Clinical Prediction Models A Practical Approach To Development Validation And Updating Statistics For Biology And Health

Medical Risk Prediction Models: With Ties to Machine Learning is a hands-on book for clinicians, epidemiologists, and professional statisticians who need to make or evaluate a statistical prediction model based on data. The subject of the book is the patient's individualized probability of a medical event within a given time horizon. Gerds and Kattan describe the mathematical details of making and evaluating a statistical prediction model in a highly pedagogical manner while avoiding mathematical notation. Read this book when you are in doubt about whether a Cox regression model predicts better than a random survival forest. Features: All you need to know to correctly make an online risk calculator from scratch Discrimination, calibration, and predictive performance with censored data and competing risks R-code and illustrative examples Interpretation of prediction performance via benchmarks Comparison and combination of rival modeling strategies via cross-validation Thomas A. Gerds is a professor at the Biostatistics Unit at the University of Copenhagen and is affiliated with the Danish Heart Foundation. He is the author of several R-packages on CRAN and has taught statistics courses to non-statisticians for many years. Michael W. Kattan is a highly cited author and Chair of the Department of Quantitative Health Sciences at Cleveland Clinic. He is a Fellow of the American Statistical Association and has received two awards from the Society for Medical Decision Making: the Eugene L. Saenger Award for Distinguished Service, and the John M. Eisenberg Award for Practical Application of Medical Decision-Making Research.

This book focuses on several underestimated topics in palliative care. Seven chapters have been divided into four sections: Ethical Issues, Volunteers in Palliative Care, Special Circumstances, and Prognostic Models in Palliative Care. The underestimated topics concern several ethical themes such as the Balance sheets of suffering, Good Death, Euthanasia, Assisted suicide, and the question of the 'Do not attempt resuscitation'. In addition, the role of volunteers, the approach to non-malignant diseases such as diabetes and Amyotrophic Lateral Sclerosis are also addressed. Finally, the features and utility of different tools in order to facilitate optimal decision making for both physicians and patients, are given in details. This book will aid several figures facing the daily challenges of palliative care. Clinicians, nurses, volunteers, students and resident trainees, and other professionals can find this volume useful in their very difficult but extraordinarily fascinating mission.

A comprehensive review of an area of machine learning that deals with the use of unlabeled data in classification problems: state-of-the-art algorithms, a taxonomy of the field, applications, benchmark experiments, and directions for future research. In the field of machine learning, semi-supervised learning (SSL) occupies the middle ground, between supervised learning (in which all training examples are labeled) and unsupervised learning (in which no label data are given). Interest in SSL has increased in recent years, particularly because of application domains in which unlabeled data are plentiful, such as images, text, and bioinformatics. This first comprehensive overview of SSL presents state-of-the-art algorithms, a taxonomy of the field, selected applications, benchmark experiments, and perspectives on ongoing and future research.Semi-Supervised Learning first presents the key assumptions and ideas underlying the field: smoothness, cluster or low-density separation, manifold structure, and transduction. The core of the book is the presentation of SSL methods, organized according to algorithmic strategies. After an examination of generative models, the book describes algorithms that implement the low-density separation assumption, graph-based methods, and algorithms that perform two-step learning. The book then discusses SSL applications and offers guidelines for SSL practitioners by analyzing the results of extensive benchmark experiments. Finally, the book looks at interesting directions for SSL research. The book closes with a discussion of the relationship between semi-supervised learning and transduction.

Psychiatry is dedicated to understanding mental disorders and helping people struggling with them live fulfilling lives. Although current treatment modalities can be remarkably effective at improving patients' quality of life and mitigating the burden of symptoms for disorders like depression, bipolar disorder, or posttraumatic stress disorder, finding the right treatment for an individual can be a long and fraught process during which symptoms can worsen the risks associated with other health conditions. Precision psychiatry, as outlined in this groundbreaking book, presents a new path forward. By integrating findings from basic and clinical neuroscience, clinical practice, and population-level data, the field seeks to develop therapeutic approaches tailored for specific individuals with a specific constellation of health issues, characteristics, strengths, and symptoms. This guide harnesses the expertise of more than three dozen contributors in diverse areas of interest, including neuroimaging, electrophysiology, neurocognition, behavioral science, machine learning, and pharmacotherapy, to examine the current state of precision medicine in psychiatry and explore future areas of advancement. Numerous case examples illustrate and apply the principles of precision psychiatry to mood and anxiety disorders, as well as schizophrenia, in adult patients, emphasizing the push to develop biomarkers and algorithms that will identify subtypes of patients that may be underserved by conventional therapies. In these pages, educators, trainees, and clinicians will find the latest research in precise classification, treatment planning, and early identification across a spectrum of psychiatric disorders--and the foundation for a future where one-size-fits-all treatments are replaced by modalities optimized for individual patients across all stages of a disorder.

