Principal Component Analysis And Randomness Tests For Big Data Analysis Evolutionary Economics And Social Complexity Science

Many of the problems that engineers face involve randomly varying phenomena of one sort or another. However, if characterized properly, even such randomness and the resulting uncertainty are subject to rigorous mathematical analysis. Taking into account the uniquely multidisciplinary demands of 21st-century science and engineering, Random Phenomena

Provides statistical tools and techniques needed to understandtoday's financial markets The Second Edition of this critically acclaimed text provides acomprehensive and systematic introduction to financial econometricmodels and their applications in modeling and predicting financialtime series data. This latest edition continues to emphasizeempirical financial data and focuses on real-world examples.Following this approach, readers will master key aspects offinancial time series, including volatility modeling, neuralnetwork applications, market microstructure and high-frequencyfinancial data, continuous-time models and Ito's Lemma, Value atRisk, multiple returns analysis, financial factor models, andeconometric modeling via computation-intensive methods. The author begins with the basic characteristics of financialtime series data, setting the foundation for the three maintopics: Analysis and application of univariate financial timeseries Return series of multiple assets Bayesian inference in finance methods This new edition is a thoroughly revised and updated text,including the addition of S-Plus® commands and illustrations.Exercises have been thoroughly updated and expanded and include themost current data, providing readers with more opportunities to putthe models and methods into practice. Among the new material addedto the text, readers will find: Consistent covariance estimation under heteroscedasticity andserial correlation Alternative approaches to volatility modeling Financial factor models State-space models Kalman filtering Estimation of stochastic diffusion models The tools provided in this text aid readers in developing adeeper understanding of financial markets through firsthandexperience in working with financial data. This is an idealtextbook for MBA students as well as a reference for researchersand professionals in business and finance.

This book provides a comprehensive introduction to the latest advances in the mathematical theory and computational tools for modeling high-dimensional data drawn from one or multiple low-dimensional subspaces (or manifolds) and potentially corrupted by noise, gross errors, or outliers. This challenging task requires the development of new algebraic, geometric, statistical, and computational methods for efficient and robust estimation and segmentation of one or multiple subspaces. The book also presents interesting real-world applications of these new methods in image processing, image and video segmentation, face recognition and clustering, and hybrid system identification etc. This book is intended to serve as a textbook for graduate students and beginning researchers in data science, machine learning, computer vision, image and signal processing, and systems theory. It contains ample illustrations, examples, and exercises and is made largely self-contained with three Appendices which survey basic concepts and principles from statistics, optimization, and algebraic-geometry used in this book. René Vidal is a Professor of Biomedical Engineering and Director of the Vision Dynamics and Learning Lab at The Johns Hopkins University. Yi Ma is Executive Dean and Professor at the School of Information Science and Technology at ShanghaiTech University. S. Shankar Sastry is Dean of the College of Engineering, Professor of Electrical Engineering and Computer Science and Professor of Bioengineering at the University of California, Berkeley.

This book surveys big data tools used in macroeconomic forecasting and addresses related econometric issues, including how to capture dynamic relationships among variables; how to select parsimonious models; how to deal with model uncertainty, instability, non-stationarity, and mixed frequency data; and how to evaluate forecasts, among others. Each chapter is self-contained with references, and provides solid background information, while also reviewing the latest advances in the field. Accordingly, the book offers a valuable resource for researchers, professional forecasters, and students of quantitative economics.

The advances in the technology and methodology for human movement capture and analysis over the last decade have been remarkable. Besides acknowledged approaches for kinematic, dynamic, and electromyographic (EMG) analysis carried out in the laboratory, more recently developed devices, such as wearables, inertial measurement units, ambient sensors, and cameras or depth sensors, have been adopted on a wide scale. Furthermore, computational intelligence (CI) methods, such as artificial neural networks, have recently emerged as promising tools for the development and application of intelligent systems in motion analysis. Thus, the synergy of classic instrumentation and novel smart devices and techniques has created unique capabilities in the continuous monitoring of motor behaviors in different fields, such as clinics, sports, and ergonomics. However, real-time sensing, signal processing, human activity recognition, and characterization and interpretation of motion metrics and behaviors from sensor data still representing a challenging problem not only in laboratories but also at home and in the community. This book addresses open research issues related to the improvement of classic approaches and the development of novel technologies and techniques in the domain of motion analysis in all the various fields of application.

