Multidimensional Systems Signal Processing And Modeling Techniques

#multidimensional signal processing #system modeling techniques #data analysis methods #multivariate data analysis #signal analysis systems

Delve into the complexities of multidimensional systems through specialized signal processing and modeling techniques. This field explores innovative data analysis methods for understanding intricate patterns in multi-variate datasets, enabling researchers and engineers to develop robust system modeling solutions and advanced signal processing algorithms for diverse applications.

Multidimensional Systems: Signal Processing and Modeling Techniques

Praise for Previous Volumes "This book will be a useful reference to control engineers and researchers. The papers contained cover well the recent advances in the field of modern control theory." -IEEE CONTROL CORRESPONDANCE " This book will help all those researchers wjo valiantly try to keep abreast of what is new in the theory and practice of optimal control." -CONTROL

Multidimensional Systems

If your work involves signal processing, digital picture processing, circuits and systems, stability, system structural analysis, feedback control techniques, digital filter design, biomedical data processing, object recognition for robotics, or related topics, Multidimensional Systems is the only reference you need! Multidimensional Systems brings you a balanced, state-of-the-art presentation of the latest MDS concepts, methods, algorithms, and practical applications. Written by leading, international experts, the contributors not only provide essential review material in each chapter as well as up-to-date aspects of topics discussed, but also present fresh, original insights into their own experience with MDS. Moving smoothly from principles into applications, this single source covers such theoretical topics as structure and stability analysis, feedback control, finite-word-length effects, two-variable analog ladders, multidimensional signal modeling, two-dimensional digital filters, parameter and state identification, and multiprocessor configurations; applications include image processing, image transform coding, image restoration, and digital tomography. An ideal single source for electrical and electronics, industrial electronics, and computer engineers, the book is also important reading for systems scientists, mechanical engineers, and physicists and geophysicists. In addition, this volume offers graduate electrical engineering students, particularly those studying signal and image processing, a convenient, time-saving work on the techniques and applications of Multidimensional Systems. Book jacket.

Multidimensional Systems Signal Processing Algorithms and Application Techniques

Praise for the Series "This book will be a useful reference to control engineers and researchers. The papers contained cover well the recent advances in the field of modern control theory." --IEEE Group Correspondence "This book will help all those researchers who valiantly try to keep abreast of what is new in the theory and practice of optimal control." --Control

Multidimensional Signals, Circuits and Systems

Although research on general multidimensional systems theory has been developing rapidly in recent years, this is the first research text to appear on the subject since the early 1980s. The text describes the current state of the art nD systems and sets out a number of open problems, and gives several different perspectives on the subject. It presents a number of different solutions to major theoretical problems as well as some interesting practical results. The book comprises of a selection of plenary and other lectures given at The First International Workshop on Multidimensional (nD) Systems (NDS-98) held in 1998 in Poland, and is written by leading world specialists in the field.

Multiscale Signal Analysis and Modeling

Multiscale Signal Analysis and Modeling presents recent advances in multiscale analysis and modeling using wavelets and other systems. This book also presents applications in digital signal processing using sampling theory and techniques from various function spaces, filter design, feature extraction and classification, signal and image representation/transmission, coding, nonparametric statistical signal processing, and statistical learning theory.

Multiscale Signal Analysis and Modeling

Radar Signal Processing and Its Applications brings together in one place important contributions and up-to-date research results in this fast-moving area. In twelve selected chapters, it describes the latest advances in architectures, design methods, and applications of radar signal processing. The contributors to this work were selected from the leading researchers and practitioners in the field. This work, originally published as Volume 14, Numbers 1-3 of the journal, Multidimensional Systems and Signal Processing, will be valuable to anyone working or researching in the field of radar signal processing. It serves as an excellent reference, providing insight into some of the most challenging issues being examined today.

