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KEY=NONPARAMETRIC - MILLS PAOLA

INTRODUCTION TO NONPARAMETRIC ESTIMATION

Springer Science & Business Media **Developed from lecture notes and ready to be used for a course on the graduate level, this concise text aims to introduce the fundamental concepts of nonparametric estimation theory while maintaining the exposition suitable for a first approach in the field.**

LECTURES ON THE NEAREST NEIGHBOR METHOD

Springer **This text presents a wide-ranging and rigorous overview of nearest neighbor methods, one of the most important paradigms in machine learning. Now in one self-contained volume, this book systematically covers key statistical, probabilistic, combinatorial and geometric ideas for understanding, analyzing and developing nearest neighbor methods. Gérard Biau is a professor at Université Pierre et Marie Curie (Paris). Luc Devroye is a professor at the School of Computer Science at McGill University (Montreal).**

NONPARAMETRIC ESTIMATION UNDER SHAPE CONSTRAINTS

Cambridge University Press **This book introduces basic concepts of shape constrained inference and guides the reader to current developments in the subject.**

AN INTRODUCTION TO THE ADVANCED THEORY OF NONPARAMETRIC ECONOMETRICS

A REPLICABLE APPROACH USING R

Cambridge University Press **Provides theory, open source R implementations, and the latest tools for reproducible nonparametric econometric research.**

LÉVY MATTERS IV

ESTIMATION FOR DISCRETELY OBSERVED LÉVY PROCESSES

Springer **The aim of this volume is to provide an extensive account of the most recent advances in statistics for discretely observed Lévy processes. These days, statistics for stochastic processes is a lively topic, driven by the needs of various fields of application, such as finance, the biosciences, and telecommunication. The three chapters of this volume are completely dedicated to the estimation of Lévy processes, and are written by experts in the field. The first chapter by Denis Belomestny and Markus Reiß treats the low frequency situation, and estimation methods are based on the empirical characteristic function. The second chapter by Fabienne Comte and Valery Genon-Catalon is dedicated to non-parametric estimation mainly covering the high-frequency data case. A distinctive feature of this part is the construction of adaptive estimators, based on deconvolution or projection or kernel methods. The last chapter by Hiroki Masuda considers the parametric situation. The chapters cover the main aspects of the estimation of discretely observed Lévy processes, when the observation scheme is regular, from an up-to-date viewpoint.**

NONPARAMETRIC STATISTICS

4TH ISNPS, SALERNO, ITALY, JUNE 2018

Springer Nature **Highlighting the latest advances in nonparametric and semiparametric statistics, this book gathers**

selected peer-reviewed contributions presented at the 4th Conference of the International Society for Nonparametric Statistics (ISNPS), held in Salerno, Italy, on June 11-15, 2018. It covers theory, methodology, applications and computational aspects, addressing topics such as nonparametric curve estimation, regression smoothing, models for time series and more generally dependent data, varying coefficient models, symmetry testing, robust estimation, and rank-based methods for factorial design. It also discusses nonparametric and permutation solutions for several different types of data, including ordinal data, spatial data, survival data and the joint modeling of both longitudinal and time-to-event data, permutation and resampling techniques, and practical applications of nonparametric statistics. The International Society for Nonparametric Statistics is a unique global organization, and its international conferences are intended to foster the exchange of ideas and the latest advances and trends among researchers from around the world and to develop and disseminate nonparametric statistics knowledge. The ISNPS 2018 conference in Salerno was organized with the support of the American Statistical Association, the Institute of Mathematical Statistics, the Bernoulli Society for Mathematical Statistics and Probability, the Journal of Nonparametric Statistics and the University of Salerno.

INTRODUCTION TO HIGH-DIMENSIONAL STATISTICS

CRC Press **Praise for the first edition: "[This book] succeeds singularly at providing a structured introduction to this active field of research. ... it is arguably the most accessible overview yet published of the mathematical ideas and principles that one needs to master to enter the field of high-dimensional statistics. ... recommended to anyone interested in the main results of current research in high-dimensional statistics as well as anyone interested in acquiring the core mathematical skills to enter this area of research." —Journal of the American Statistical Association Introduction to High-Dimensional Statistics, Second Edition preserves the philosophy of the first edition: to be a concise guide for students and researchers discovering the area and interested in the mathematics involved. The main concepts and ideas are presented in simple settings, avoiding thereby unessential technicalities. High-dimensional statistics is a fast-evolving field, and much progress has been made on a large variety of topics, providing new insights and methods. Offering a succinct presentation of the mathematical foundations of high-dimensional statistics, this new edition: Offers revised chapters from the previous edition, with the inclusion of many additional materials on some important topics, including compress sensing, estimation with convex constraints, the slope estimator, simultaneously low-rank and row-sparse linear regression, or aggregation of a continuous set of estimators. Introduces three new chapters on iterative algorithms, clustering, and minimax lower bounds. Provides enhanced appendices, minimax**

