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KEY=CHEMICAL - OSBORN MORSE

NOISE-INDUCED HEARING LOSS

SCIENTIFIC ADVANCES

Springer Science & Business Media Exposure to loud noise continues to be the largest cause of hearing loss in the adult population. The problem of NIHL impacts a number of disciplines. US standards for permissible noise exposure were originally published in 1968 and remain largely unchanged today. Indeed, permissible noise exposure for US personnel is significantly greater than that allowed in numerous other countries, including for example, Canada, China, Brazil, Mexico, and the European Union. However, there have been a number of discoveries and advances that have increased our understanding of the mechanisms of NIHL. These advances have the potential to impact how NIHL can be prevented and how our noise standards can be made more appropriate.

THE ELEMENTS OF STATISTICAL LEARNING

DATA MINING, INFERENCE, AND PREDICTION

Springer Science & Business Media During the past decade there has been an explosion in computation and information technology. With it have come vast amounts of data in a variety of fields such as medicine, biology, finance, and marketing. The challenge of understanding these data has led to the development of new tools in the field of statistics, and spawned new areas such as data mining, machine learning, and bioinformatics. Many of these tools have common underpinnings but are often expressed with different terminology. This book describes the important ideas in these areas in a common conceptual framework. While the approach is statistical, the emphasis is on concepts rather than mathematics. Many examples are given, with a liberal use of color graphics. It should be a valuable resource for statisticians and anyone interested in data mining in science or industry. The book's coverage is broad, from supervised learning (prediction) to unsupervised learning. The many topics include neural networks, support vector machines, classification trees and boosting--the first comprehensive treatment of this topic in any book. This major new edition features many topics not covered in the original, including graphical models, random forests, ensemble methods, least angle regression & path algorithms for the lasso, non-negative matrix factorization, and spectral clustering. There is also a chapter on methods for "wide" data (p bigger than n), including multiple testing and false discovery rates. Trevor Hastie, Robert Tibshirani, and Jerome Friedman are professors of statistics at Stanford University. They are prominent researchers in this area: Hastie and Tibshirani developed generalized additive models and wrote a popular book of that title. Hastie co-developed much of the statistical modeling software and environment in R/S-PLUS and invented principal curves and surfaces. Tibshirani proposed the lasso and is co-author of the very successful *An Introduction to the Bootstrap*. Friedman is the co-inventor of many data-mining tools including CART, MARS, projection pursuit and gradient boosting.

PHOTOSYNTHESIS IN ALGAE: BIOCHEMICAL AND PHYSIOLOGICAL MECHANISMS

Springer Nature Algae, including cyanobacteria, are in the spotlight today for a number of reasons; firstly it has become abundantly clear over recent years that algae have been neglected in terms of basic research and that knowledge gap is being rapidly closed with the establishment of some surprising discoveries, such as the presence of Near-Infra-Red-Absorbing cyanobacteria and a wealth of natural products; secondly molecular approaches have provided a wealth of approaches to genetically modify algae and produce value-added products; thirdly it has become clear just how important, marine phytoplankton is to global carbon capture and the production of food globally; and fourthly, it has also become clear that algae present unparalleled opportunities to generate biofuels in a sustainable and non-polluting way. This volume presents 15 chapters by world experts on their subjects, ranging from reviews of algal diversity and genetics to in-depth reviews of special algal groups such as diatoms (which account for over 30% of marine carbon capture). Other chapters chart the ways in which this carbon capture occurs or how there are a multiplicity of ways in which algae intercept sun light and deploy this energy for carbon capture. A fascinating aspect here is the way in which sun light is harvested. A special chapter is devoted to the very recent and exciting possibility that algae use coherent light energy transformation to enhance

the efficiency of light capture, an aspect of quantum physics that has implications for future developments at several levels and a variety of industries. Just how and why algae use Chlorophyll a as the major light capture pigment is discussed in several chapters. However, attention is also given to those cyanobacteria, which have been found to use the special Near-Infra Red absorbing chlorophylls mentioned above. And attention is also given to those algae that employ phycobiliproteins to fill in the "green window", i.e., the spectral region from 400 - 650 nm, which is not efficiently covered by chlorophyll and carotenoid pigments. Photoinhibition and photoprotection is the subject area of several chapters and one which it is essential to understand as we work towards greater efficiency of algal photosynthesis. A final chapter is devoted to understanding the molecular basis for coral bleaching, a much-neglected area that is essential in trying to come up with solutions to this very worrying phenomenon, caused by global warming and ocean acidification. This is a book for research scientists, environmentalists, planners in a range of areas including those of marine resources, nutrient control and pollution of water bodies and that growing body of concerned citizens interested in controlling carbon emissions and global warming. Special attention has been given to generating a set of articles that will be read by university students, informed laymen and all those whose wish to understand the rapid changes that have come about in our knowledge of algae over the past decade.

