together with its generalizations and modifications, offers. The

exposition systematically unfolds with many examples, tables, illustrations, and exercises. A comprehensive index and extensive bibliography also make this book an ideal text for a senior undergraduate and graduate seminar on statistical distributions, or for a short half-term academic course in statistics, applied probability, and finance.

Big and Complex Data Analysis - S. Ejaz Ahmed 2017-03-21

This volume conveys some of the surprises, puzzles and success stories in high-dimensional and complex data analysis and related fields. Its peer-reviewed contributions showcase recent advances in variable selection, estimation and prediction strategies for a host of useful models, as well as essential new developments in the field. The continued and rapid advancement of modern technology now allows scientists to collect data of increasingly unprecedented size and complexity. Examples include epigenomic data, genomic data, proteomic data, high-resolution image data, high-frequency financial data, functional and longitudinal data, and network data. Simultaneous variable selection and estimation is one of the key statistical problems involved in analyzing such big and complex data. The purpose of this book is to stimulate research and foster interaction between researchers in the area of high-dimensional data analysis. More concretely, its goals are to: 1) highlight and expand the breadth of existing methods in big data and high-dimensional data analysis and their potential for the advancement of both the mathematical and statistical sciences; 2) identify important directions for future research in the theory of regularization methods, in algorithmic development, and in methodologies for different application areas; and 3) facilitate collaboration between theoretical and subject-specific researchers.

Mathematical and Statistical Methods for Actuarial Sciences and Finance - Marco Corazza

2021-12-13

The cooperation and contamination between mathematicians, statisticians and econometricians working in actuarial sciences and finance is improving the research on these topics and producing numerous meaningful scientific results. This volume presents new ideas, in the form of four- to six-page papers, presented at the International Conference eMAF2020 – Mathematical and Statistical Methods for Actuarial Sciences and Finance. Due to the now sadly famous COVID-19 pandemic, the conference was held remotely through the Zoom platform offered by the Department of Economics of the Ca' Foscari University of Venice on September 18, 22 and 25, 2020. eMAF2020 is the ninth edition of an international biennial series of scientific meetings, started in 2004 at the initiative of the Department of Economics and Statistics of the University of Salerno. The effectiveness of this idea has been proven by wide participation in all editions, which have been held in Salerno (2004, 2006, 2010 and 2014), Venice (2008, 2012 and 2020), Paris (2016) and Madrid (2018). This book covers a wide variety of subjects: artificial intelligence and machine learning in finance and insurance, behavioral finance, credit risk methods and models, dynamic optimization in finance, financial data analytics, forecasting dynamics of actuarial and financial phenomena, foreign exchange markets, insurance models, interest rate models, longevity risk, models and methods for financial time series analysis, multivariate techniques for financial markets analysis, pension systems, portfolio selection and management, real-world finance, risk analysis and management, trading systems, and others. This volume is a valuable resource for academics, PhD students, practitioners, professionals and researchers. Moreover, it is also of interest to other readers with quantitative background knowledge.

Handbooks in Operations Research and

Management Science: Simulation - Shane G. Henderson 2006-09-02
This Handbook is a collection of chapters on key issues in the design and analysis of computer simulation experiments on models of stochastic systems. The chapters are tightly focused and written by experts in each area. For the purpose of this volume "simulation refers to the analysis of stochastic processes through the generation of sample paths (realization) of the processes. Attention focuses on design and analysis issues and the goal of this volume is to survey the concepts, principles, tools and techniques that underlie the theory and practice of stochastic simulation design and analysis. Emphasis is placed on the ideas and methods that are likely to remain an intrinsic part of the foundation of the field for the foreseeable future. The chapters provide up-to-date references for both the simulation researcher and the advanced simulation user, but they do not constitute an introductory level 'how to' guide. Computer scientists, financial analysts, industrial engineers, management scientists, operations researchers and many other professionals use stochastic simulation to design, understand and improve communications, financial, manufacturing, logistics, and service systems. A theme that runs throughout these diverse applications is the need to evaluate system performance in the face of uncertainty, including uncertainty in user load, interest rates, demand for product, availability of goods, cost of transportation and equipment failures. * Tightly focused chapters written by experts * Surveys concepts, principles, tools, and techniques that underlie the theory and practice of stochastic simulation design and analysis * Provides an up-to-date reference for both simulation researchers and advanced simulation users