lower-bounds mainly with the addition of the Davis-Kahan perturbation bound and of two simple versions of the Hanson-Wright concentration inequality. Covers cutting-edge statistical methods including model selection, sparsity and the Lasso, iterative hard thresholding, aggregation, support vector machines, and learning theory. Provides detailed exercises at the end of every chapter with collaborative solutions on a wiki site. Illustrates concepts with simple but clear practical examples.

MATHEMATICAL STATISTICS

ASYMPTOTIC MINIMAX THEORY

American Mathematical Soc. **This book is designed to bridge the gap between traditional textbooks in statistics and more advanced books that include the sophisticated nonparametric techniques. It covers topics in parametric and nonparametric large-sample estimation theory. The exposition is based on a collection of relatively simple statistical models. It gives a thorough mathematical analysis for each of them with all the rigorous proofs and explanations. The book also includes a number of helpful exercises. Prerequisites for the book include senior undergraduate/beginning graduate-level courses in probability and statistics.**

NONPARAMETRIC STATISTICS

3RD ISNPS, AVIGNON, FRANCE, JUNE 2016

Springer **This volume presents the latest advances and trends in nonparametric statistics, and gathers selected and peer-reviewed contributions from the 3rd Conference of the International Society for Nonparametric Statistics (ISNPS), held in Avignon, France on June 11-16, 2016. It covers a broad range of nonparametric statistical methods, from density estimation, survey sampling, resampling methods, kernel methods and extreme values, to statistical learning and classification, both in the standard i.i.d. case and for dependent data, including big data. The International Society for Nonparametric Statistics is uniquely global, and its international conferences are intended to foster the exchange of ideas and the latest advances among researchers from around the world, in cooperation with established statistical societies such as the Institute of Mathematical Statistics, the Bernoulli Society and the International Statistical Institute. The 3rd ISNPS conference in Avignon attracted more than 400 researchers from around the globe, and contributed to the further development and dissemination of nonparametric statistics knowledge.**

LONG-MEMORY PROCESSES

PROBABILISTIC PROPERTIES AND STATISTICAL METHODS

Springer Science & Business Media **Long-memory processes are known to play an important part in many areas of science and technology, including physics, geophysics, hydrology, telecommunications, economics, finance, climatology, and network engineering. In the last 20 years enormous progress has been made in understanding the probabilistic foundations and statistical principles of such processes. This book provides a timely and comprehensive review, including a thorough discussion of mathematical and probabilistic foundations and statistical methods, emphasizing their practical motivation and mathematical justification. Proofs of the main theorems are provided and data examples illustrate practical aspects. This book will be a valuable resource for researchers and graduate students in statistics, mathematics, econometrics and other quantitative areas, as well as for practitioners and applied researchers who need to analyze data in which long memory, power laws, self-similar scaling or fractal properties are relevant.**

WAVELETS IN FUNCTIONAL DATA ANALYSIS

Springer **Wavelet-based procedures are key in many areas of statistics, applied mathematics, engineering, and science. This book presents wavelets in functional data analysis, offering a glimpse of problems in which they can be applied, including tumor analysis, functional magnetic resonance and meteorological data. Starting with the Haar wavelet, the authors explore myriad families of wavelets and how they can be used. High-dimensional data visualization (using Andrews' plots), wavelet shrinkage (a simple, yet powerful, procedure for nonparametric models) and a selection of estimation and testing techniques (including a discussion on Stein's Paradox) make this a highly valuable resource for graduate students and experienced researchers alike.**

HIGH DIMENSIONAL PROBABILITY VI

THE BANFF VOLUME

Springer Science & Business Media **This is a collection of papers by participants at High Dimensional Probability VI Meeting held from October 9-14, 2011 at the Banff International Research Station in Banff, Alberta, Canada. High Dimensional Probability (HDP) is an area of mathematics that includes the study of probability distributions and limit theorems in**

infinite-dimensional spaces such as Hilbert spaces and Banach spaces. The most remarkable feature of this area is that it has resulted in the creation of powerful new tools and perspectives, whose range of application has led to interactions with other areas of mathematics, statistics, and computer science. These include random matrix theory, nonparametric statistics, empirical process theory, statistical learning theory, concentration of measure phenomena, strong and weak approximations, distribution function estimation in high dimensions, combinatorial optimization, and random graph theory. The papers in this volume show that HDP theory continues to develop new tools, methods, techniques and perspectives to analyze the random phenomena. Both researchers and advanced students will find this book of great use for learning about new avenues of research.