INFERENCE FOR FUNCTIONAL DATA WITH APPLICATIONS

Springer Science & Business Media This book presents recently developed statistical methods and theory required for the application of the tools of functional data analysis to problems arising in geosciences, finance, economics and biology. It is concerned with inference based on second order statistics, especially those related to the functional principal component analysis. While it covers inference for independent and identically distributed functional data, its distinguishing feature is an in depth coverage of dependent functional data structures, including functional time series and spatially indexed functions. Specific inferential problems studied include two sample inference, change point analysis, tests for dependence in data and model residuals and functional prediction. All procedures are described algorithmically, illustrated on simulated and real data sets, and supported by a complete asymptotic theory. The book can be read at two levels. Readers interested primarily in methodology will find detailed descriptions of the methods and examples of their application. Researchers interested also in mathematical foundations will find carefully developed theory. The organization of the chapters makes it easy for the reader to choose an appropriate focus. The book introduces the requisite, and frequently used, Hilbert space formalism in a systematic manner. This will be useful to graduate or advanced undergraduate students seeking a self-contained introduction to the subject. Advanced researchers will find novel asymptotic arguments.

MICROBIAL BIOENERGY: HYDROGEN PRODUCTION

Springer The central theme of this book "Microbial BioEnergy: Hydrogen Production" is focused on the biological machinery that microorganisms use to produce hydrogen gas. The book summarizes the achievements over the past decade in the biochemistry, structural and molecular biology, genomics and applied aspects of microbial H₂-production, including microbial fuel cells (MFC), by phototrophs such as purple sulfur and non-sulfur bacteria (*Thiocapsa* spp., *Rhodobacter* and *Rhodospseudomonas* spp.) microalgae (*Chlamydomonas*) and cyanobacteria (*Anabaena* spp.) along with anaerobes and thermophiles such as *Caldicellulosiruptor* and *Thermotoga*. This is the first book of this series entirely devoted to microbial bio-hydrogen production and is intended to be a precious source of information for PhD students, researchers and undergraduates from disciplines such as microbiology, biochemistry, biotechnology, photochemistry and chemical engineering, interested in basic and applied sciences.

GENOMICS OF CHLOROPLASTS AND MITOCHONDRIA

Springer Science & Business Media The past decade has witnessed an explosion of our knowledge on the structure, coding capacity and evolution of the genomes of the two DNA-containing cell organelles in plants: chloroplasts (plastids) and mitochondria. Comparative genomics analyses have provided new insights into the origin of organelles by endosymbioses and uncovered an enormous evolutionary dynamics of organellar genomes. In addition, they have greatly helped to clarify phylogenetic relationships, especially in algae and early land plants with limited morphological and anatomical diversity. This book, written by leading experts, summarizes our current knowledge about plastid and mitochondrial genomes in all major groups of algae and land plants. It also includes chapters on endosymbioses, plastid and mitochondrial mutants, gene expression profiling and methods for organelle transformation. The book is designed for students and researchers in plant molecular biology, taxonomy, biotechnology and evolutionary biology.

PROBABILITY

Springer Science & Business Media This is a text for a one-quarter or one-semester course in probability, aimed at students who have done a year of calculus. The book is organised so a student can learn the fundamental ideas of probability from the first three chapters without reliance on calculus. Later chapters develop these ideas further using calculus tools. The book contains more than the usual number of examples worked out in detail. The most valuable thing for students to learn from a course like this is how to pick up a probability problem in a new setting and relate it to the standard body of theory. The more they see this happen in class, and the more they do it themselves in exercises, the better. The style of the text is deliberately informal. My experience is that students learn more from intuitive explanations, diagrams, and examples than they do from theorems and proofs. So the emphasis is on problem solving rather than theory.