This open access book explores ways to leverage information technology and machine learning to combat disease and promote health, especially in resource-constrained settings. It focuses on digital disease surveillance through the application of machine learning to non-traditional data sources. Developing countries are uniquely prone to large-scale emerging infectious disease outbreaks due to disruption of ecosystems, civil unrest, and poor healthcare infrastructure – and without comprehensive surveillance, delays in outbreak identification, resource deployment, and case management can be catastrophic. In combination with context-informed analytics, students will learn how non-traditional digital disease data sources – including news media, social media, Google Trends, and Google Street View – can fill critical knowledge gaps and help inform on-the-ground decision-making when formal surveillance systems are insufficient.

Individual Participant Data Meta-Analysis: A Handbook for Healthcare Research provides a comprehensive introduction to the fundamental principles and methods that healthcare researchers need when considering, conducting or using individual participant data (IPD) meta-analysis projects. Written and edited by researchers with substantial experience in the field, the book details key concepts and practical guidance for each stage of an IPD meta-analysis project, alongside illustrated examples and summary learning points. Split into five parts, the book chapters take the reader through the journey from initiating and planning IPD projects to obtaining, checking, and meta-analysing IPD, and appraising and reporting findings. The book initially focuses on the synthesis of IPD from randomised trials to evaluate treatment effects, including the evaluation of participant-level effect modifiers (treatment-covariate interactions). Detailed extension is then made to specialist topics such as diagnostic test accuracy, prognostic factors, risk prediction models, and advanced statistical topics such as multivariate and network meta-analysis, power calculations, and missing data. Intended for a broad audience, the book will enable the reader to: Understand the advantages of the IPD approach and decide when it is needed over a conventional systematic review Recognise the scope, resources and challenges of IPD meta-analysis projects Appreciate the importance of a multi-disciplinary project team and close collaboration with the original study investigators Understand how to obtain, check, manage and harmonise IPD from multiple studies Examine risk of bias (quality) of IPD and minimise potential biases throughout the project Understand fundamental statistical methods for IPD meta-analysis, including two-stage and one-stage approaches (and their differences), and statistical software to implement them Clearly report and disseminate IPD meta-analyses to inform policy, practice and future research Critically appraise existing IPD meta-analysis projects Address specialist topics such as effect modification, multiple correlated outcomes, multiple treatment comparisons, non-linear relationships, test accuracy at multiple thresholds, multiple imputation, and developing and validating clinical prediction models Detailed examples and case studies are provided throughout.

The Tutorials in Biostatistics have become a very popular feature of the prestigious Wiley journal, Statistics in Medicine (SIM). The introductory style and practical focus make them accessible to a wide audience including medical practitioners with limited statistical knowledge. This book represents the first of two volumes presenting the best tutorials published in SIM, focusing on statistical methods in clinical studies. Topics include the design and analysis of clinical trials, epidemiology, survival analysis, and data monitoring. Each tutorial is focused on a medical problem, has been fully peer-reviewed and edited, and is authored by leading researchers in biostatistics. Many articles include an appendix on the latest developments since publication in the journal and additional references. This will appeal to statisticians working in medical research, as well as statistically-minded clinicians, biologists, epidemiologists and geneticists. It will also appeal to graduate students of biostatistics.

Discover best practices for real world data research with SAS code and examples Real world health care data is common and growing in use with sources such as observational studies, patient registries, electronic medical record databases, insurance healthcare claims databases, as well as data from pragmatic trials. This data serves as the basis for the growing use of real world evidence in medical decision-making. However, the data itself is not evidence. Analytical methods must be used to turn real world data into valid and meaningful evidence. Real World Health Care Data Analysis: Causal Methods and Implementation Using SAS brings together best practices for causal comparative effectiveness analyses based on real world data in a single location and provides SAS code and examples to make the analyses relatively easy and efficient. The book focuses on analytic methods adjusted for time-independent confounding, which are useful when comparing the effect of different potential interventions on some outcome of interest when there is no randomization. These methods include: propensity score matching, stratification methods, weighting methods, regression methods, and approaches that combine and average across these methods methods for comparing two interventions as well as comparisons between three or more interventions algorithms for personalized medicine sensitivity analyses for unmeasured confounding