This book reports on the latest advances in concepts and further developments of principal component analysis (PCA), addressing a number of open problems related to dimensional reduction techniques and their extensions in detail. Bringing together research results previously scattered throughout many scientific journals papers worldwide, the book presents them in a methodologically unified form. Offering vital insights into the subject matter in self-contained chapters that balance the theory and concrete applications, and especially focusing on open problems, it is essential reading for all researchers and practitioners with an interest in PCA.

Data Mining, Second Edition, describes data mining techniques and shows how they work. The book is a major revision of the first edition that appeared in 1999. While the basic core remains the same, it has been updated to reflect the changes that have taken place over five years, and now has nearly double the references. The highlights of this new edition include thirty new technique sections; an enhanced Weka machine learning workbench, which now features an interactive interface; comprehensive information on neural networks; a new section on Bayesian networks; and much more. This text is designed for information systems practitioners, programmers, consultants, developers, information technology managers, specification writers as well as professors and students of graduate-level data mining and machine learning courses. Algorithmic methods at the heart of successful data mining—including tried and true techniques as well as leading edge methods Performance improvement techniques that work by transforming the input or output

The book describes and discusses the numerical methods which are successfully being used for analysing ecological data, using a clear and comprehensive approach. These methods are derived from the fields of mathematical physics, parametric and nonparametric statistics, information theory, numerical taxonomy, archaeology, psychometry, sociometry, econometry and others. An updated, 3rd English edition of the most widely cited book on quantitative analysis of multivariate ecological data Relates ecological questions to methods of statistical analysis, with a clear description of complex numerical methods All methods are illustrated by examples from the ecological literature so that ecologists clearly see how to use the methods and approaches in their own research All calculations are available in R language functions

Principal component analysis is central to the study of multivariate data. This book includes core material, research and a wide range of applications. It is suitable for researchers in statistics and for those who use principal component analysis. It requires some knowledge of matrix algebra.

In multivariate data analysis, regression techniques predict one set of variables from another while principal component analysis (PCA) finds a subspace of minimal dimensionality that captures the largest variability in the data. How can regression analysis and PCA be combined in a beneficial way? Why and when is it a good idea to combine them? What kind of benefits are we getting from them? Addressing these questions, Constrained Principal Component Analysis and Related Techniques shows how constrained PCA (CPCA) offers a unified framework for these approaches. The book begins with four concrete examples of CPCA that provide readers with a basic understanding of the technique and its applications. It gives a detailed account of two key mathematical ideas in CPCA: projection and singular value decomposition. The author then describes the basic data requirements, models, and analytical tools for CPCA and their immediate extensions. He also introduces techniques that are special cases of or closely related to CPCA and discusses several topics relevant to practical uses of CPCA. The book concludes with a technique that imposes different constraints on different dimensions (DCDD), along with its analytical extensions. MATLAB® programs for CPCA and DCDD as well as data to create the book’s examples are available on the author’s website.

This book contains the results of 30 years of investigation by the author into the creation of a new theory on statistical analysis of observations, based on the principle of random arrays of random vectors and matrices of increasing dimensions. It describes limit phenomena of sequences of random observations, which occupy a central place in the theory of random matrices. This is the first book to explore statistical analysis of random arrays and provides the necessary tools for such analysis. This book is a natural generalization of multidimensional statistical analysis and aims to provide its readers with new, improved estimators of this analysis. The book consists of 14 chapters and opens with the theory of sample random matrices of fixed dimension, which allows to envelop not only the problems of multidimensional statistical analysis, but also some important problems of mechanics, physics and economics. The second chapter deals with all 50 known canonical equations of the new statistical analysis, which form the basis for finding new and improved statistical estimators. Chapters 3-5 contain detailed proof of the three main laws on the theory of sample random matrices. In chapters 6-10 detailed, strong proofs of the Circular and Elliptic Laws and their generalization are given. In chapters 11-13 the convergence rates of spectral functions are given for the practical application of new estimators and important questions on random matrix physics are considered. The final chapter contains 54 new statistical estimators, which generalize the main estimators of statistical analysis.