Analytical and Computational Methods in Probability Theory - Vladimir V. Rykov 2017-12-21
This book constitutes the refereed proceedings

of the First International Conference on Analytical and Computational Methods in Probability Theory and its Applications, ACMPT 2017, held in Moscow, Russia, in October 2017. The 42 full papers presented were carefully reviewed and selected from 173 submissions. The conference program consisted of four main themes associated with significant contributions made by A.D.Soloviev. These are: Analytical methods in probability theory, Computational methods in probability theory, Asymptotical methods in probability theory, the history of mathematics.

Handbook of Heavy Tailed Distributions in Finance - S.T Rachev 2003-03-05
The Handbooks in Finance are intended to be a definitive source for comprehensive and accessible information in the field of finance. Each individual volume in the series should present an accurate self-contained survey of a sub-field of finance, suitable for use by finance and economics professors and lecturers, professional researchers, graduate students and as a teaching supplement. The goal is to have a broad group of outstanding volumes in various areas of finance. The Handbook of Heavy Tailed Distributions in Finance is the first handbook to be published in this series. This volume presents current research focusing on heavy tailed distributions in finance. The contributions cover methodological issues, i.e., probabilistic, statistical and econometric modelling under non-Gaussian assumptions, as well as the applications of the stable and other non - Gaussian models in finance and risk management.

Heterogeneous Agent Modeling - Cars Hommes 2018-06-27
Handbook of Computational Economics: Heterogeneous Agent Modeling, Volume Four, focuses on heterogeneous agent models, emphasizing recent advances in macroeconomics (including DSGE), finance, empirical validation and experiments, networks

and related applications. Capturing the advances made since the publication of Volume Two (Tesfatsion & Judd, 2006), it provides high-level literature with sections devoted to Macroeconomics, Finance, Empirical Validation and Experiments, Networks, and other applications, including Innovation Diffusion in Heterogeneous Populations, Market Design and Electricity Markets, and a final section on Perspectives on Heterogeneity. Helps readers fully understand the dynamic properties of realistically rendered economic systems Emphasizes detailed specifications of structural conditions, institutional arrangements and behavioral dispositions Provides broad assessments that can lead researchers to recognize new synergies and opportunities

Handbook of Quantile Regression - Roger Koenker 2017-10-12

Quantile regression constitutes an ensemble of statistical techniques intended to estimate and draw inferences about conditional quantile functions. Median regression, as introduced in the 18th century by Boscovich and Laplace, is a special case. In contrast to conventional mean regression that minimizes sums of squared residuals, median regression minimizes sums of absolute residuals; quantile regression simply replaces symmetric absolute loss by asymmetric linear loss. Since its introduction in the 1970's by Koenker and Bassett, quantile regression has been gradually extended to a wide variety of data analytic settings including time series, survival analysis, and longitudinal data. By focusing attention on local slices of the conditional distribution of response variables it is capable of providing a more complete, more nuanced view of heterogeneous covariate effects. Applications of quantile regression can now be found throughout the sciences, including astrophysics, chemistry, ecology, economics, finance, genomics, medicine, and meteorology. Software for quantile regression is now widely available in all the major statistical computing

environments. The objective of this volume is to provide a comprehensive review of recent developments of quantile regression methodology illustrating its applicability in a wide range of scientific settings. The intended audience of the volume is researchers and graduate students across a diverse set of disciplines.

Journal of the American Statistical Association - 2002

Planning and Operation of Hybrid Renewable Energy Systems - Weihao Hu 2022-10-19

The Laplace Distribution and Generalizations - Samuel Kotz 2001-05-18 This book describes the inferential and modeling advantages that this distribution, together with its generalizations and modifications, offers. The exposition systematically unfolds with many examples, tables, illustrations, and exercises. A comprehensive index and extensive bibliography also make this book an ideal text for a senior undergraduate and graduate seminar on statistical distributions, or for a short half-term academic course in statistics, applied probability, and finance.