At the intersection of computer science and healthcare, data analytics has emerged as a promising tool for solving problems across many healthcare-related disciplines. Supplying a comprehensive overview of recent healthcare analytics research, Healthcare Data Analytics provides a clear understanding of the analytical techniques currently available to solve healthcare problems. The book details novel techniques for acquiring, handling, retrieving, and making best use of healthcare data. It analyzes recent developments in healthcare computing and discusses emerging technologies that can help improve the health and well-being of patients. Written by prominent researchers and experts working in the healthcare domain, the book sheds light on many of the computational challenges in the field of medical informatics. Each chapter in the book is structured as a "survey-style" article discussing the prominent research issues and the advances made on that research topic. The book is divided into three major categories: Healthcare Data Sources and Basic Analytics - details the various healthcare data sources and analytical techniques used in the processing and analysis of such data Advanced Data Analytics for Healthcare - covers advanced analytical methods, including clinical prediction models, temporal pattern mining methods, and visual analytics Applications and Practical Systems for Healthcare - covers the applications of data analytics to pervasive healthcare, fraud detection, and drug discovery along with systems for medical imaging and decision support Computer scientists are usually not trained in domain-specific medical concepts, whereas medical practitioners and researchers have limited exposure to the data analytics area. The contents of this book will help to bring together these diverse communities by carefully and comprehensively discussing the most relevant contributions from each domain.

Advances in computing hardware and algorithms have dramatically improved the ability to simulate complex processes computationally. Today's simulation capabilities offer the prospect of addressing questions that in the past could be addressed only by resource-intensive experimentation, if at all. Assessing the Reliability of Complex Models recognizes the ubiquity of uncertainty in computational estimates of reality and the necessity for its quantification. As computational science and engineering have matured, the process of quantifying or bounding uncertainties in a computational estimate of a physical quality of interest has evolved into a small set of interdependent tasks: verification, validation, and uncertainty of quantification (VVUQ). In recognition of the increasing importance of computational simulation and the increasing need to assess uncertainties in computational results, the National Research Council was asked to study the mathematical foundations of VVUQ and to recommend steps that will ultimately lead to improved processes. Assessing the Reliability of Complex Models discusses changes in education of professionals and dissemination of information that should enhance the ability of future VVUQ practitioners to improve and properly apply VVUQ methodologies to difficult problems, enhance the ability of VVUQ customers to understand VVUQ results and use them to make informed decisions, and enhance the ability of all VVUQ stakeholders to communicate with each other. This report is an essential resource for all decision and policy makers in the field, students, stakeholders, UQ experts, and VVUQ educators and practitioners.

Introduction to AI techniques for Renewable Energy System Artificial Intelligence (AI) techniques play an essential role in modeling, analysis, and prediction of the performance and control of renewable energy. The algorithms used to model, control, or predict performances of the energy systems are complicated, involving differential equations, enormous computing power, and time requirements. Instead of complex rules and mathematical routines, AI techniques can learn critical information patterns within a multidimensional information domain. Design, control, and operation of renewable energy systems require a long-term series of meteorological data such as solar radiation, temperature, or wind data. Such long-term measurements are often non-existent for most of the interest locations or, wherever they are available, they suffer from several shortcomings, like inferior quality of data, and in-sufficient long series. The book focuses on AI techniques to overcome these problems. It summarizes commonly used AI methodologies in renewal energy, with a particular emphasis on neural networks, fuzzy logic, and genetic algorithms. It outlines selected AI applications for renewable energy. In particular, it discusses methods using the AI approach for prediction and modeling of solar radiation, seizing, performances, and controls of the solar photovoltaic (PV) systems. Features Focuses on a significant area of concern to develop a foundation for the implementation of renewable energy system with intelligent techniques Showcases how researchers working on renewable energy systems can correlate their work with intelligent and machine learning approaches Highlights international standards for intelligent renewable energy systems design, reliability, and maintenance Provides insights on solar cell, biofuels, wind, and other renewable energy systems design and characterization, including the equipment for smart energy systems This book, which includes real-life examples, is aimed at undergraduate and graduate students and academicians studying AI techniques used in renewal energy systems.

Prediction models are important in various fields, including medicine, physics, meteorology, and finance. Prediction models will become more relevant in the medical field with the increase in knowledge on potential predictors of outcome, e.g. from genetics. Also, the number of applications will increase, e.g. with targeted early detection of disease, and individualized approaches to diagnostic testing and treatment. The current era of evidence-based medicine asks for an individualized approach to medical decision-making. Evidence-based medicine has a central place for meta-analysis to summarize results from randomized controlled trials; similarly prediction models may summarize the effects of predictors to provide individu- ized predictions of a diagnostic or prognostic outcome. Why Read This Book? My motivation for working on this book stems primarily from the fact that the development and applications of prediction models are often suboptimal in medical publications. With this book I hope to contribute to better understanding of relevant issues and give practical advice on better modelling strategies than are nowadays widely used. Issues include: (a) Better predictive modelling is sometimes easily possible; e.g. a large data set with high quality data is available, but all continuous predictors are dich- omized, which is known to have several disadvantages.