QUANTITATIVE PORTFOLIO MANAGEMENT

THE ART AND SCIENCE OF STATISTICAL ARBITRAGE

John Wiley & Sons **Discover foundational and advanced techniques in quantitative equity trading from a veteran insider In Quantitative Portfolio Management: The Art and Science of Statistical Arbitrage, distinguished physicist-turned-quant Dr. Michael Isichenko delivers a systematic review of the quantitative trading of equities, or statistical arbitrage. The book teaches you how to source financial data, learn patterns of asset returns from historical data, generate and combine multiple forecasts, manage risk, build a stock portfolio optimized for risk and trading costs, and execute trades. In this important book, you'll discover: Machine learning methods of forecasting stock returns in efficient financial markets How to combine multiple forecasts into a single model by using secondary machine learning, dimensionality reduction, and other methods Ways of avoiding the pitfalls of overfitting and the curse of dimensionality, including topics of active research such as "benign overfitting" in machine learning The theoretical and practical aspects of portfolio construction, including multi-factor risk models, multi-period trading costs, and optimal leverage Perfect for investment professionals, like quantitative traders and portfolio managers, Quantitative Portfolio Management will also earn a place in the libraries of data scientists and students in a variety of statistical and quantitative disciplines. It is an indispensable guide for anyone who hopes to improve their understanding of how to apply data science, machine learning, and optimization to the stock market.**

COGNITIVE NETWORKED SENSING AND BIG DATA

Springer Science & Business Media **Wireless Distributed Computing and Cognitive Sensing defines high-dimensional data**

processing in the context of wireless distributed computing and cognitive sensing. This book presents the challenges that are unique to this area such as synchronization caused by the high mobility of the nodes. The author will discuss the integration of software defined radio implementation and testbed development. The book will also bridge new research results and contextual reviews. Also the author provides an examination of large cognitive radio network; hardware testbed; distributed sensing; and distributed computing.

BANDIT ALGORITHMS

Cambridge University Press **Decision-making in the face of uncertainty is a significant challenge in machine learning, and the multi-armed bandit model is a commonly used framework to address it. This comprehensive and rigorous introduction to the multi-armed bandit problem examines all the major settings, including stochastic, adversarial, and Bayesian frameworks. A focus on both mathematical intuition and carefully worked proofs makes this an excellent reference for established researchers and a helpful resource for graduate students in computer science, engineering, statistics, applied mathematics and economics. Linear bandits receive special attention as one of the most useful models in applications, while other chapters are dedicated to combinatorial bandits, ranking, non-stationary problems, Thompson sampling and pure exploration. The book ends with a peek into the world beyond bandits with an introduction to partial monitoring and learning in Markov decision processes.**

MODEL SELECTION AND ERROR ESTIMATION IN A NUTSHELL

Springer **How can we select the best performing data-driven model? How can we rigorously estimate its generalization error? Statistical learning theory answers these questions by deriving non-asymptotic bounds on the generalization error of a model or, in other words, by upper bounding the true error of the learned model based just on quantities computed on the available data. However, for a long time, Statistical learning theory has been considered only an abstract theoretical framework, useful for inspiring new learning approaches, but with limited applicability to practical problems. The purpose of this book is to give an intelligible overview of the problems of model selection and error estimation, by focusing on the ideas behind the different statistical learning theory approaches and simplifying most of the technical aspects with the purpose of making them more accessible and usable in practice. The book starts by presenting the seminal works of the 80's and includes the most recent results. It discusses open problems and outlines future directions for research.**

INFORMATION-THEORETIC METHODS IN DATA SCIENCE

Cambridge University Press **The first unified treatment of the interface between information theory and emerging topics in data science, written in a clear, tutorial style. Covering topics such as data acquisition, representation, analysis, and communication, it is ideal for graduate students and researchers in information theory, signal processing, and machine learning.**