Introduction to Audio Analysis serves as a standalone introduction to audio analysis, providing theoretical background to many state-of-the-art techniques. It covers the essential theory necessary to develop audio engineering applications, but also uses programming techniques, notably MATLAB®, to take a more applied approach to the topic. Basic theory and reproducible experiments are combined to demonstrate theoretical concepts from a practical point of view and provide a solid foundation in the field of audio analysis. Audio feature extraction, audio classification, audio segmentation, and music information retrieval are all addressed in detail, along with material on basic audio processing and frequency domain representations and filtering. Throughout the text, reproducible MATLAB® examples are accompanied by theoretical descriptions, illustrating how concepts and equations can be applied to the development of audio analysis systems and components. A blend of reproducible MATLAB® code and essential theory provides enable the reader to delve into the world of audio signals and develop real-world audio applications in various domains. Practical approach to signal processing: The first book to focus on audio analysis from a signal processing perspective, demonstrating practical implementation alongside theoretical concepts Bridge the gap between theory and practice: The authors demonstrate how to apply equations to real-life code examples and resources, giving you the technical skills to develop real-world applications Library of MATLAB code: The book is accompanied by a well-documented library of MATLAB functions and reproducible experiments

Communication and network technology has witnessed recent rapid development and numerous information services and applications have been developed globally. These technologies have high impact on society and the way people are leading their lives. The advancement in technology has undoubtedly improved the quality of service and user experience yet a lot needs to be still done. Some areas that still need improvement include seamless wide-area coverage, high-capacity hot-spots, low-power massive-connections, low-latency and high-reliability and so on. Thus, it is highly desirable to develop smart technologies for communication to improve the overall services and management of wireless communication. Machine learning and cognitive computing have converged to give some groundbreaking solutions for smart machines. With these two technologies coming together, the machines can acquire the ability to reason similar to the human brain. The research area of machine learning and cognitive computing cover many fields like psychology, biology, signal processing, physics, information theory, mathematics, and statistics that can be used effectively for topology management. Therefore, the utilization of machine learning techniques like data analytics and cognitive power will lead to better performance of communication and wireless systems.

This book presents the novel approach of analyzing large-sized rectangular-shaped numerical data (so-called big data). The essence of this approach is to grasp the "meaning" of the data instantly, without getting into the details of individual data. Unlike conventional approaches of principal component analysis, randomness tests, and visualization methods, the authors' approach has the benefits of universality and simplicity of data analysis, regardless of data types, structures, or specific field of science. First, mathematical preparation is described. The RMT-PCA and the RMT-test utilize the cross-correlation matrix of time series, C = XXT, where Xrepresents a rectangular matrix of N rows and L columns and XT represents the transverse matrix of X. Because C is symmetric, namely, C =CT, it can be converted to a diagonal matrix of eigenvalues by a similarity transformationSCS-1= SCST using an orthogonal matrix S. When N is significantly large, the histogram of the eigenvalue distribution can be compared to the theoretical formula derived in the context of the random matrix theory (RMT, in abbreviation). Then the RMT-PCA applied to high-frequency stock prices in Japanese and American markets is dealt with. This approach proves its effectiveness in extracting "trendy" business sectors of the financial market over the prescribed time scale. In this case, X consists of N stock-prices of lengthL, and the correlation matrix C is an N by N square matrix, whose element at the i-th row and j-th column is the inner product of the price time series of the length L of the i-th stock and the j-th stock of the equal length L. Next, the RMT-test is applied to measure randomness of various random number generators, including algorithmically generated random numbers and physically generated random numbers. The book concludes by demonstrating two application of the RMT-test: (1) a comparison of hash functions, and (2) stock prediction by means of randomness.

This book presents the fundamental notions and advanced mathematical tools in the stochastic modeling of uncertainties and their quantification for large-scale computational models in sciences and engineering. In particular, it focuses in parametric uncertainties, and non-parametric uncertainties with applications from the structural dynamics and vibroacoustics of complex mechanical systems, from micromechanics and multiscale mechanics of heterogeneous materials. Resulting from a course developed by the author, the book begins with a description of the fundamental mathematical tools of probability and statistics that are directly useful for uncertainty quantification. It proceeds with a well carried out description of some basic and advanced methods for constructing stochastic models of uncertainties, paying particular attention to the problem of calibrating and identifying a stochastic model of uncertainty when experimental data is available. This book is intended to be a graduate-level textbook for students as well as professionals interested in the theory, computation, and applications of risk and prediction in science and engineering fields.

Together with the fundamentals of probability, random processes and statistical analysis, this insightful book also presents a broad range of advanced topics and applications. There is extensive coverage of Bayesian vs. frequentist statistics, time series and spectral representation, inequalities, bound and approximation, maximum-likelihood estimation and the expectation-maximization (EM) algorithm, geometric Brownian motion and Itô process. Applications such as hidden Markov models (HMM), the Viterbi, BCJR, and Baum–Welch algorithms, algorithms for machine learning, Wiener and Kalman filters, and queueing and loss networks are treated in detail. The book will be useful to students and researchers in such areas as communications, signal processing, networks, machine learning, bioinformatics, econometrics and mathematical finance. With a solutions manual, lecture slides, supplementary materials and MATLAB programs all available online, it is ideal for classroom teaching as well as a valuable reference for professionals.