"What is going to happen to me?" Most patients ask this question during a clinical encounter with a health professional. As well as learning what problem they have (diagnosis) and what needs to be done about it (treatment), patients want to know about their future health and wellbeing (prognosis). Prognosis research can provide answers to this question and satisfy the need for individuals to understand the possible outcomes of their condition, with and without treatment. Central to modern medical practise, the topic of prognosis is the basis of decision making in healthcare and policy development. It translates basic and clinical science into practical care for patients and populations. Prognosis Research in Healthcare: Concepts, Methods and Impact provides a comprehensive overview of the field of prognosis and prognosis research and gives a global perspective on how prognosis research and prognostic information can improve the outcomes of healthcare. It details how to design, carry out, analyse and report prognosis studies, and how prognostic information can be the basis for tailored, personalised healthcare. In particular, the book discusses how information about the characteristics of people, their health, and environment can be used to predict an individual's future health. Prognosis Research in Healthcare: Concepts, Methods and Impact, addresses all types of prognosis research and provides a practical step-by-step guide to undertaking and interpreting prognosis research studies, ideal for medical students, health researchers, healthcare professionals and methodologists, as well as for guideline and policy makers in healthcare wishing to learn more about the field of prognosis.

A practical approach to using regression and computation to solve real-world problems of estimation, prediction, and causal inference. Many texts are excellent sources of knowledge about individual statistical tools, but the art of data analysis is about choosing and using multiple tools. Instead of presenting isolated techniques, this text emphasizes problem solving strategies that address the many issues arising when developing multivariable models using real data and not standard textbook examples. It includes imputation methods for dealing with missing data effectively, methods for dealing with nonlinear relationships and for making the estimation of transformations a formal part of the modeling process, methods for dealing with "too many variables to analyze and not enough observations," and powerful model validation techniques based on the bootstrap. This text realistically deals with model uncertainty and its effects on inference to achieve "safe data mining".

Advances in medical, biomedical and health services research have reduced the level of uncertainty in clinical practice. Clinical practice guidelines (CPGs) complement this progress by establishing standards of care backed by strong scientific evidence. CPGs are statements that include recommendations intended to optimize patient care. These statements are informed by a systematic review of evidence and an assessment of the benefits and costs of alternative care options. Clinical Practice Guidelines We Can Trust examines the current state of clinical practice guidelines and how they can be improved to enhance healthcare quality and patient outcomes. Clinical practice guidelines now are ubiquitous in our healthcare system. The Guidelines International Network (GIN) database currently lists more than 3,700 guidelines from 39 countries. Developing guidelines presents a number of challenges including lack of transparent methodological practices, difficulty reconciling conflicting guidelines, and conflicts of interest. Clinical Practice Guidelines We Can Trust explores questions surrounding the quality of CPG development processes and the establishment of standards. It proposes eight standards for developing trustworthy clinical practice guidelines emphasizing transparency; management of conflict of interest ; systematic review--guideline development intersection; establishing evidence foundations for and rating strength of guideline recommendations; articulation of recommendations; external review; and updating. Clinical Practice Guidelines We Can Trust shows how clinical practice guidelines can enhance clinician and patient decision-making by translating complex scientific research findings into recommendations for clinical practice that are relevant to the individual patient encounter, instead of implementing a one size fits all approach to patient care. This book contains information directly related to the work of the Agency for Healthcare Research and Quality (AHRQ), as well as various Congressional staff and policymakers. It is a vital resource for medical specialty societies, disease advocacy groups, health professionals, private and international organizations that develop or use clinical practice guidelines, consumers, clinicians, and payers.

"Clinical versus Statistical Prediction" is Paul Meehl's famous examination of benefits and disutilities related to the different ways of combining information to make predictions. It is a clarifying analysis as relevant today as when it first appeared. A major methodological problem for clinical psychology concerns the relation between clinical and actuarial methods of arriving at diagnoses and predicting behavior. Without prejudging the question as to whether these methods are fundamentally different, we can at least set forth the obvious distinctions between them in practical applications. The problem is to predict how a person is going to behave: What is the most accurate way to go about this task? "Clinical versus Statistical Prediction" offers a penetrating and thorough look at the pros and cons of human judgment versus actuarial integration of information as applied to the prediction problem. Widely considered the leading text on the subject, Paul Meehl's landmark analysis is reprinted here in its entirety, including his updated preface written forty-two years after the first publication of the book. This classic work is a must-have for students and practitioners interested in better understanding human behavior, for anyone wanting to make the most accurate decisions from all sorts of data, and for those interested in the ethics and intricacies of prediction. As Meehl puts it, " "When one is dealing with human lives and life opportunities, it is immoral to adopt a mode of decision-making which has been demonstrated repeatedly to be either inferior in success rate or, when equal, costlier to the client or the taxpayer.""