A COURSE IN MATHEMATICAL STATISTICS AND LARGE SAMPLE THEORY

Springer **This graduate-level textbook is primarily aimed at graduate students of statistics, mathematics, science, and engineering who have had an undergraduate course in statistics, an upper division course in analysis, and some acquaintance with measure theoretic probability. It provides a rigorous presentation of the core of mathematical statistics. Part I of this book constitutes a one-semester course on basic parametric mathematical statistics. Part II deals with the large sample theory of statistics - parametric and nonparametric, and its contents may be covered in one semester as well. Part III provides brief accounts of a number of topics of current interest for practitioners and other disciplines whose work involves statistical methods.**

QUANTUM INSPIRED COMPUTATIONAL INTELLIGENCE

RESEARCH AND APPLICATIONS

Morgan Kaufmann **Quantum Inspired Computational Intelligence: Research and Applications explores the latest quantum computational intelligence approaches, initiatives, and applications in computing, engineering, science, and business. The book explores this emerging field of research that applies principles of quantum mechanics to develop more efficient and robust intelligent systems. Conventional computational intelligence—or soft computing—is conjoined with quantum computing to achieve this objective. The models covered can be applied to any endeavor which handles complex and meaningful information. Brings together quantum computing with computational intelligence to achieve enhanced performance and robust solutions Includes numerous case studies, tools, and technologies to apply the concepts to real world practice Provides the missing link between the research and practice**

ESSAYS IN HONOR OF AMAN ULLAH

<u>Emerald Group Publishing</u> **Volume 36 of Advances in Econometrics recognizes Aman Ullah's significant contributions in many areas of econometrics and celebrates his long productive career.**

STATISTICAL INFERENCE FOR PIECEWISE-DETERMINISTIC MARKOV PROCESSES

<u>John Wiley & Sons</u> **Piecewise-deterministic Markov processes form a class of stochastic models with a sizeable scope of applications: biology, insurance, neuroscience, networks, finance... Such processes are defined by a deterministic motion punctuated by random jumps at random times, and offer simple yet challenging models to study. Nevertheless, the issue of statistical estimation of the parameters ruling the jump mechanism is far from trivial. Responding to new developments in the field as well as to current research interests and needs, Statistical inference for piecewise-deterministic Markov processes offers a detailed and comprehensive survey of state-of-the-art results. It covers a wide range of general processes as well as applied models. The present book also dwells on statistics in the context of Markov chains, since piecewise-deterministic Markov processes are characterized by an embedded Markov chain corresponding to the position of the process right after the jumps.**

HANDBOOK OF BIG DATA ANALYTICS

<u>Springer</u> **Addressing a broad range of big data analytics in cross-disciplinary applications, this essential handbook focuses on the statistical prospects offered by recent developments in this field. To do so, it covers statistical methods for high-dimensional problems, algorithmic designs, computation tools, analysis flows and the software-hardware co-designs that are needed to support insightful discoveries from big data. The book is primarily intended for statisticians, computer experts, engineers and application developers interested in using big data analytics with statistics. Readers should have a solid background in statistics and computer science.**

FINANCIAL STATISTICS AND MATHEMATICAL FINANCE

METHODS, MODELS AND APPLICATIONS

<u>John Wiley & Sons</u> **Mathematical finance has grown into a huge area of research which requires a lot of care and a large number of sophisticated mathematical tools. Mathematically rigorous and yet accessible to advanced level**

practitioners and mathematicians alike, it considers various aspects of the application of statistical methods in finance and illustrates some of the many ways that statistical tools are used in financial applications. Financial Statistics and Mathematical Finance: Provides an introduction to the basics of financial statistics and mathematical finance. Explains the use and importance of statistical methods in econometrics and financial engineering. Illustrates the importance of derivatives and calculus to aid understanding in methods and results. Looks at advanced topics such as martingale theory, stochastic processes and stochastic integration. Features examples throughout to illustrate applications in mathematical and statistical finance. Is supported by an accompanying website featuring R code and data sets. Financial Statistics and Mathematical Finance introduces the financial methodology and the relevant mathematical tools in a style that is both mathematically rigorous and yet accessible to advanced level practitioners and mathematicians alike, both graduate students and researchers in statistics, finance, econometrics and business administration will benefit from this book.