Please note that the content of this book primarily consists of articles available from Wikipedia or other free sources online. Pages: 79. Chapters: Central tendency, Multivariate random variable, Principal component analysis, Cluster analysis, Factor analysis, Nonlinear dimensionality reduction, Copula, Non-negative matrix factorization, Linear discriminant analysis, Structural equation modeling, Information bottleneck method, Distance correlation, Geometric median, Multidimensional scaling, Wishart distribution, Independent component analysis, Sufficient dimension reduction, Simultaneous equations model, Procrustes analysis, Energy distance, Canonical correlation, Growth curve, Mahalanobis distance, Detrended correspondence analysis, Elastic map, Kernel principal component analysis, Matching pursuit, Neighbourhood components analysis, Stress majorization, Online NMF, Biplot, Cluster-weighted modeling, Geodemographic segmentation, Multivariate analysis, CP decomposition, Wold's theorem, Panel data, Canonical analysis, Multiple correspondence analysis, Similarity matrix, Optimal discriminant analysis, Centering matrix, Quadratic form, Stationary subspace analysis, RV coefficient, High-dimensional statistics, Conjoint analysis, Generalized linear array model, Confirmatory factor analysis, Bivariate analysis, Ordination, General linear model, Varimax rotation, Pseudo-determinant, Multidimensional panel data, Factorial code, Sparse PCA, Owen's T function, Generalized Procrustes analysis, FastICA, Non-linear iterative partial least squares, Projection pursuit, Multiple discriminant analysis, Scatter matrix, Multidimensional analysis, Discriminant function analysis, Tucker decomposition, Higher-order factor analysis, Generalized multidimensional scaling, Ancestral graph, Reification.

This contributed volume contains articles written by the plenary and invited speakers from the second international MATHEON Workshop 2015 that focus on applications of compressed sensing. Article authors address their techniques for solving the problems of compressed sensing, as well as connections to related areas like detecting community-like structures in graphs, curbatures on Grassmanians, and randomized tensor train singular value decompositions. Some of the novel applications covered include dimensionality reduction, information theory, random matrices, sparse approximation, and sparse recovery. This book is aimed at both graduate students and researchers in the areas of applied mathematics, computer science, and engineering, as well as other applied scientists exploring the potential applications for the novel methodology of compressed sensing. An introduction to the subject of compressed sensing is also provided for researchers interested in the field who are not as familiar with it.

Expert guidance on managing credit risk in bond portfolios Managing Credit Risk in Corporate Bond Portfolios shows readers howto measure and manage the risks of a corporate bond portfolioagainst its benchmark. This comprehensive guide explores a widerange of topics surrounding credit risk and bond portfolios,including the similarities and differences between corporate andgovernment bond portfolios, yield curve risk, default and creditmigration risk, Monte Carlo simulation techniques, and portfolioselection methods. Srichander Ramaswamy, PhD (Basel, Switzerland), is Head ofInvestment Analysis at the Bank for International Settlements (BIS)in Basel, Switzerland, and Adjunct Professor of Banking andFinance, University of Lausanne.

The Industrial Electronics Handbook, Second Edition combines traditional and newer, more specialized knowledge that will help industrial electronics engineers develop practical solutions for the design and implementation of high-power applications. Embracing the broad technological scope of the field, this collection explores fundamental areas, including analog and digital circuits, electronics, electromagnetic machines, signal processing, and industrial control and communications systems. It also facilitates the use of intelligent systems—such as neural networks, fuzzy systems, and evolutionary methods—in terms of a hierarchical structure that makes factory control and supervision more efficient by addressing the needs of all production components. Enhancing its value, this fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics Journal, one of the largest and most respected publications in the field. As intelligent systems continue to replace and sometimes outperform human intelligence in decision-making processes, they have made substantial contributions to the solution of very complex problems. As a result, the field of computational intelligence has branched out in several directions. For instance, artificial neural networks can learn how to classify patterns, such as images or sequences of events, and effectively model complex nonlinear systems. Simple and easy to implement, fuzzy systems can be applied to successful modeling and system control. Illustrating how these and other tools help engineers model nonlinear system behavior, determine and evaluate system parameters, and ensure overall system control, Intelligent Systems: Addresses various aspects of neural networks and fuzzy systems Focuses on system optimization, covering new techniques such as evolutionary methods, swarm, and ant colony optimizations Discusses several applications that deal with methods of computational intelligence Other volumes in the set: Fundamentals of Industrial Electronics Power Electronics and Motor Drives Control and Mechatronics Industrial Communication Systems