Predictive Modeling of Drug Sensitivity gives an overview of drug sensitivity modeling for personalized medicine that includes data characterizations, modeling techniques, applications, and research challenges. It covers the major mathematical techniques used for modeling drug sensitivity, and includes the requisite biological knowledge to guide a user to apply the mathematical tools in different biological scenarios. This book is an ideal reference for computer scientists, engineers, computational biologists, and mathematicians who want to understand and apply multiple approaches and methods to drug sensitivity modeling. The reader will learn a broad range of mathematical and computational techniques applied to the modeling of drug sensitivity, biological concepts, and measurement techniques crucial to drug sensitivity modeling, how to design a combination of drugs under different constraints, and the applications of drug sensitivity prediction methodologies. Applies mathematical and computational approaches to biological problems Covers all aspects of drug sensitivity modeling, starting from initial data generation to final experimental validation Includes the latest results on drug sensitivity modeling that is based on updated research findings Provides information on existing data and software resources for applying the mathematical and computational tools available

This is a comprehensive major reference work for our SpringerReference program covering clinical trials. Although the core of the Work will focus on the analysis and interpretation of scientific data gleaned from the trial process, a broad spectrum of clinical trial principles and practice areas will be covered in detail. This is an important time to develop such a Work, as drug safety and efficacy cannot be guaranteed and regulated without the Clinical Trials process. Because of an immense and continuing to grow international disease burden, pharmaceutical and biotechnology companies continue to develop new drugs. Clinical trials have also become extremely globalized in the past 15 years, with over 225,000 international trials ongoing at this point in time. Principles in Practice of Clinical Trials is truly an interdisciplinary that will be divided into the following areas: 1) Clinical Trials Basic Perspectives2) Regulation and Oversight3) Basic Trial Designs4) Advanced Trial Designs5) Analysis6) Trial Publication7) Topics Related Specific Populations and Legal Aspects of Clinical Trials The Work is designed to be comprised of 175 chapters and approximately 2500 pages. The Work will be oriented like many of our SpringerReference Handbooks, presenting detailed and comprehensive expository chapters on broad subjects. The Editors are major figures in the field of clinical trials, and both have

written textbooks on the topic. There will also be a slate of 7-8 renowned associate editors that will edit individual sections of the Reference.

The high-level language of R is recognized as one of the most powerful and flexible statistical software environments, and is rapidly becoming the standard setting for quantitative analysis, statistics and graphics. R provides free access to unrivalled coverage and cutting-edge applications, enabling the user to apply numerous statistical methods ranging from simple regression to time series or multivariate analysis. Building on the success of the author's bestselling Statistics: An Introduction using R, The R Book is packed with worked examples, providing an all inclusive guide to R, ideal for novice and more accomplished users alike. The book assumes no background in statistics or computing and introduces the advantages of the R environment, detailing its applications in a wide range of disciplines. Provides the first comprehensive reference manual for the R language, including practical guidance and full coverage of the graphics facilities. Introduces all the statistical models covered by R, beginning with simple classical tests such as chi-square and t-test. Proceeds to examine more advance methods, from regression and analysis of variance, through to generalized linear models, generalized mixed models, time series, spatial statistics, multivariate statistics and much more. The R Book is aimed at undergraduates, postgraduates and professionals in science, engineering and medicine. It is also ideal for students and professionals in statistics, economics, geography and the social sciences.

Explanatory Model Analysis Explore, Explain and Examine Predictive Models is a set of methods and tools designed to build better predictive models and to monitor their behaviour in a changing environment. Today, the true bottleneck in predictive modelling is neither the lack of data, nor the lack of computational power, nor inadequate algorithms, nor the lack of flexible models. It is the lack of tools for model exploration (extraction of relationships learned by the model), model explanation (understanding the key factors influencing model decisions) and model examination (identification of model weaknesses and evaluation of model's performance). This book presents a collection of model agnostic methods that may be used for any black-box model together with real-world applications to classification and regression problems.

This book highlights recent research on intelligent systems and nature-inspired computing. It presents 62 selected papers from the 19th International Conference on Intelligent Systems Design and Applications (ISDA 2019), which was held online. The ISDA is a premier conference in the field of computational intelligence, and the latest installment brought together researchers, engineers and practitioners whose work involves intelligent systems and their applications in industry. Including contributions by authors from 33 countries, the book offers a valuable reference guide for all researchers, students and practitioners in the fields of Computer Science and Engineering.