MULTIVARIATE KERNEL SMOOTHING AND ITS APPLICATIONS

CRC Press **Kernel smoothing has greatly evolved since its inception to become an essential methodology in the data science tool kit for the 21st century. Its widespread adoption is due to its fundamental role for multivariate exploratory data analysis, as well as the crucial role it plays in composite solutions to complex data challenges. Multivariate Kernel Smoothing and Its Applications offers a comprehensive overview of both aspects. It begins with a thorough exposition of the approaches to achieve the two basic goals of estimating probability density functions and their derivatives. The focus then turns to the applications of these approaches to more complex data analysis goals, many with a geometric/topological flavour, such as level set estimation, clustering (unsupervised learning), principal curves, and feature significance. Other topics, while not direct applications of density (derivative) estimation but sharing many commonalities with the previous settings, include classification (supervised learning), nearest neighbour estimation, and deconvolution for data observed with error. For a data scientist, each chapter contains illustrative Open data examples that are analysed by the most appropriate kernel smoothing method. The emphasis is always placed on an intuitive understanding of the data provided by the accompanying statistical visualisations. For a reader wishing to investigate further the details of their underlying statistical reasoning, a graduated exposition to a unified theoretical framework is provided. The algorithms for efficient software implementation are also discussed. José E. Chacón is an associate professor at the Department of Mathematics of the Universidad de Extremadura in Spain. Tarn Duong is a Senior Data Scientist for a start-up which provides short distance carpooling services in France. Both authors have**

made important contributions to kernel smoothing research over the last couple of decades.

REGULARIZED SYSTEM IDENTIFICATION

LEARNING DYNAMIC MODELS FROM DATA

Springer Nature **This open access book provides a comprehensive treatment of recent developments in kernel-based identification that are of interest to anyone engaged in learning dynamic systems from data. The reader is led step by step into understanding of a novel paradigm that leverages the power of machine learning without losing sight of the system-theoretical principles of black-box identification. The authors' reformulation of the identification problem in the light of regularization theory not only offers new insight on classical questions, but paves the way to new and powerful algorithms for a variety of linear and nonlinear problems. Regression methods such as regularization networks and support vector machines are the basis of techniques that extend the function-estimation problem to the estimation of dynamic models. Many examples, also from real-world applications, illustrate the comparative advantages of the new nonparametric approach with respect to classic parametric prediction error methods. The challenges it addresses lie at the intersection of several disciplines so Regularized System Identification will be of interest to a variety of researchers and practitioners in the areas of control systems, machine learning, statistics, and data science. This is an open access book.**

AUTOMATA, LANGUAGES, AND PROGRAMMING

40TH INTERNATIONAL COLLOQUIUM, ICALP 2013, RIGA, LATVIA, JULY 8-12, 2013, PROCEEDINGS, PART I

Springer **This two-volume set of LNCS 7965 and LNCS 7966 constitutes the refereed proceedings of the 40th International Colloquium on Automata, Languages and Programming, ICALP 2013, held in Riga, Latvia, in July 2013. The total of 124 revised full papers presented were carefully reviewed and selected from 422 submissions. They are organized in three tracks focussing on algorithms, complexity and games; logic, semantics, automata and theory of programming; and foundations of networked computation.**

COMPUTATIONAL STATISTICS IN DATA SCIENCE

John Wiley & Sons **Ein unverzichtbarer Leitfaden bei der Anwendung computergestützter Statistik in der modernen**

Datenwissenschaft In Computational Statistics in Data Science präsentiert ein Team aus bekannten Mathematikern und Statistikern eine fundierte Zusammenstellung von Konzepten, Theorien, Techniken und Praktiken der computergestützten Statistik für ein Publikum, das auf der Suche nach einem einzigen, umfassenden Referenzwerk für Statistik in der modernen Datenwissenschaft ist. Das Buch enthält etliche Kapitel zu den wesentlichen konkreten Bereichen der computergestützten Statistik, in denen modernste Techniken zeitgemäß und verständlich dargestellt werden. Darüber hinaus bietet Computational Statistics in Data Science einen kostenlosen Zugang zu den fertigen Einträgen im Online-Nachschlagewerk Wiley StatsRef: Statistics Reference Online. Außerdem erhalten die Leserinnen und Leser: * Eine gründliche Einführung in die computergestützte Statistik mit relevanten und verständlichen Informationen für Anwender und Forscher in verschiedenen datenintensiven Bereichen * Umfassende Erläuterungen zu aktuellen Themen in der Statistik, darunter Big Data, Datenstromverarbeitung, quantitative Visualisierung und Deep Learning Das Werk eignet sich perfekt für Forscher und Wissenschaftler sämtlicher Fachbereiche, die Techniken der computergestützten Statistik auf einem gehobenen oder fortgeschrittenen Niveau anwenden müssen. Zudem gehört Computational Statistics in Data Science in das Bücherregal von Wissenschaftlern, die sich mit der Erforschung und Entwicklung von Techniken der computergestützten Statistik und statistischen Grafiken beschäftigen.