THE LEAF: A PLATFORM FOR PERFORMING PHOTOSYNTHESIS

Springer The leaf is an organ optimized for capturing sunlight and safely using that energy through the process of photosynthesis to drive the productivity of the plant and, through the position of plants as primary producers, that of Earth's biosphere. It is an exquisite organ composed of multiple tissues, each with unique functions, working synergistically to: (1) deliver water, nutrients, signals, and sometimes energy-rich carbon compounds throughout the leaf (xylem); (2) deliver energy-rich carbon molecules and signals within

the leaf during its development and then from the leaf to the plant once the leaf has matured (phloem); (3) regulate exchange of gasses between the leaf and the atmosphere (epidermis and stomata); (4) modulate the radiation that penetrates into the leaf tissues (trichomes, the cuticle, and its underlying epidermis); (5) harvest the energy of visible sunlight to transform water and carbon dioxide into energy-rich sugars or sugar alcohols for export to the rest of the plant (palisade and spongy mesophyll); and (6) store sugars and/or starch during the day to feed the plant during the night and/or acids during the night to support light-driven photosynthesis during the day (palisade and spongy mesophyll). Various regulatory controls that have been shaped through the evolutionary history of each plant species result in an incredible diversity of leaf form across the plant kingdom. Genetic programming is also flexible in allowing acclimatory phenotypic adjustments that optimize leaf functioning in response to a particular set of environmental conditions and biotic influences experienced by the plant. Moreover, leaves and the primary processes carried out by the leaf respond to changes in their environment, and the status of the plant, through multiple regulatory networks over time scales ranging from seconds to seasons. This book brings together the findings from laboratories at the forefront of research into various aspects of leaf function, with particular emphasis on the relationship to photosynthesis.

CANOPY PHOTOSYNTHESIS: FROM BASICS TO APPLICATIONS

Springer The last 30 years has seen the development of increasingly sophisticated models that quantify canopy carbon exchange. These models are now essential parts of larger models for prediction and simulation of crop production, climate change, and regional and global carbon dynamics. There is thus an urgent need for increasing expertise in developing, use and understanding of these models. This in turn calls for an advanced, yet easily accessible textbook that summarizes the “canopy science” and introduces the present and the future scientists to the theoretical background of the current canopy models. This book presents current knowledge of functioning of plant canopies, models and strategies employed to simulate canopy function, and the significance of canopy architecture, physiology and dynamics in ecosystems, landscape and biosphere.

NON-PHOTOCHEMICAL QUENCHING AND ENERGY DISSIPATION IN PLANTS, ALGAE AND CYANOBACTERIA

Springer Harnessing the sun’s energy via photosynthesis is at the core of sustainable production of food, fuel, and materials by plants, algae, and cyanobacteria. Photosynthesis depends on photoprotection against intense sunlight, starting with the safe removal of excess excitation energy from the light-harvesting system, which can be quickly and non-destructively assessed via non-photochemical quenching of chlorophyll fluorescence (NPQ). By placing NPQ into the context of whole-organism function, this book aims to contribute towards identification of plant and algal lines with superior stress resistance and productivity. By addressing agreements and open questions concerning photoprotection’s molecular mechanisms, this book contributes towards development of artificial photosynthetic systems. A comprehensive picture –from single molecules to organisms in ecosystems, and from leading expert’s views to practical information for non-specialists on NPQ measurement and terminology – is presented.

CYTOCHROME COMPLEXES: EVOLUTION, STRUCTURES, ENERGY TRANSDUCTION, AND SIGNALING

Springer An Introduction that describes the origin of cytochrome notation also connects to the history of the field, focusing on research in England in the pre-World War II era. The start of the modern era of studies on structure-function of cytochromes and energy-transducing membrane proteins was marked by the 1988 Nobel Prize in Chemistry, given to J. Deisenhofer, H. Michel, and R. Huber for determination of the crystal structure of the bacterial photosynthetic reaction center. An ab initio logic of presentation in the book discusses the evolution of cytochromes and hemes, followed by theoretical perspectives on electron transfer in proteins and specifically in cytochromes. There is an extensive description of the molecular structures of cytochromes and cytochrome complexes from eukaryotic and prokaryotic sources, bacterial, plant and animal. The presentation of atomic structure information has a major role in these discussions, and makes an important contribution to the broad field of membrane protein structure-function.

PHOTOSYNTHESIS: MOLECULAR APPROACHES TO SOLAR ENERGY CONVERSION

Springer Nature In the modern world, to meet increasing energy demands we need to develop new technologies allowing us to use eco-friendly carbon-neutral energy sources. Solar energy as the most promising renewable source could be the way to solve that problem, but it is variable depending on day time and season. From this side, the understanding of photosynthesis process could be of significant help for us to develop effective strategies of solar energy capturing, conversion, and storage. Plants, algae, and cyanobacteria perform photosynthesis, annually producing around 100 billion tons of dry biomass. Presently, the detailed studies of photosynthetic system structure make functional investigations of the photosynthetic process available, allowing scientists to construct artificial systems for solar energy transduction. This book summarizes exciting achievements in understanding of photosynthetic structures and mechanisms of this process made by world leaders in photosynthesis field, and contains information about modern ideas in development of revolutionary new technologies of energy conversion. Organized according to the natural sequence of events occurring during photosynthesis, the book includes information of both photosynthetic structures and mechanisms and its applications in bioenergetics issues.