Publisher's Note: Products purchased from Third Party sellers are not guaranteed by the publisher for quality, authenticity, or access to any online entitlements included with the product. The world-renowned experts at JAMA® explain statistical analysis and the methods used in medical research Written in the language and style appropriate for clinicians and researchers, this new JAMA Guide to Statistics and Methods provides explanations and expert discussion of the statistical analytic approaches and methods used in the medical research reported in articles appearing in JAMA and the JAMA Network journals. This addition to the JAMAevidence® series is particularly timely and necessary because today's physicians and other health care professionals must pursue lifelong learning to keep up with the ever-expanding universe of new medical science and evidence-based clinical information. Readers and users of research articles must have a firm grasp of the myriad new statistical, analytic, and methodologic approaches used in contemporary medical studies. To provide concrete examples, the explanations in the book link to research articles that incorporate the specific statistical test or methodological approach being discussed.

Clinical Prediction ModelsA Practical Approach to Development, Validation, and UpdatingSpringer Science & Business Media

Bayesian statistical methods have become widely used for data analysis and modelling in recent years, and the BUGS software has become the most popular software for Bayesian analysis worldwide. Authored by the team that originally developed this software, The BUGS Book provides a practical introduction to this program and its use. The text presents complete coverage of all the functionalities of BUGS, including prediction, missing data, model criticism, and prior sensitivity. It also features a large number of worked examples and a wide range of applications from various disciplines. The book introduces regression models, techniques for criticism and comparison, and a wide range of modelling issues before going into the vital area of hierarchical models, one of the most common applications of Bayesian methods. It deals with essentials of modelling without getting bogged down in complexity. The book emphasises model criticism, model comparison, sensitivity analysis to alternative priors, and thoughtful choice of prior distributions—all those aspects of the "art" of modelling that are easily overlooked in more theoretical expositions. More pragmatic than ideological, the authors systematically work through the large range of "tricks" that reveal the real power of the BUGS software, for example, dealing with missing data, censoring, grouped data, prediction, ranking, parameter constraints, and so on. Many of the examples are biostatistical, but they do not require domain knowledge and are generalisable to a wide range of other application areas. Full code and data for examples, exercises, and some solutions can be found on the book's website.

Now in its Fifth Edition, Clinical Epidemiology: The Essentials is a comprehensive, concise, and clinically oriented introduction to the subject of epidemiology. Written by expert educators, this text introduces students to the principles of evidence-based medicine that will help them develop and apply methods of clinical observation in order to form accurate conclusions. The Fifth Edition includes more complete coverage of systematic reviews and knowledge management, as well as other key topics such as abnormality, diagnosis, frequency and risk, prognosis, treatment, prevention, chance, studying cases and cause.

Clinical Prediction Rules: A Physical Therapy Reference Manual, is intended to be used for multiple musculoskeletal courses. It includes musculoskeletal clinical prediction rules organized by region, thus allowing for its repeated use during the upper and lower quarter as well as in the students spine coursework. Additionally this manual includes multiple medical screening prediction rules, making it appropriate for differential diagnosis and diagnostic imaging coursework. Perfect for entry-level physical therapy programs, this text is also suitable for post-professional physical therapy programs, especially those that include an orthopaedic residency or manual therapy fellowship program, and as a reference manual for students going out on their clinical rotations.

There is a huge amount of literature on statistical models for the prediction of survival after diagnosis of a wide range of diseases like cancer, cardiovascular disease, and chronic kidney disease. Current practice is to use prediction models based on the Cox proportional hazards model and to present those as static models for remaining lifetime after diagnosis or treatment. In contrast, Dynamic Prediction in Clinical Survival Analysis focuses on dynamic models for the remaining lifetime at later points in time, for instance using landmark models. Designed to be useful to applied statisticians and clinical epidemiologists, each chapter in the

book has a practical focus on the issues of working with real life data. Chapters conclude with additional material either on the interpretation of the models, alternative models, or theoretical background. The book consists of four parts: Part I deals with prognostic models for survival data using (clinical) information available at baseline, based on the Cox model Part II is about prognostic models for survival data using (clinical) information available at baseline, when the proportional hazards assumption of the Cox model is violated Part III is dedicated to the use of time-dependent information in dynamic prediction Part IV explores dynamic prediction models for survival data using genomic data Dynamic Prediction in Clinical Survival Analysis summarizes cutting-edge research on the dynamic use of predictive models with traditional and new approaches. Aimed at applied statisticians who actively analyze clinical data in collaboration with clinicians, the analyses of the different data sets throughout the book demonstrate how predictive models can be obtained from proper data sets.