Applications of Characteristic Functions - Eugene Lukacs 1964

Extreme Financial Risks and Asset Allocation - Olivier Le Courtois 2014-01-21 Each financial crisis calls for — by its novelty and the mechanisms it shares with preceding crises — appropriate means to analyze financial risks. In Extreme Financial Risks and Asset Allocation, the authors present in an accessible and timely manner the concepts, methods, and techniques that are essential for an understanding of these risks in an environment where asset prices are subject to sudden, rough, and unpredictable changes. These phenomena, mathematically known as "jumps", play an important role in practice. Their quantitative

treatment is generally tricky and is sparsely tackled in similar books. One of the main appeals of this book lies in its approachable and concise presentation of the ad hoc mathematical tools without sacrificing the necessary rigor and precision. This book contains theories and methods which are usually found in highly technical mathematics books or in scattered, often very recent, research articles. It is a remarkable pedagogical work that makes these difficult results accessible to a large readership. Researchers, Masters and PhD students, and financial engineers alike will find this book highly useful. Contents:IntroductionMarket FrameworkStatistical Description of MarketsLévy ProcessesStable Distributions and ProcessesLaplace Distributions and ProcessesThe Time Change FrameworkTail DistributionsRisk BudgetsThe Psychology of RiskMonoperiodic Portfolio ChoiceDynamic Portfolio ChoiceConclusion Readership: Researchers, graduate students and financial engineers in the field of mathematical and quantitative finance. Key Features:This book offers an excellent synthesis of the academic literature in a clear, ordered, and intuitive wayThe continuous-time theory of the choice of portfolio is exposed with particular care when asset dynamics are modeled with processes admitting a jump component. This is a technically difficult topic that is tackled here with a lot of clarityThe collated works in this book facilitates access to the most recent techniques, making it user-friendly for readersKeywords:Lévy Process;Extreme Risks;Risk Management;Portfolio Management;Asset AllocationReviews: "A pedagogical work of updated financial models using Lévy processes. Very well written, very well explained and argued with examples and appropriate simulations. Recommended to academics, researchers and PhD students, slightly less to practitioners." Zentralblatt MATH
Advanced Multivariate Statistics with Matrices -

Tõnu Kollo 2006-03-30
The book presents important tools and techniques for treating problems in m- ern multivariate statistics in a systematic way. The ambition is to indicate new directions as well as to present the classical part of multivariate statistical analysis in this framework. The book has been written for graduate students and statis- cians who are not afraid of matrix formalism. The goal is to provide them with a powerful toolkit for their research and to give necessary background and deeper knowledge for further studies in di?erent areas of multivariate statistics. It can also be useful for researchers in applied mathematics and for people working on data analysis and data mining who can ?nd useful methods and ideas for solving their problems.

Ithasbeendesignedasatextbookforatwosemesterg raduatecourseonmultiva- ate statistics. Such a course has been held at the Swedish Agricultural University in 2001/02. On the other hand, it can be used as material for series of shorter courses. In fact, Chapters 1 and 2 have been used for a graduate course "Matrices in Statistics" at University of Tartu for the last few years, and Chapters 2 and 3 formed the material for the graduate course "Multivariate Asymptotic Statistics" in spring 2002. An advanced course "Multivariate Linear Models" may be based on Chapter 4. A lot of literature is available on multivariate statistical analysis written for di?- ent purposes and for people with di?erent interests, background and knowledge.

The Art of Progressive Censoring - N. Balakrishnan 2014-07-24
This book offers a thorough and updated guide to the theory and methods of progressive censoring, an area that has experienced tremendous growth over the last decade. The theory has developed quite nicely in some special cases having practical applications to reliability and quality. The Art of Progressive Censoring is a valuable reference for graduate

students, researchers, and practitioners in applied statistics, quality control, life testing, and reliability. With its accessible style and concrete examples, the work may also be used as a textbook in an advanced undergraduate or a beginning graduate course on censoring or progressive censoring, as well as a supplementary textbook for a course on ordered data.