INFORMATION TECHNOLOGY, SYSTEMS RESEARCH, AND COMPUTATIONAL PHYSICS

Springer **This book highlights a broad range of modern information technology tools, techniques, investigations and open challenges, mainly with applications in systems research and computational physics. Divided into three major sections, it begins by presenting specialized calculation methods in the framework of data analysis and intelligent computing. In turn, the second section focuses on application aspects, mainly for systems research, while the final section investigates how various tasks in the basic disciplines—mathematics and physics—can be tackled with the aid of contemporary IT methods. The book gathers selected presentations from the 3rd Conference on Information Technology, Systems Research and Computational Physics (ITSRCP'18), which took place on 2–5 July 2018 in Krakow, Poland. The intended readership includes interdisciplinary scientists and practitioners pursuing research at the interfaces of information technology, systems research, and computational physics.**

MATHEMATICAL FOUNDATIONS OF INFINITE-DIMENSIONAL STATISTICAL MODELS

Cambridge University Press **In nonparametric and high-dimensional statistical models, the classical Gauss–Fisher–Le Cam**

theory of the optimality of maximum likelihood estimators and Bayesian posterior inference does not apply, and new foundations and ideas have been developed in the past several decades. This book gives a coherent account of the statistical theory in infinite-dimensional parameter spaces. The mathematical foundations include self-contained 'mini-courses' on the theory of Gaussian and empirical processes, approximation and wavelet theory, and the basic theory of function spaces. The theory of statistical inference in such models - hypothesis testing, estimation and confidence sets - is presented within the minimax paradigm of decision theory. This includes the basic theory of convolution kernel and projection estimation, but also Bayesian nonparametrics and nonparametric maximum likelihood estimation. In a final chapter the theory of adaptive inference in nonparametric models is developed, including Lepski's method, wavelet thresholding, and adaptive inference for self-similar functions. Winner of the 2017 PROSE Award for Mathematics.

HIGH DIMENSIONAL PROBABILITY VII

THE CARGÈSE VOLUME

Birkhäuser **This volume collects selected papers from the 7th High Dimensional Probability meeting held at the Institut d'Études Scientifiques de Cargèse (IESC) in Corsica, France. High Dimensional Probability (HDP) is an area of mathematics that includes the study of probability distributions and limit theorems in infinite-dimensional spaces such as Hilbert spaces and Banach spaces. The most remarkable feature of this area is that it has resulted in the creation of powerful new tools and perspectives, whose range of application has led to interactions with other subfields of mathematics, statistics, and computer science. These include random matrices, nonparametric statistics, empirical processes, statistical learning theory, concentration of measure phenomena, strong and weak approximations, functional estimation, combinatorial optimization, and random graphs. The contributions in this volume show that HDP theory continues to thrive and develop new tools, methods, techniques and perspectives to analyze random phenomena.**

STATISTICAL PHYSICS, OPTIMIZATION, INFERENCE AND MESSAGE-PASSING ALGORITHMS

LECTURE NOTES OF THE LES HOUCHES SCHOOL OF PHYSICS - SPECIAL ISSUE, OCTOBER 2013

Oxford University Press **In the last decade, there has been an increasing convergence of interest and methods between theoretical physics and fields as diverse as probability, machine learning, optimization and compressed sensing. In**

particular, many theoretical and applied works in statistical physics and computer science have relied on the use of message passing algorithms and their connection to statistical physics of spin glasses. The aim of this book, especially adapted to PhD students, post-docs, and young researchers, is to present the background necessary for entering this fast developing field.