AN INTRODUCTION TO STATISTICAL LEARNING

WITH APPLICATIONS IN R

Springer Science & Business Media An Introduction to Statistical Learning provides an accessible overview of the field of statistical learning, an essential toolset for making sense of the vast and complex data sets that have emerged in fields ranging from biology to finance to marketing to astrophysics in the past twenty years. This book presents some of the most important modeling and prediction techniques, along with relevant applications. Topics include linear regression, classification, resampling methods, shrinkage approaches, tree-based methods, support vector machines, clustering, and more. Color graphics and real-world examples are used to illustrate the methods presented. Since the goal of this textbook is to facilitate the use of these statistical learning techniques by

practitioners in science, industry, and other fields, each chapter contains a tutorial on implementing the analyses and methods presented in R, an extremely popular open source statistical software platform. Two of the authors co-wrote *The Elements of Statistical Learning* (Hastie, Tibshirani and Friedman, 2nd edition 2009), a popular reference book for statistics and machine learning researchers. An *Introduction to Statistical Learning* covers many of the same topics, but at a level accessible to a much broader audience. This book is targeted at statisticians and non-statisticians alike who wish to use cutting-edge statistical learning techniques to analyze their data. The text assumes only a previous course in linear regression and no knowledge of matrix algebra.

PLANT RESPIRATION: METABOLIC FLUXES AND CARBON BALANCE

Springer There are currently intense efforts devoted to understand plant respiration (from genes to ecosystems) and its regulatory mechanisms; this is because respiratory CO₂ production represents a substantial carbon loss in crops and in natural ecosystems. Thus, in addition to manipulating photosynthesis to increase plant biomass production, minimization of respiratory loss should be considered in plant science and engineering. However, respiratory metabolic pathways are at the heart of energy and carbon skeleton production and therefore, it is an essential component of carbon metabolism sustaining key processes such as photosynthesis. The overall goal of this book is to provide an insight in such interactions as well as an up-to-date view on respiratory metabolism, taking advantage of recent advances and concepts, from fluxomics to natural isotopic signal of plant CO₂ efflux. It is thus a nonoverlapping complement to Volume 18 in this series (*Plant Respiration From Cell to Ecosystem*) which mostly deals with mitochondrial electron fluxes and plant-scale respiratory losses.

WARRANTY DATA COLLECTION AND ANALYSIS

Springer Science & Business Media *Warranty Data Collection and Analysis* deals with warranty data collection and analysis and the problems associated with these activities. The book is both a research monograph and a handbook for practitioners. As a research monograph, it unifies the literature on warranty data collection and analysis, and presents the important results in an integrated manner. In the process, it highlights topics that require further research. As a handbook, it provides the essential methodology needed by practitioners involved with warranty data collection and analysis, along with extensive references to further results. Models and techniques needed for proper and effective analysis of data are included, together with guidelines for their use in warranty management, product improvement, and new product development. *Warranty Data Collection and Analysis* will be of interest to researchers (engineers and statisticians) and practitioners (engineers, applied statisticians, and managers) involved with product warranty and reliability. It is also suitable for use as a reference text for graduate-level reliability programs in engineering, applied statistics, operations research, and management.

DESIGN OF OBSERVATIONAL STUDIES

Springer Science & Business Media An observational study is an empiric investigation of effects caused by treatments when randomized experimentation is unethical or infeasible. Observational studies are common in most fields that study the effects of treatments on people, including medicine, economics, epidemiology, education, psychology, political science and sociology. The quality and strength of evidence provided by an observational study is determined largely by its design. *Design of Observational Studies* is both an introduction to statistical inference in observational studies and a detailed discussion of the principles that guide the design of observational studies. *Design of Observational Studies* is divided into four parts. Chapters 2, 3, and 5 of Part I cover concisely, in about one hundred pages, many of the ideas discussed in Rosenbaum's *Observational Studies* (also published by Springer) but in a less technical fashion. Part II discusses the practical aspects of using propensity scores and other tools to create a matched comparison that balances many covariates. Part II includes a chapter on matching in R. In Part III, the concept of design sensitivity is used to appraise the relative ability of competing designs to distinguish treatment effects from biases due to unmeasured covariates. Part IV discusses planning the analysis of an observational study, with particular reference to Sir Ronald Fisher's striking advice for observational studies, "make your theories elaborate." The second edition of his book, *Observational Studies*, was published by Springer in 2002.