Proper treatment of structural behavior under severe loading - such as the performance of a high-rise building during an earthquake - relies heavily on the use of probability-based analysis and decision-making tools. Proper application of these tools is significantly enhanced by a thorough understanding of the underlying theoretical and computation

This volume contains the papers from the Sixth Eugene Lukacs Symposium on "Multidimensional Statistical Analysis and Random Matrices", which was held at the Bowling Green State University, Ohio, USA, 29--30 March 1996. Multidimensional statistical analysis and random matrices have been the topics of great research. The papers presented in this volume discuss many varied aspects of this all-encompassing topic. In particular, topics covered include generalized statistical analysis, elliptically contoured distribution, covariance structure analysis, metric scaling, detection of outliers, density approximation, and circulant and band random matrices.

This modern approach integrates classical and contemporary methods, fusing theory and practice and bridging the gap to statistical learning.

Connects fundamental mathematical theory with real-world problems, through efficient and scalable optimization algorithms.

With its focus on the practical application of the techniques of multivariate statistics, this book shapes the powerful tools of statistics for the specific needs of ecologists and makes statistics more applicable to their course of study. It gives readers a solid conceptual understanding of the role of multivariate statistics in ecological applications and the relationships among various techniques, while avoiding detailed mathematics and the underlying theory. More importantly, the reader will gain insight into the type of research questions best handled by each technique and the important considerations in applying them. Whether used as a textbook for specialised courses or as a supplement to general statistics texts, the book emphasises those techniques that students of ecology and natural resources most need to understand and employ in their research. While targeted for upper-division and graduate students in wildlife biology, forestry, and ecology, and for professional wildlife scientists and natural resource managers, this book will also be valuable to researchers in any of the biological sciences.

Image techniques have been developed and implemented for various purposes, and image engineering (IE) is a rapidly evolving, integrated discipline comprising the study of all the different branches of image techniques, and encompassing mathematics, physics, biology, physiology, psychology, electrical engineering, computer science and automation. Advances in the field are also closely related to the development of telecommunications, biomedical engineering, remote sensing, surveying and mapping, as well as document processing and industrial applications. IE involves three related and partially overlapping groups of image techniques: image processing (IP) (in its narrow sense), image analysis (IA) and image understanding (IU), and the integration of these three groups makes the discipline of image engineering an important part of the modern information era. This is the first handbook on image engineering, and provides a well-structured, comprehensive overview of this new discipline. It also offers detailed information on the various image techniques. It is a valuable reference resource for R&D professional and undergraduate students involved in image-related activities.

Statistical Performance Modeling and Optimization reviews various statistical methodologies that have been recently developed to model, analyze and optimize performance variations at both transistor level and system level in integrated circuit (IC) design. The following topics are discussed in detail: sources of process variations, variation characterization and modeling, Monte Carlo analysis, response surface modeling, statistical timing and leakage analysis, probability distribution extraction, parametric yield estimation and robust IC optimization. These techniques provide the necessary CAD infrastructure that facilitates the bold move from deterministic, corner-based IC design toward statistical and probabilistic design. Statistical Performance Modeling and Optimization reviews and compares different statistical IC analysis and optimization techniques, and analyzes their trade-offs for practical industrial applications. It serves as a valuable reference for researchers, students and CAD practitioners.

This book is aimed at raising awareness of researchers, scientists and engineers on the benefits of Principal Component Analysis (PCA) in data analysis. In this book, the reader will find the applications of PCA in fields such as image processing, biometric, face recognition and speech processing. It also includes the core concepts and the state-of-the-art methods in data analysis and feature extraction.

This book presents the combined proceedings of the 12th International Conference on Multimedia and Ubiquitous Engineering (MUE 2018) and the 13th International Conference on Future Information Technology (Future Tech 2018), both held in Salerno, Italy, April 23 - 25, 2018. The aim of these two meetings was to promote discussion and interaction among academics, researchers and professionals in the field of ubiquitous computing technologies. These proceedings reflect the state of the art in the development of computational methods, involving theory, algorithms, numerical simulation, error and uncertainty analysis and novel applications of new processing techniques in engineering, science, and other disciplines related to ubiquitous computing.