The process of developing predictive models includes many stages. Most resources focus on the modeling algorithms but neglect other critical aspects of the modeling process. This book describes techniques for finding the best representations of predictors for modeling and for nding the best subset of predictors for improving model performance. A variety of example data sets are used to illustrate the techniques along with R programs for reproducing the results.

A guide for everyone involved in medical decision making to plot a clear course through complex and conflicting benefits and risks. This open access book comprehensively covers the fundamentals of clinical data science, focusing on data collection, modelling and clinical applications. Topics covered in the first section on data collection include: data sources, data at scale (big data), data stewardship (FAIR data) and related privacy concerns. Aspects of predictive modelling using techniques such as classification, regression or clustering, and prediction model validation will be covered in the second section. The third section covers aspects of (mobile) clinical decision support systems, operational excellence and value-based healthcare. Fundamentals of Clinical Data Science is an essential resource for healthcare professionals and IT consultants intending to develop and refine their skills in personalized medicine, using solutions based on large datasets from electronic health records or telemonitoring programmes. The book's promise is "no math, no code"and will explain the topics in a style that is optimized for a healthcare audience.

Applied Predictive Modeling covers the overall predictive modeling process, beginning with the crucial steps of data preprocessing, data splitting and foundations of model tuning. The text then provides intuitive explanations of numerous common and modern regression and classification techniques, always with an emphasis on illustrating and solving real data problems. The text illustrates all parts of the modeling process through many hands-on, real-life examples, and every chapter contains extensive R code for each step of the process. This multi-purpose text can be used as an introduction to predictive models and the overall modeling process, a practitioner's reference handbook, or as a text for advanced undergraduate or graduate level predictive modeling courses. To that end, each chapter contains problem sets to help solidify the covered concepts and uses data available in the book's R package. This text is intended for a broad audience as both an introduction to predictive models as well as a guide to applying them. Non-mathematical readers will appreciate the intuitive explanations of the techniques while an emphasis on problem-solving with real data across a wide variety of applications will aid practitioners who wish to extend their expertise. Readers should have knowledge of basic statistical ideas, such as correlation and linear regression analysis. While the text is biased against complex equations, a mathematical background is needed for advanced topics.

This two-volume set constitutes the refereed proceedings of the workshops which complemented the 19th Joint European Conference on Machine Learning and Knowledge Discovery in Databases, ECML PKDD, held in Würzburg, Germany, in September 2019. The 70 full papers and 46 short papers presented in the two-volume set were carefully reviewed and selected from 200 submissions. The two volumes (CCIS 1167 and CCIS 1168) present the papers that have been accepted for the following workshops: Workshop on Automating Data Science, ADS 2019; Workshop on Advances in Interpretable Machine Learning and Artificial Intelligence and eXplainable Knowledge Discovery in Data Mining, AIMLAI-XKDD 2019; Workshop on Decentralized Machine Learning at the Edge, DMLE 2019; Workshop on Advances in Managing and Mining Large Evolving Graphs, LEG 2019; Workshop on Data and Machine Learning Advances with Multiple Views; Workshop on New Trends in Representation Learning with Knowledge Graphs; Workshop on Data Science for Social Good, SoGood 2019; Workshop on Knowledge Discovery and User Modelling for Smart Cities, UMCIT 2019; Workshop on Data Integration and Applications Workshop, DINA 2019; Workshop on Machine Learning for Cybersecurity, MLCS 2019; Workshop on Sports Analytics: Machine Learning and Data Mining for Sports Analytics, MLSA 2019; Workshop on Categorising Different Types of Online Harassment Languages in Social Media; Workshop on IoT Stream for Data Driven Predictive Maintenance, IoTStream 2019; Workshop on Machine Learning and Music, MML 2019; Workshop on Large-Scale Biomedical Semantic Indexing and Question Answering, BioASQ 2019.

The STIAS research theme on Being Human Today explores the interrelated questions: What does it mean to be human? And: What is the nature of the world in which we aspire to be human? In the context of post-apartheid South Africa race and racism remain key references in both these questions. Why is this so, considering that the biological basis of race thinking has been refuted? Templates of race and racialism remain at the core of state policy in South Africa, periodic gross incidents of racism surface in public, and notions of the existence of races remain central to everyday thinking and discourse. This book is the result of the work of a group of leading thinkers and their in-depth conversations at STIAS during the winter of 2015 on the effects of race. Convened by evolutionary anthropologist Nina Jablonski and sociologist Gerhard Mar,, the group included Njabulo Ndebele, Chabani Manganyi, Barney Pityana, Crain Soudien, G"ran Therborn, Mikael Hjerm, Zimitri Erasmus and George Chaplin. The group reconvened annually through 2017. This is the first in a series of planned publications on the their work.