ALL OF NONPARAMETRIC STATISTICS

Springer Science & Business Media This text provides the reader with a single book where they can find accounts of a number of up-to-date issues in nonparametric inference. The book is aimed at Masters or PhD level students in statistics, computer science, and engineering. It is also suitable for researchers who want to get up to speed quickly on modern nonparametric methods. It covers a wide range of topics including the bootstrap, the nonparametric delta method, nonparametric regression, density estimation, orthogonal function methods, minimax estimation, nonparametric confidence sets, and wavelets. The book's dual approach includes a mixture of methodology and theory.

MOLECULAR MAGNETS RECENT HIGHLIGHTS

Springer Science & Business Media The book deals with recent scientific highlights on molecular magnetism in Europe. Molecular magnetism is a new interdisciplinary discipline gathering together chemists and physicists, theoreticians and experimentalists. The book intends to provide the reader with documented answers to many current questions: How can chemists use soft conditions to transform molecules in light and transparent magnets. How does a molecular system can behave as a single molecule magnet. How to combine several functions in the same molecular system. How light can be used to switch molecular magnetic properties. How can molecules be used for ultimate high density information storage or in quantum computing. What kind of methods do physicists develop and use to explore these new properties of matter. What kind of concepts and calculations can be provided for theoreticians to design new objects and to better understand the field and to enlarge its exciting developments.

ESSENTIALS OF STOCHASTIC PROCESSES

Springer Building upon the previous editions, this textbook is a first course in stochastic processes taken by undergraduate and graduate students (MS and PhD students from math, statistics, economics, computer science, engineering, and finance departments) who have had a course in probability theory. It covers Markov chains in discrete and continuous time, Poisson processes, renewal processes, martingales, and option pricing. One can only learn a subject by seeing it in action, so there are a large number of examples and more than 300 carefully chosen exercises to deepen the reader's understanding. Drawing from teaching experience and student feedback, there are many new examples and problems with solutions that use TI-83 to eliminate the tedious details of solving linear equations by hand, and the collection of exercises is much improved, with many more biological examples. Originally included in previous editions, material too advanced for this first course in stochastic processes has been eliminated while treatment of other topics useful for applications has been expanded. In addition, the ordering of topics has been improved; for example, the difficult subject of martingales is delayed until its usefulness can be applied in the treatment of mathematical finance.

NANOPARTICLE-BASED DRUG DELIVERY IN CANCER TREATMENT

CRC Press The careful choice of nanoparticles as targets and in drug delivery routes enhances therapeutic efficacy in cancer. Nanoparticle-Based Drug Delivery in Cancer Treatment discusses nanotechnological developments of interfering RNA-based nanoparticles, delivery vehicles, and validated therapeutic RNAi-molecular target interactions and explains the results of clinical and preclinical trials. The book also gives strategies for universal methods of constructing hybrid organic-inorganic nanomaterials that can be widely applied in the biomedical field. Key Features: Reviews recent advances of nanoparticle-mediated siRNA delivery systems and their application in clinical trials for cancer therapy Focuses on material platforms that establish NPs and both localized and controlled gene silencing Emphasizes the most promising systems for clinical application Surveys progress in nanoparticle-based nanomedicine in cancer treatment Describes the most advanced of the nonviral nanocarriers for delivery of oligonucleotides to malignant blood cancer cells This book is a valuable resource for researchers, professors, and students researching drug delivery, gene carriers, cancer therapy, nanotechnology, and nanomaterials.

THE STRUCTURAL BASIS OF BIOLOGICAL ENERGY GENERATION

Springer Science & Business Media The fascinating machinery that life uses to harness energy is the focus of this volume of the Advances in Photosynthesis and Respiration series. Experts in the field communicate their insights into the mechanisms that govern biological energy conversion from the atomic scale to the physiological integration within organisms. By leveraging the power of current structural techniques the authors reveal the inner workings of life.

PHOTOSYNTHESIS IN BRYOPHYTES AND EARLY LAND PLANTS

Springer Science & Business Media Bryophytes, which are important constituents of ecosystems globally and often dominate carbon and water dynamics at high latitudes and elevations, were also among the pioneers of terrestrial photosynthesis. Consequently, in addition to their present day ecological value, modern representatives of these groups contain the legacy of adaptations that led to the greening of Earth. This volume brings together experts on bryophyte photosynthesis whose research spans the genome and cell through whole plant and ecosystem function and combines that with historical perspectives on the role of algal, bryophyte and vascular plant ancestors on terrestrialization of the Earth. The eighteen well-illustrated chapters reveal unique physiological approaches to achieving carbon balance and dealing with environmental limitations and stresses that present an alternative, yet successful strategy for land plants.