Classical Methods of Statistics is a guidebook combining theory and practical methods. It is especially conceived for graduate students and scientists who are interested in the applications of statistical methods to plasma physics. Thus it provides also concise information on experimental aspects of fusion-oriented plasma physics. In view of the first three basic chapters it can be fruitfully used by students majoring in probability theory and statistics. The first part deals with the mathematical foundation and framework of the subject. Some attention is given to the historical background. Exercises are added to help readers understand the underlying concepts. In the second part, two major case studies are presented which exemplify the areas of discriminant analysis and multivariate profile analysis, respectively. To introduce these case studies, an outline is provided of the context of magnetic plasma fusion research. In the third part an overview is given of statistical software; separate attention is devoted to SAS and S-PLUS. The final chapter presents several datasets and gives a description of their physical setting. Most of these datasets were assembled at the ASDEX Upgrade Tokamak. All of them are accompanied by exercises in form of guided (minor) case studies. The book concludes with translations of key concepts into several languages.

The need to understand and predict the processes that influence the Earth's atmosphere is one of the grand scientific challenges for the next century. This volume is a series of case studies and review chapters that cover many of the recent developments in statistical methodology that are useful for interpreting atmospheric data. L. Mark Berliner is Professor of Statistics at Ohio State University.

Experimental datasets are a combination of signal and randomness, and data analysis algorithms, such as Principal Component Analysis (PCA), all seek to extract the signal. We used random matrix theory to demonstrate that even in situations where the dataset contains too much noise for PCA to be successful, the signal can be still be recovered with the use of prior information.

For anyone in need of a concise, introductory guide to principal components analysis, this book is a must. Through an effective use of simple mathematical-geometrical and multiple real-life examples (such as crime statistics, indicators of drug abuse, and educational expenditures) -- and by minimizing the use of matrix algebra -- the reader can quickly master and put this technique to immediate use.

These twenty-six expository papers on random matrices and products of random matrices survey the major results of the last thirty years. They reflect both theoretical and applied concerns in fields as diverse as computer science, probability theory, mathematical physics, and population biology. Many of the articles are tutorial, consisting of examples, sketches of proofs, and interpretations of results. They address a wide audience of mathematicians and scientists who have an elementary knowledge of probability theory and linear algebra, but not necessarily any prior exposure to this specialized area. More advanced articles, aimed at specialists in allied areas, survey current research with references to the original literature. The book's major topics include the computation and behavior under perturbation of Lyapunov exponents and the spectral theory of large random matrices. The applications to mathematical and physical sciences under consideration include computer image generation, card shuffling, and other random walks on groups, Markov chains in random environments, the random Schroedinger equations and random waves in random media. Most of the papers were originally presented at an AMS-IMS-SIAM Joint Summer Research Conference held at Bowdoin College in June, 1984. Of special note are the papers by Kotani on random Schroedinger equations, Yin and Bai on spectra for large random matrices, and Newman on the relations between the Lyapunov and eigenvalue spectra.

This book provides readers with an understanding of the fundamentals and applications of structural reliability, stochastic finite element method, reliability analysis via stochastic expansion, and optimization under uncertainty. It examines the use of stochastic expansions, including polynomial chaos expansion and Karhunen-Loeve expansion for the reliability analysis of practical engineering problems.

Principal Component Analysis and Randomness Tests for Big Data AnalysisSpringer

This book can be considered a companion to two other highly acclaimed books involving James Ramsay and Bernard Silverman: Functional Data Analysis, Second Edition (2005) and Applied Functional Data Analysis (2002). This user's manual also provides the documentation for the S+FDA library for SPlus.

This book addresses various aspects of how smart healthcare can be used to detect and analyze diseases, the underlying methodologies, and related security concerns. Healthcare is a multidisciplinary field that involves a range of factors like the financial system, social factors, health technologies, and organizational structures that affect the healthcare provided to individuals, families, institutions, organizations, and populations. The goals of healthcare services include patient safety, timeliness, effectiveness, efficiency, and equity. Smart healthcare consists of mhealth, e-health, electronic resource management, smart and intelligent home services, and medical devices. The Internet of Things (IoT) is a system comprising real-world things that interact and communicate with each other via networking technologies. The wide range of potential applications of IoT includes healthcare services. IoT-enabled healthcare technologies are suitable for remote health monitoring, including rehabilitation, assisted ambient living, etc. In turn, healthcare analytics can be applied to the data gathered from different areas to improve healthcare at minimum expense.