Empirical Process Techniques for Dependent Data - Herold Dehling 2012-12-06 Empirical process techniques for independent data have been used for many years in statistics and probability theory. These techniques have proved very useful for studying asymptotic properties of parametric as well as non-parametric statistical procedures. Recently, the need to model the dependence structure in data sets from many different subject areas such as finance, insurance, and telecommunications has led to new developments concerning the empirical distribution function and the empirical process for dependent, mostly stationary sequences. This work gives an introduction to this new theory of empirical process techniques, which has so far been scattered in the statistical and probabilistic literature, and surveys the most recent developments in various related fields. Key features: A thorough and comprehensive introduction to the existing theory of empirical process techniques for dependent data * Accessible surveys by leading experts of the most recent developments in various related fields * Examines empirical process techniques for dependent data, useful for studying parametric and non-parametric statistical procedures * Comprehensive bibliographies * An overview of applications in various fields related to empirical processes: e.g., spectral analysis of time-series, the bootstrap for stationary sequences, extreme value theory, and the empirical process for mixing dependent observations, including the case of strong dependence. To date this book is

the only comprehensive treatment of the topic in book literature. It is an ideal introductory text that will serve as a reference or resource for classroom use in the areas of statistics, time-series analysis, extreme value theory, point process theory, and applied probability theory. Contributors: P. Ango Nze, M.A. Arcones, I. Berkes, R. Dahlhaus, J. Dedecker, H.G. Dehling,

Machine Learning - Kevin P. Murphy
2012-08-24
A comprehensive introduction to machine learning that uses probabilistic models and inference as a unifying approach. Today's Web-enabled deluge of electronic data calls for automated methods of data analysis. Machine learning provides these, developing methods that can automatically detect patterns in data and then use the uncovered patterns to predict future data. This textbook offers a comprehensive and self-contained introduction to the field of machine learning, based on a unified, probabilistic approach. The coverage combines breadth and depth, offering necessary background material on such topics as probability, optimization, and linear algebra as well as discussion of recent developments in the field, including conditional random fields, L1 regularization, and deep learning. The book is written in an informal, accessible style, complete with pseudo-code for the most important algorithms. All topics are copiously illustrated with color images and worked examples drawn from such application domains as biology, text processing, computer vision, and robotics. Rather than providing a cookbook of different heuristic methods, the book stresses a principled model-based approach, often using the language of graphical models to specify models in a concise and intuitive way. Almost all the models described have been implemented in a MATLAB software package—PMTK (probabilistic modeling toolkit)—that is freely available online. The book is suitable for upper-level undergraduates with an introductory-level

college math background and beginning graduate students.

Vector Generalized Linear and Additive Models - Thomas W. Yee 2015-09-11
This book presents a greatly enlarged statistical framework compared to generalized linear models (GLMs) with which to approach regression modelling. Comprising of about half-a-dozen major classes of statistical models, and fortified with necessary infrastructure to make the models more fully operable, the framework allows analyses based on many semi-traditional applied statistics models to be performed as a coherent whole. Since their advent in 1972, GLMs have unified important distributions under a single umbrella with enormous implications. However, GLMs are not flexible enough to cope with the demands of practical data analysis. And data-driven GLMs, in the form of generalized additive models (GAMs), are also largely confined to the exponential family. The methodology here and accompanying software (the extensive VGAM R package) are directed at these limitations and are described comprehensively for the first time in one volume. This book treats distributions and classical models as generalized regression models, and the result is a much broader application base for GLMs and GAMs. The book can be used in senior undergraduate or first-year postgraduate courses on GLMs or categorical data analysis and as a methodology resource for VGAM users. In the second part of the book, the R package VGAM allows readers to grasp immediately applications of the methodology. R code is integrated in the text, and datasets are used throughout. Potential applications include ecology, finance, biostatistics, and social sciences. The methodological contribution of this book stands alone and does not require use of the VGAM package.

Advances in Distribution Theory, Order Statistics, and Inference - N. Balakrishnan 2007-10-23

The purpose of this book is to honor the fundamental contributions to many different areas of statistics made by Barry Arnold. Distinguished and active researchers highlight some of the recent developments in statistical distribution theory, order statistics and their properties, as well as inferential methods associated with them. Applications to survival analysis, reliability, quality control, and environmental problems are emphasized.