This book trains the next generation of scientists representing different disciplines to leverage the data generated during routine patient care. It formulates a more complete lexicon of evidence-based recommendations and support shared, ethical decision making by doctors with their patients. Diagnostic and therapeutic technologies continue to evolve rapidly, and both individual practitioners and clinical teams face increasingly complex ethical decisions. Unfortunately, the current state of medical knowledge does not provide the guidance to make the majority of clinical decisions on the basis of evidence. The present research infrastructure is inefficient and frequently produces unreliable results that cannot be replicated. Even randomized controlled trials (RCTs), the traditional gold standards of the research reliability hierarchy, are not without limitations. They can be costly, labor intensive, and slow, and can return results that are seldom generalizable to every patient population. Furthermore, many pertinent but unresolved clinical and medical systems issues do not seem to have attracted the interest of the research enterprise, which has come to focus instead on cellular and molecular investigations and single-agent (e.g., a drug or device) effects. For clinicians,

the end result is a bit of a "data desert" when it comes to making decisions. The new research infrastructure proposed in this book will help the medical profession to make ethically sound and well informed decisions for their patients.

Predictive Modeling for Energy Management and Power Systems Engineering introduces readers to the cutting-edge use of big data and large computational infrastructures in energy demand estimation and power management systems. The book supports engineers and scientists who seek to become familiar with advanced optimization techniques for power systems designs, optimization techniques and algorithms for consumer power management, and potential applications of machine learning and artificial intelligence in this field. The book provides modeling theory in an easy-to-read format, verified with on-site models and case studies for specific geographic regions and complex consumer markets. Presents advanced optimization techniques to improve existing energy demand system Provides data-analytic models and their practical relevance in proven case studies Explores novel developments in machine-learning and artificial intelligence applied in energy management Provides modeling theory in an easy-to-read format

The success of the Apgar score demonstrates the astounding power of an appropriate clinical instrument. This down-to-earth book provides practical advice, underpinned by theoretical principles, on developing and evaluating measurement instruments in all fields of medicine. It equips you to choose the most appropriate instrument for specific purposes. The book covers measurement theories, methods and criteria for evaluating and selecting instruments. It provides methods to assess measurement properties, such as reliability, validity and responsiveness, and interpret the results. Worked examples and end-of-chapter assignments use real data and well-known instruments to build your skills at implementation and interpretation through hands-on analysis of real-life cases. All data and solutions are available online. This is a perfect course book for students and a perfect companion for professionals/researchers in the medical and health sciences who care about the quality and meaning of the measurements they perform.

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.

"Appendix F_Nonresearch Evidence Appraisal Tool"--"Appendix G_Individual Evidence Summary Tool"--"Appendix H_Synthesis Process and Recommendations Tool" -- "Appendix I_Action Planning Tool" -- "Appendix J_Dissemination Tool

Bankruptcy prediction is one of the most important research areas in corporate finance. Bankruptcies are an indispensable element of the functioning of the market economy, and at the same time generate significant losses for stakeholders. Hence, this book was established to collect the results of research on the latest trends in predicting the bankruptcy of enterprises. It suggests models developed for different countries using both traditional and more advanced methods. Problems connected with predicting bankruptcy during periods of prosperity and recession, the selection of appropriate explanatory variables, as well as the dynamization of models are presented. The reliability of financial data and the validity of the audit are also referenced. Thus, I hope that this book will inspire you to undertake new research in the field of forecasting the risk of bankruptcy.

With the advent of electronic medical records years ago and the increasing capabilities of computers, our healthcare systems are sitting on growing mountains of data. Not only does the data grow from patient volume but the type of data we store is also growing exponentially. Practical Predictive Analytics and Decisioning Systems for Medicine provides research tools to analyze these large amounts of data and addresses some of the most pressing issues and challenges where data integrity is compromised: patient safety, patient communication, and patient information. Through the use of predictive analytic models and applications, this book is an invaluable resource to predict more accurate outcomes to help improve quality care in the healthcare and medical industries in the most cost–efficient manner. Practical Predictive Analytics and Decisioning Systems for Medicine provides the basics of predictive analytics for those new to the area and focuses on general philosophy and activities in the healthcare and medical system. It explains why predictive models are important, and how they can be applied to the predictive analysis process in order to solve real industry problems. Researchers need this valuable resource to improve data analysis skills and make more accurate and cost-effective decisions. Includes models and applications of predictive analytics why they are important and how they can be used in healthcare and medical research Provides real world step-by-step tutorials to help beginners understand how the predictive analytic processes works and to successfully do the computations Demonstrates methods to help sort through

data to make better observations and allow you to make better predictions

data to make better observations and allow you to make better predictions