INTRODUCTION TO EMPIRICAL PROCESSES AND SEMIPARAMETRIC INFERENCE

Springer Science & Business Media Kosorok's brilliant text provides a self-contained introduction to empirical processes and semiparametric inference. These powerful research techniques are surprisingly useful for developing methods of statistical inference for complex models and in understanding the properties of such methods. This is an authoritative text that covers all the bases, and also a friendly and gradual introduction to the area. The book can be used as research reference and textbook.

NATURAL RESOURCES CONSERVATION AND ADVANCES FOR SUSTAINABILITY

Elsevier Natural Resources Conservation and Advances for Sustainability addresses the latest challenges associated with the management and conservation of natural resources. It presents interdisciplinary approaches to promote advances in solving these challenges. By examining what has already been done and analyzing it in the context of what still needs to be done, particularly in the context of latest technologies and sustainability, the book helps to identify ideal methods for natural resource management and conservation. Each chapter begins with a graphical abstract and presents complicated or detailed content in the form of figures or tables. In addition, the book compares the latest techniques with conventional techniques and troubleshoots conventional methods with modifications, making it a practical resource for researchers in environmental science and natural resource management. Discusses the pros and cons of past and current endeavors related to natural resource management Presents recent technologies and methods for management and conservation, particularly with applications for sustainability Covers a variety of disciplines, from environmental science to life science Includes a graphical abstract as well as a section on significant achievements in the field and future perspectives

FUNDAMENTALS OF PHOTONICS

John Wiley & Sons Fundamentals of Photonics A complete, thoroughly updated, full-color third edition Fundamentals of Photonics, Third Edition is a self-contained and up-to-date introductory-level textbook that thoroughly surveys this rapidly expanding area of engineering and applied physics. Featuring a blend of theory and applications, coverage includes detailed accounts of the primary

theories of light, including ray optics, wave optics, electromagnetic optics, and photon optics, as well as the interaction of light and matter. Presented at increasing levels of complexity, preliminary sections build toward more advanced topics, such as Fourier optics and holography, photonic-crystal optics, guided-wave and fiber optics, LEDs and lasers, acousto-optic and electro-optic devices, nonlinear optical devices, ultrafast optics, optical interconnects and switches, and optical fiber communications. The third edition features an entirely new chapter on the optics of metals and plasmonic devices. Each chapter contains highlighted equations, exercises, problems, summaries, and selected reading lists. Examples of real systems are included to emphasize the concepts governing applications of current interest. Each of the twenty-four chapters of the second edition has been thoroughly updated.

MISSING DATA

ANALYSIS AND DESIGN

Springer Science & Business Media Missing data have long plagued those conducting applied research in the social, behavioral, and health sciences. Good missing data analysis solutions are available, but practical information about implementation of these solutions has been lacking. The objective of *Missing Data: Analysis and Design* is to enable investigators who are non-statisticians to implement modern missing data procedures properly in their research, and reap the benefits in terms of improved accuracy and statistical power. *Missing Data: Analysis and Design* contains essential information for both beginners and advanced readers. For researchers with limited missing data analysis experience, this book offers an easy-to-read introduction to the theoretical underpinnings of analysis of missing data; provides clear, step-by-step instructions for performing state-of-the-art multiple imputation analyses; and offers practical advice, based on over 20 years' experience, for avoiding and troubleshooting problems. For more advanced readers, unique discussions of attrition, non-Monte-Carlo techniques for simulations involving missing data, evaluation of the benefits of auxiliary variables, and highly cost-effective planned missing data designs are provided. The author lays out missing data theory in a plain English style that is accessible and precise. Most analysis described in the book are conducted using the well-known statistical software packages SAS and SPSS, supplemented by Norm 2.03 and associated Java-based automation utilities. A related web site contains free downloads of the supplementary software, as well as sample empirical data sets and a variety of practical exercises described in the book to enhance and reinforce the reader's learning experience. *Missing Data: Analysis and Design* and its web site work together to enable beginners to gain confidence in their ability to conduct missing data analysis, and more advanced readers to expand their skill set.