Flexible Bayesian Regression Modelling - Yanan Fan 2019-10-30

Flexible Bayesian Regression Modeling is a step-by-step guide to the Bayesian revolution in regression modeling, for use in advanced econometric and statistical analysis where datasets are characterized by complexity, multiplicity, and large sample sizes, necessitating the need for considerable flexibility in modeling techniques. It reviews three forms of flexibility: methods which provide flexibility in their error distribution; methods which model non-central parts of the distribution (such as quantile regression); and finally models that allow the mean function to be flexible (such as spline models). Each chapter discusses the key aspects of fitting a regression model. R programs accompany the methods. This book is particularly relevant to non-specialist practitioners with intermediate mathematical training seeking to apply Bayesian approaches in economics, biology, finance, engineering and medicine. Introduces powerful new nonparametric Bayesian regression techniques to classically trained practitioners Focuses on approaches offering both superior power and methodological flexibility Supplemented with instructive and relevant R programs within the text Covers linear regression, nonlinear regression and quantile regression techniques Provides diverse disciplinary case studies for correlation and optimization problems drawn from Bayesian analysis 'in the wild'

Intermediate Probability - Marc S. Paolella

2007-09-27

Intermediate Probability is the natural extension of the author's Fundamental Probability. It details several highly important topics, from standard ones such as order statistics, multivariate normal, and convergence concepts, to more advanced ones which are usually not addressed at this mathematical level, or have never previously appeared in textbook form. The author adopts a computational approach throughout, allowing the reader to directly implement the methods, thus greatly enhancing the learning experience and clearly illustrating the applicability, strengths, and weaknesses of the theory. The book: Places great emphasis on the numeric computation of convolutions of random variables, via numeric integration, inversion theorems, fast Fourier transforms, saddlepoint approximations, and simulation. Provides introductory material to required mathematical topics such as complex numbers, Laplace and Fourier transforms, matrix algebra, confluent hypergeometric functions, digamma functions, and Bessel functions. Presents full derivation and numerous computational methods of the stable Paretian and the singly and doubly non-central distributions. A whole chapter is dedicated to mean-variance mixtures, NIG, GIG, generalized hyperbolic and numerous related distributions. A whole chapter is dedicated to nesting, generalizing, and asymmetric extensions of popular distributions, as have become popular in empirical finance and other applications. Provides all essential programming code in Matlab and R. The user-friendly style of writing and attention to detail means that self-study is easily possible, making the book ideal for senior undergraduate and graduate students of mathematics, statistics, econometrics, finance, insurance, and computer science, as well as researchers and professional statisticians working in these fields.

Univariate Stable Distributions - John P. Nolan
2020-09-13

This textbook highlights the many practical uses of stable distributions, exploring the theory, numerical algorithms, and statistical methods used to work with stable laws. Because of the author's accessible and comprehensive approach, readers will be able to understand and use these methods. Both mathematicians and non-mathematicians will find this a valuable resource for more accurately modelling and predicting large values in a number of real-world scenarios. Beginning with an introductory chapter that explains key ideas about stable laws, readers will be prepared for the more advanced topics that appear later. The following chapters present the theory of stable distributions, a wide range of applications, and statistical methods, with the final chapters focusing on regression, signal processing, and related distributions. Each chapter ends with a number of carefully chosen exercises. Links to free software are included as well, where readers can put these methods into practice.

Univariate Stable Distributions is ideal for advanced undergraduate or graduate students in mathematics, as well as many other fields, such as statistics, economics, engineering, physics, and more. It will also appeal to researchers in probability theory who seek an authoritative reference on stable distributions.

The Rise and Fall of Business Firms - S. V. Buldyrev 2020-03-31
At the intersection between statistical physics and rigorous econometric analysis, this powerful new framework sheds light on how innovation and competition shape the growth and decline of companies and industries. Analyzing various sources of data including a unique micro level database which collects historic data on the sales of more than 3,000 firms and 50,000 products in 20 countries, the authors introduce and test a model of innovation and proportional growth, which relies on minimal assumptions and accounts for the empirically observed regularities. Through a combination of extensive

stochastic simulations and statistical tests, the authors investigate to what extent their simple assumptions are falsified by empirically observable facts. Physicists looking for application of their mathematical and modelling skills to relevant economic problems as well as economists interested in the explorative analysis of extensive data sets and in a physics-orientated way of thinking will find this book a key reference.