A COMPUTATIONAL APPROACH TO STATISTICAL LEARNING

CRC Press **A Computational Approach to Statistical Learning gives a novel introduction to predictive modeling by focusing on the algorithmic and numeric motivations behind popular statistical methods. The text contains annotated code to over 80 original reference functions. These functions provide minimal working implementations of common statistical learning algorithms. Every chapter concludes with a fully worked out application that illustrates predictive modeling tasks using a real-world dataset. The text begins with a detailed analysis of linear models and ordinary least squares. Subsequent chapters explore extensions such as ridge regression, generalized linear models, and additive models. The second half focuses on the use of general-purpose algorithms for convex optimization and their application to tasks in statistical learning. Models covered include the elastic net, dense neural networks, convolutional neural networks (CNNs), and spectral clustering. A unifying theme throughout the text is the use of optimization theory in the description of predictive models, with a particular focus on the singular value decomposition (SVD). Through this theme, the computational approach motivates and clarifies the relationships between various predictive models. Taylor Arnold is an assistant professor of statistics at the University of Richmond. His work at the intersection of computer vision, natural language processing, and digital humanities has been supported by multiple grants from the National Endowment for the Humanities (NEH) and the American Council of Learned Societies (ACLS). His first book, Humanities Data in R, was published in 2015. Michael Kane is an assistant professor of biostatistics at Yale University. He is the recipient of grants from the National Institutes of Health (NIH), DARPA, and the Bill and Melinda Gates Foundation. His R package bigmemory won the Chamber's prize for statistical software in 2010. Bryan Lewis is an applied mathematician and author of many popular R packages, including irlba, doRedis, and threejs.**

INTELLIGENT SYSTEMS AND APPLICATIONS

PROCEEDINGS OF THE 2020 INTELLIGENT SYSTEMS CONFERENCE (INTELLISYS) VOLUME 2

Springer Nature **The book Intelligent Systems and Applications - Proceedings of the 2020 Intelligent Systems Conference**

is a remarkable collection of chapters covering a wider range of topics in areas of intelligent systems and artificial intelligence and their applications to the real world. The Conference attracted a total of 545 submissions from many academic pioneering researchers, scientists, industrial engineers, students from all around the world. These submissions underwent a double-blind peer review process. Of those 545 submissions, 177 submissions have been selected to be included in these proceedings. As intelligent systems continue to replace and sometimes outperform human intelligence in decision-making processes, they have enabled a larger number of problems to be tackled more effectively.This branching out of computational intelligence in several directions and use of intelligent systems in everyday applications have created the need for such an international conference which serves as a venue to report on up-to-the-minute innovations and developments. This book collects both theory and application based chapters on all aspects of artificial intelligence, from classical to intelligent scope. We hope that readers find the volume interesting and valuable; it provides the state of the art intelligent methods and techniques for solving real world problems along with a vision of the future research.

INTELLIGENT COMPUTING

PROCEEDINGS OF THE 2022 COMPUTING CONFERENCE, VOLUME 1

Springer Nature **The book, "Intelligent Computing - Proceedings of the 2022 Computing Conference", is a comprehensive collection of chapters focusing on the core areas of computing and their further applications in the real world. Each chapter is a paper presented at the Computing Conference 2022 held on July 14-15, 2022. Computing 2022 attracted a total of 498 submissions which underwent a double-blind peer-review process. Of those 498 submissions, 179 submissions have been selected to be included in this book. The goal of this conference is to give a platform to researchers with fundamental contributions and to be a premier venue for academic and industry practitioners to share new ideas and development experiences. We hope that readers find this book interesting and valuable as it provides the state-of-the-art intelligent methods and techniques for solving real-world problems. We also expect that the conference and its publications will be a trigger for further related research and technology improvements in this important subject.**

INTELLIGENT DATA ENGINEERING AND AUTOMATED LEARNING – IDEAL 2020

21ST INTERNATIONAL CONFERENCE, GUIMARAES, PORTUGAL, NOVEMBER 4–6, 2020, PROCEEDINGS, PART II

Springer Nature **This two-volume set of LNCS 12489 and 12490 constitutes the thoroughly refereed conference proceedings of the 21th International Conference on Intelligent Data Engineering and Automated Learning, IDEAL 2020, held in Guimaraes, Portugal, in November 2020.* The 93 papers presented were carefully reviewed and selected from 134 submissions. These papers provided a timely sample of the latest advances in data engineering and machine learning, from methodologies, frameworks, and algorithms to applications. The core themes of IDEAL 2020 include big data challenges, machine learning, data mining, information retrieval and management, bio-/neuro-informatics, bio-inspiredmodels, agents and hybrid intelligent systems, real-world applications of intelligent techniques and AI. * The conference was held virtually due to the COVID-19 pandemic.**