MODELING AND SIMULATION OF EVERYDAY THINGS

CRC Press How can computer modeling and simulation tools be used to understand and analyze common situations and everyday problems? Readers will find here an easy-to-follow, enjoyable introduction for anyone even with little background training. Examples are incorporated throughout to stimulate interest and engage the reader. Build the necessary skillsets with operating systems, editing, languages, commands, and visualization. Obtain hands-on examples from sports, accidents, and disease to problems of heat transfer, fluid flow, waves, and groundwater flow. Includes discussion of parallel computing and graphics processing units. This introductory, practical guide is suitable for students at any level up to professionals looking to use modeling and simulation to help solve basic to more advanced problems. Michael W. Roth, PhD, serves as Dean of the School of STEM and Business at Hawkeye Community College in Waterloo, Iowa. He was most recently Chair for three years at Northern Kentucky University's Department of Physics, Geology and Engineering Technology, and holds several awards for teaching excellence.

CHEMICAL AND PHYSICAL BEHAVIOR OF HUMAN HAIR

Springer Science & Business Media Human hair is the subject of a wide range of scientific investigations. Its chemical and physical properties are of importance to the cosmetics industry, forensic scientists, and to biomedical researchers. This updated and enlarged fourth edition continues the tradition of its predecessor as being the definitive monograph on the subject. It now contains new information on various topics including: chemical hair damage, the cause of dandruff, skin and eye irritation, hair straightening, and others. *Chemical and Physical Behavior of Human Hair* is a teaching guide and reference volume for cosmetic chemists and other scientists in the hair products industry, academic researchers studying hair and hair growth, textile scientists, and forensic specialists.

CELL-FREE PROTEIN EXPRESSION

Springer Science & Business Media Cell-free protein synthesis is coming of age! Motivated by an escalating need for efficient protein synthesis and empowered by readily accessible cell-free protein synthesis kits, the technology is expanding both in the range of feasible proteins and in the ways that proteins can be labeled and modified. This volume follows "*Cell-Free Translation Systems*", edited by Professor Alexander S. Spirin in 2002. Since then, an impressive collection of new work has emerged that demonstrates a substantial expansion of capability. In this volume, we show that proteins now can be efficiently produced using PCR products as DNA templates and that even membrane proteins and proteins with multiple disulfide proteins are obtained at high yields. Many additional advances are also presented. It is an exciting time for protein synthesis technology.

STATISTICAL LEARNING WITH SPARSITY

THE LASSO AND GENERALIZATIONS

CRC Press 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 l_1 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.

CHEMISTRY AND PHYSICS OF SOLID SURFACES VI

Springer Science & Business Media This volume contains review articles which were written by the invited speakers of the seventh International Summer Institute in Surface Science (ISIS), held at the University of Wisconsin - Milwaukee in July 1985. The form of ISIS is a set of tutorial review lectures presented over a one-week period by internationally recognized experts on various aspects of surface science. Each speaker is asked, in addition, to write a review article on his lecture topic. No single volume in the series Chemistry and Physics of Solid Surfaces can possibly cover the entire field of modern surface science. However, the series as a whole is intended to provide experts and students alike with a comprehensive set of reviews and literature references, particularly emphasizing the gas-solid interface. The collected articles from previous Summer Institutes have been published under the following titles: Surface Science: Recent Progress and Perspectives, Crit. Rev. Solid State Sci. 4, 125-559 (1974) Chemistry and Physics of Solid Surfaces, Vols. I, II, and III (CRC Press, Boca Raton, FL 1976, 1979 and 1982), Vols. IV and V, Springer Ser. Chern. Phys., Vols. 20 and 35, (Springer, Berlin, Heidelberg 1982 and 1984). The field of catalysis, which has provided the major impetus for the development of modern surface science, lost two of its pioneers during 1984 and 1985: Professors G.-M. Schwab (1899-1984) and p.k. Emmett (1900-1985).

MAKING STARSHIPS AND STARGATES

THE SCIENCE OF INTERSTELLAR TRANSPORT AND ABSURDLY BENIGN WORMHOLES

Springer Science & Business Media To create the exotic materials and technologies needed to make stargates and warp drives is the holy grail of advanced propulsion. A less ambitious, but nonetheless revolutionary, goal is finding a way to accelerate a spaceship without having to lug along a gargantuan reservoir of fuel that you blow out a tailpipe. Tethers and solar sails are conventional realizations of the basic idea. There may now be a way to achieve these lofty objectives. "Making Starships and Stargates" will have three parts. The first will deal with information about the theories of relativity needed to understand the predictions of the effects that make possible the "propulsion" techniques, and an explanation of those techniques. The second will deal with experimental investigations into the feasibility of the predicted effects; that is, do the effects exist and can they be applied to propulsion? The third part of the book - the most speculative - will examine the question: what physics is needed if we are to make wormholes and warp drives? Is such physics plausible? And how might we go about actually building such devices? This book pulls all of that material together from various sources, updates and revises it, and presents it in a coherent form so that those interested will be able to find everything of relevance all in one place.