Stability Problems for Stochastic Models: Theory and Applications - Alexander Zeifman 2021-03-05

The aim of this Special Issue of Mathematics is to commemorate the outstanding Russian mathematician Vladimir Zolotarev, whose 90th birthday will be celebrated on February 27th, 2021. The present Special Issue contains a collection of new papers by participants in sessions of the International Seminar on Stability Problems for Stochastic Models founded by Zolotarev. Along with research in

probability distributions theory, limit theorems of probability theory, stochastic processes, mathematical statistics, and queuing theory, this collection contains papers dealing with applications of stochastic models in modeling of pension schemes, modeling of extreme precipitation, construction of statistical indicators of scientific publication importance, and other fields.

Ill-posed Problems in Probability and Stability of Random Sums - Lev Borisovich Klebanov 2006

This volume is concerned with the problems in probability and statistics. Ill-posed problems are usually understood as those results where small changes in the assumptions lead to arbitrarily large changes in the conclusions. Such results are not very useful for practical applications where the presumptions usually hold only approximately (because even a slightest departure from the assumed model may produce an uncontrollable shift in the outcome). Often, the ill-posedness of certain practical problems is

due to the lack of their precise mathematical formulation. Consequently, one can deal with such problems by replacing a given ill-posed problem with another, well-posed problem, which in some sense is 'close' to the original one. The goal in this book is to show that ill-posed problems are not just a mere curiosity in the contemporary theory of mathematical statistics and probability. On the contrary, such problems are quite common, and majority of classical results fall into this class. The objective of this book is to identify problems of this type, and re-formulate them more correctly. Thus, alternative (more precise in the above sense) versions are proposed of numerous classical theorems in the theory of probability and mathematical statistics. In addition, some non-standard problems are considered from this point of view.

Fundamental Statistical Inference - Marc S. Paolella 2018-06-19
A hands-on approach to statistical inference that addresses the latest developments in this ever-growing field This clear and accessible book for beginning graduate students offers a practical and detailed approach to the field of statistical inference, providing complete derivations of results, discussions, and MATLAB programs for computation. It emphasizes details of the relevance of the material, intuition, and discussions with a view towards very modern statistical inference. In addition to classic subjects associated with mathematical statistics, topics include an intuitive presentation of the (single and double) bootstrap for confidence interval calculations, shrinkage estimation, tail (maximal moment) estimation, and a variety of methods of point estimation besides maximum likelihood, including use of characteristic functions, and indirect inference. Practical examples of all methods are given. Estimation issues associated with the discrete mixtures of normal distribution, and their solutions, are developed in detail. Much emphasis throughout is on non-Gaussian distributions, including

details on working with the stable Paretian distribution and fast calculation of the noncentral Student's t. An entire chapter is dedicated to optimization, including development of Hessian-based methods, as well as heuristic/genetic algorithms that do not require continuity, with MATLAB codes provided. The book includes both theory and nontechnical discussions, along with a substantial reference to the literature, with an emphasis on alternative, more modern approaches. The recent literature on the misuse of hypothesis testing and p-values for model selection is discussed, and emphasis is given to alternative model selection methods, though hypothesis testing of distributional assumptions is covered in detail, notably for the normal distribution. Presented in three parts—Essential Concepts in Statistics; Further Fundamental Concepts in Statistics; and Additional Topics—Fundamental Statistical Inference: A Computational Approach offers comprehensive chapters on: Introducing Point and Interval Estimation; Goodness of Fit and Hypothesis Testing; Likelihood; Numerical Optimization; Methods of Point Estimation; Q-Q Plots and Distribution Testing; Unbiased Point Estimation and Bias Reduction; Analytic Interval Estimation; Inference in a Heavy-Tailed Context; The Method of Indirect Inference; and, as an appendix, A Review of Fundamental Concepts in Probability Theory, the latter to keep the book self-contained, and giving material on some advanced subjects such as saddlepoint approximations, expected shortfall in finance, calculation with the stable Paretian distribution, and convergence theorems and proofs.