STATISTICAL PARADIGMS

RECENT ADVANCES AND RECONCILIATIONS

World Scientific **This volume consists of a collection of research articles on classical and emerging Statistical Paradigms — parametric, non-parametric and semi-parametric, frequentist and Bayesian — encompassing both theoretical advances and emerging applications in a variety of scientific disciplines. For advances in theory, the topics include: Bayesian Inference, Directional Data Analysis, Distribution Theory, Econometrics and Multiple Testing Procedures. The areas in emerging applications include: Bioinformatics, Factorial Experiments and Linear Models, Hotspot Geoinformatics and Reliability. Contents:Reviews:Weak Paradoxes and Paradigms (Jayanta K Ghosh)Nonparametrics in Modern Interdisciplinary Research: Some Perspectives and Prospectives (Pranab K Sen)Parametric:Bounds on Distributions Involving Partial, Marginal and Conditional Information: The Consequences of Incomplete Prior Specification (Barry C Arnold)Stepdown Procedures Controlling a Generalized False Discovery Rate (Wenge Guo and Sanat K Sarkar)On Confidence Intervals for Expected Response in 2n Factorial Experiments with Exponentially Distributed Response Variables (H V Kulkarni and S C Patil)Predictive Influence of Variables in a Linear Regression Model when the Moment Matrix is Singular (Md Nurul Haque Mollah and S K Bhattacharjee)New Wrapped Distributions — Goodness of Fit (A V Dattatreya Rao, I Ramabhadra Sarma and S V S Girija)Semi-Parametric:Non-Stationary Samples and Meta-Distribution (Dominique Guégan)MDL Model Selection Criterion for Mixed Models with an Application to Spline Smoothing (Antti Liski and Erkki P Liski)Digital Governance and Hotspot Geoinformatics with Continuous**

Fractional Response (G P Patil, S W Joshi and R E Koli)Bayesian Curve Registration of Functional Data (Z Zhong, A Majumdar and R L Eubank)Non-Parametric & Probability:Nonparametric Estimation in a One-Way Error Component Model: A Monte Carlo Analysis (Daniel J Henderson and Aman Ullah)GERT Analysis of Consecutive-k Systems: An Overview (Kanwar Sen, Manju Agarwal and Pooja Mohan)Moment Bounds for Strong-Mixing Processes with Applications (Ratan Dasgupta) Readership: Researchers, professionals and advanced students working on Bayesian and frequentist approaches to statistical modeling and on interfaces for both theory and applications. Key Features:A scholarly and motivating review of non-parametric methods by P K Sen, winner of the Wilks Medal in 2010Discussion of paradoxes of the frequentist and Bayesian paradigms, related counterexamples, and their implicationsStands out in terms of the width and depthKeywords:Bayesian Inference;Design of Experiments;Econometrics;Hotspot Geoinformatics;Linear Models and Regression Analysis;Multiple Testing Procedures;Probability Distributions for Linear and Directional Data;Reliability

MINIMAX THEORY OF IMAGE RECONSTRUCTION

Springer Science & Business Media **There exists a large variety of image reconstruction methods proposed by different authors (see e. g. Pratt (1978), Rosenfeld and Kak (1982), Marr (1982)). Selection of an appropriate method for a specific problem in image analysis has been always considered as an art. How to find the image reconstruction method which is optimal in some sense? In this book we give an answer to this question using the asymptotic minimax approach in the spirit of Ibragimov and Khasminskii (1980a,b, 1981, 1982), Bretagnolle and Huber (1979), Stone (1980, 1982). We assume that the image belongs to a certain functional class and we find the image estimators that achieve the best order of accuracy for the worst images in the class. This concept of optimality is rather rough since only the order of accuracy is optimized. However, it is useful for comparing various image reconstruction methods. For example, we show that some popular methods such as simple linewise processing and linear estimation are not optimal for images with sharp edges. Note that discontinuity of images is an important specific feature appearing in most practical situations where one has to distinguish between the "image domain" and the "background" . The approach of this book is based on generalization of nonparametric regression and nonparametric change-point techniques. We discuss these two basic problems in Chapter 1. Chapter 2 is devoted to minimax lower bounds for arbitrary estimators in general statistical models.**

TOPICS IN STOCHASTIC ANALYSIS AND NONPARAMETRIC ESTIMATION

Springer Science & Business Media **To honor Rafail Z. Khasminskii, on his seventy-fifth birthday, for his contributions to stochastic processes and nonparametric estimation theory an IMA participating institution conference entitled "Conference on Asymptotic Analysis in Stochastic Processes, Nonparametric Estimation, and Related Problems" was held. This volume commemorates this special event. Dedicated to Professor Khasminskii, it consists of nine papers on various topics in probability and statistics.**

MATHEMATICAL METHODS OF STATISTICS

APPLIED NONPARAMETRIC REGRESSION

Cambridge University Press **This is the first book to bring together in one place the techniques for regression curve smoothing involving more than one variable.**