SOFTWARE DEVELOPMENT FOR SAP R/3®

DATA DICTIONARY, ABAP/4®, INTERFACES

Springer Science & Business Media The ABAP/4 workbench presented here is built on the enterprise-wide data model of R/3 and contains all the tools needed for the effective development of large program systems in distributed teams. The book explains how to apply the development environment such that R/3 users and advisors can extend and adapt the system to their special needs. In particular, the text focuses on how to solve interface problems and the integration of desktop PCs into R/3. The source code for all examples is included on the accompanying diskette.

VEHICLE DYNAMICS AND CONTROL

Springer Science & Business Media Vehicle Dynamics and Control provides a comprehensive coverage of vehicle control systems and the dynamic models used in the development of these control systems. The control system applications covered in the book include cruise control, adaptive cruise control, ABS, automated lane keeping, automated highway systems, yaw stability control, engine control, passive, active and semi-active suspensions, tire-road friction coefficient estimation, rollover prevention, and hybrid electric vehicles. In developing the dynamic model for each application, an effort is made to both keep the model simple enough for control system design but at the same time rich enough to capture the essential features of the dynamics. A special effort has been made to explain the several different tire models commonly used in literature and to interpret them physically. In the second edition of the book, chapters on roll dynamics, rollover prevention and hybrid electric vehicles have been added, and the chapter on electronic stability control has been enhanced. The use of feedback control systems on automobiles is growing rapidly. This book is intended to serve as a useful resource to researchers who work on the development of such control systems, both in the automotive industry and at universities. The book can also serve as a textbook for a graduate level course on Vehicle Dynamics and Control.

BERGEY'S MANUAL® OF SYSTEMATIC BACTERIOLOGY

VOLUME 2: THE PROTEOBACTERIA, PART B: THE GAMMAPROTEOBACTERIA

Springer Science & Business Media Includes a description of the Gammaproteobacteria (1203 pages, 222 figures, and 300 tables). This large taxon includes many well known medically and environmentally important groups. Especially notable are the Enterobacteriaceae, Aeromonas, Beggiatoa, Chromatium, Legionella, Nitrococcus, Oceanospirillum, Pseudomonas, Rickettsiella, Vibrio,

Xanthomonas and 155 additional genera.

SPHERICAL INVERSION ON $SL_n(R)$

Springer Science & Business Media For the most part the authors are concerned with $SL_n(R)$ and with invariant differential operators, the invariance being with respect to various subgroups. To a large extent, this book carries out the general results of Harish-Chandra.

FRACTALS IN MULTIMEDIA

Springer Science & Business Media This IMA Volume in Mathematics and its Applications FRACTALS IN MULTIMEDIA is a result of a very successful three-day minisymposium on the same title. The event was an integral part of the IMA annual program on Mathematics in Multimedia, 2000-2001. We would like to thank Michael F. Barnsley (Department of Mathematics and Statistics, University of Melbourne), Dietmar Saupe (Institut für Informatik, Universität Leipzig), and Edward R. Vrscay (Department of Applied Mathematics, University of Waterloo) for their excellent work as organizers of the meeting and for editing the proceedings. We take this opportunity to thank the National Science Foundation for their support of the IMA. Series Editors Douglas N. Arnold, Director of the IMA Fadil Santosa, Deputy Director of the IMA v PREFACE This volume grew out of a meeting on Fractals in Multimedia held at the IMA in January 2001. The meeting was an exciting and intense one, focused on fractal image compression, analysis, and synthesis, iterated function systems and fractals in education. The central concerns of the meeting were to establish within these areas where we are now and to develop a vision for the future.

TIME SERIES ANALYSIS AND ITS APPLICATIONS

ACOUSTICS TODAY

STATISTICS FOR HIGH-DIMENSIONAL DATA

METHODS, THEORY AND APPLICATIONS

Springer Science & Business Media Modern statistics deals with large and complex data sets, and consequently with models containing a large number of parameters. This book presents a detailed account of recently developed approaches, including the Lasso and versions of it for various models, boosting methods, undirected graphical modeling, and procedures controlling false positive selections. A special characteristic of the book is that it contains comprehensive mathematical theory on high-dimensional statistics combined with methodology, algorithms and illustrations with real data examples. This in-depth approach highlights the methods' great potential and practical applicability in a variety of settings. As such, it is a valuable resource for researchers, graduate students and experts in statistics, applied mathematics and computer science.