Multivariate, Multilinear and Mixed Linear Models - Katarzyna Filipiak 2021-10-01 This book presents the latest findings on statistical inference in multivariate, multilinear and mixed linear models, providing a holistic presentation of the subject. It contains pioneering and carefully selected review

contributions by experts in the field and guides the reader through topics related to estimation and testing of multivariate and mixed linear model parameters. Starting with the theory of multivariate distributions, covering identification and testing of covariance structures and means under various multivariate models, it goes on to discuss estimation in mixed linear models and their transformations. The results presented originate from the work of the research group Multivariate and Mixed Linear Models and their meetings held at the Mathematical Research and Conference Center in Będlewo, Poland, over the last 10 years. Featuring an extensive bibliography of related publications, the book is intended for PhD students and researchers in modern statistical science who are interested in multivariate and mixed linear models.

Linear Models and Time-Series Analysis - Marc S. Paolella 2018-10-10
A comprehensive and timely edition on an emerging new trend in time series Linear Models and Time-Series Analysis: Regression, ANOVA, ARMA and GARCH sets a strong foundation, in terms of distribution theory, for the linear model (regression and ANOVA), univariate time series analysis (ARMAX and GARCH), and some multivariate models associated primarily with modeling financial asset returns (copula-based structures and the discrete mixed normal and Laplace). It builds on the author's previous book, Fundamental Statistical Inference: A Computational Approach, which introduced the major concepts of statistical inference. Attention is explicitly paid to application and numeric computation, with examples of Matlab code throughout. The code offers a framework for discussion and illustration of numerics, and shows the mapping from theory to computation. The topic of time series analysis is on firm footing, with numerous textbooks and research journals dedicated to it. With respect to the subject/technology, many chapters in Linear Models and Time-Series

Analysis cover firmly entrenched topics (regression and ARMA). Several others are dedicated to very modern methods, as used in empirical finance, asset pricing, risk management, and portfolio optimization, in order to address the severe change in performance of many pension funds, and changes in how fund managers work. Covers traditional time series analysis with new guidelines Provides access to cutting edge topics that are at the forefront of financial econometrics and industry Includes latest developments and topics such as financial returns data, notably also in a multivariate context Written by a leading expert in time series analysis Extensively classroom tested Includes a tutorial on SAS Supplemented with a companion website containing numerous Matlab programs Solutions to most exercises are provided in the book Linear Models and Time-Series Analysis: Regression, ANOVA, ARMA and GARCH is suitable for advanced masters students in statistics and quantitative finance, as well as doctoral students in economics and finance. It is also useful for quantitative financial practitioners in large financial institutions and smaller finance outlets.

Credit-Risk Modelling - David Jamieson Bolder 2018-10-31

The risk of counterparty default in banking, insurance, institutional, and pension-fund portfolios is an area of ongoing and increasing importance for finance practitioners. It is, unfortunately, a topic with a high degree of technical complexity. Addressing this challenge, this book provides a comprehensive and attainable mathematical and statistical discussion of a broad range of existing default-risk models. Model description and derivation, however, is only part of the story. Through use of exhaustive practical examples and extensive code illustrations in the Python programming language, this work also explicitly shows the reader how these models are implemented.

Bringing these complex approaches to life by combining the technical details with actual real-life Python code reduces the burden of model complexity and enhances accessibility to this decidedly specialized field of study. The entire work is also liberally supplemented with model-diagnostic, calibration, and parameter-estimation techniques to assist the quantitative analyst in day-to-day implementation as well as in mitigating model risk. Written by an active and experienced practitioner, it is an invaluable learning resource and reference text for financial-risk practitioners and an excellent source for advanced undergraduate and graduate students seeking to acquire knowledge of the key elements of this discipline.

Mixture Model-Based Classification - Paul D. McNicholas 2016-10-04
"This is a great overview of the field of model-based clustering and classification by one of its leading developers. McNicholas provides a resource that I am certain will be used by researchers in statistics and related disciplines for quite some time. The discussion of mixtures with heavy tails and asymmetric distributions will place this text as the authoritative, modern reference in the mixture modeling literature." (Douglas Steinley, University of Missouri) Mixture Model-Based Classification is the first monograph devoted to mixture model-based approaches to clustering and classification. This is both a book for established researchers and newcomers to the field. A history of mixture models as a tool for classification is provided and Gaussian mixtures are considered extensively, including mixtures of factor analyzers and other approaches for high-dimensional data. Non-Gaussian mixtures are considered, from mixtures with components that parameterize skewness and/or concentration, right up to mixtures of multiple scaled distributions. Several other important topics are considered, including mixture approaches for clustering and classification of longitudinal data

as well as discussion about how to define a cluster Paul D. McNicholas is the Canada Research Chair in Computational Statistics at McMaster University, where he is a Professor in the Department of Mathematics and Statistics. His research focuses on the use of mixture model-based approaches for classification, with particular attention to clustering applications, and he has published extensively within the field. He is an associate editor for several journals and has served as a guest editor for a number of special issues on mixture models.

Proceedings of the ... Annual International ACMSIGIR Conference on Research and Development in Information Retrieval - 2003

Statistical Learning with Sparsity - Trevor Hastie 2015-05-07
Discover New Methods for Dealing with High-Dimensional Data A sparse statistical model has only a small number of nonzero parameters or weights; therefore, it is much easier to estimate and interpret than a dense model. Statistical Learning with Sparsity: The Lasso and Generalizations presents methods that exploit sparsity to help recover the underlying signal in a set of data. Top experts in this rapidly evolving field, the authors describe the lasso for linear regression and a simple coordinate descent algorithm for its computation. They discuss the application of l1 penalties to generalized linear models and support vector machines, cover generalized penalties such as the elastic net and group lasso, and review numerical methods for optimization. They also present statistical inference methods for fitted (lasso) models, including the bootstrap, Bayesian methods, and recently developed approaches. In addition, the book examines matrix decomposition, sparse multivariate analysis, graphical models, and compressed sensing. It concludes with a survey of theoretical results for the lasso. In this age of big data, the number of features measured on a person or object can be large and might be

larger than the number of observations. This book shows how the sparsity assumption allows us to tackle these problems and extract useful and reproducible patterns from big datasets. Data analysts, computer scientists, and theorists will appreciate this thorough and up-to-date treatment of sparse statistical modeling.

Probability, Combinatorics and Control - Andrey Kostogryzov 2020-04-15
Probabilistic and combinatorial techniques are often used for solving advanced problems. This book describes different probabilistic modeling methods and their applications in various areas, such as artificial intelligence, offshore platforms, social networks, and others. It aims to educate how modern probabilistic and combinatorial models may be created to formalize uncertainties; to train how new probabilistic models can be generated for the systems of complex structures; to describe the correct use of the presented models for rational control in systems creation and operation; and to demonstrate analytical possibilities and practical effects for solving different system problems on each life cycle stage.

A Primer on Statistical Distributions - Narayanaswamy Balakrishnan 2004-12-04
Designed as an introduction to statistical distribution theory. * Includes a first chapter on basic notations and definitions that are essential to working with distributions. * Remaining chapters are divided into three parts: Discrete Distributions, Continuous Distributions, and Multivariate Distributions. * Exercises are incorporated throughout the text in order to enhance understanding of materials just taught.

Mathematical and Statistical Applications in Life Sciences and Engineering - Avishek Adhikari 2017-12-06
The book includes articles from eminent international scientists discussing a wide spectrum of topics of current importance in mathematics and statistics and their applications. It presents state-of-the-art material

along with a clear and detailed review of the relevant topics and issues concerned. The topics discussed include message transmission, colouring problem, control of stochastic structures and information dynamics, image denoising, life testing and reliability, survival and frailty models, analysis of drought periods, prediction of genomic profiles, competing risks, environmental applications and chronic disease control. It is a valuable resource for researchers and practitioners in the relevant areas of mathematics and statistics.

Unifying Ecology Across Scales: Progress, Challenges and Opportunities - Mary I. O'Connor 2020-12-29

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