Radar Signal Processing and Its Applications

Praise for the Series: "This book will be a useful reference to control engineers and researchers. The papers contained cover well the recent advances in the field of modern control theory." --IEEE Group Correspondence "This book will help all those researchers who valiantly try to keep abreast of what is new in the theory and practice of optimal control." --Control

Digital Control and Signal Processing Systems and Techniques

This book highlights new methods, algorithms and software for the digital processing and recovery of signals. In addition, it describes a new method for modeling one dimensional and multidimensional signals as successions of local polynomial splines and their spectral characteristics. It provides examples of how the proposed methods can be applied in specific cases, together with signal processing software examples in the MATLAB environment, and models of special processes in the Simulink environment. The book’s goal is to make it easier for beginners to understand the subject matter; it is intended for engineers, undergraduate and graduate students engaged in research or the evaluation and design of hardware and software for the digital processing and recovery of signals.

Signal Processing Applications Using Multidimensional Polynomial Splines

This book includes the papers presented in 2nd International Conference on Image Processing and Capsule Networks [ICIPCN 2021]. In this digital era, image processing plays a significant role in wide range of real-time applications like sensing, automation, health care, industries etc. Today, with many technological advances, many state-of-the-art techniques are integrated with image processing domain to enhance its adaptiveness, reliability, accuracy and efficiency. With the advent of intelligent technologies like machine learning especially deep learning, the imaging system can make decisions more and more accurately. Moreover, the application of deep learning will also help to identify the hidden information in volumetric images. Nevertheless, capsule network, a type of deep neural network,

is revolutionizing the image processing domain; it is still in a research and development phase. In this perspective, this book includes the state-of-the-art research works that integrate intelligent techniques with image processing models, and also, it reports the recent advancements in image processing techniques. Also, this book includes the novel tools and techniques for deploying real-time image processing applications. The chapters will briefly discuss about the intelligent image processing technologies, which leverage an authoritative and detailed representation by delivering an enhanced image and video recognition and adaptive processing mechanisms, which may clearly define the image and the family of image processing techniques and applications that are closely related to the humanistic way of thinking.

Second International Conference on Image Processing and Capsule Networks

This book is a collection of papers presented at the International Workshop on New Approaches for Multidimensional Signal Processing (NAMSP 2022), held at Technical University of Sofia, Sofia, Bulgaria, during 23–25 June 2022. The book covers research papers in the field of N-dimensional multicomponent image processing, multidimensional image representation and super-resolution, 3D image processing and reconstruction, MD computer vision systems, multidimensional multimedia systems, neural networks for MD image processing, data-based MD image retrieval and knowledge data mining, watermarking, hiding and encryption of MD images, MD image processing in robot systems, tensor-based data processing, 3D and multi-view visualization, forensic analysis systems for MD images and many more.

New Approaches for Multidimensional Signal Processing

Multidimensional or spatio-temporal signals are important in image processing and television. This book presents the mathematical methods for processing multidimensional signals. It describes applications in system analysis, measurement and optimization and signal restoration, with varying examples of applications.

Processing of Multidimensional Signals

Multidimensional signals and systems. Discrete fourier analysis of multidimensional signals. Design and implementation of two-dimensional fir filters. Multidimensional recursive systems. Design and implementation of two-dimensional iir filters. Processing signals carried by propagation waves. Inverse problems.

Digital Control and Signal Processing Systems and Techniques

The Second Edition of this book includes an abundance of examples to illustrate advanced concepts and brings out in a text book setting the algorithms for bivariate polynomial matrix factorization results that form the basis of two-dimensional systems theory. Algorithms and their implementation using symbolic algebra are emphasized.

Multidimensional Digital Signal Processing

Although research on general multidimensional systems theory has been developing rapidly in recent years, this is the first research text to appear on the subject since the early 1980s. The field is closely related to control, systems, circuits and signal/image processing. The text describes the current state of the art nD systems and sets out a number of open problems, and gives several different perspectives on the subject. It presents a number of different solutions to major theoretical problems as well as some interesting practical results. The book comprises of a selection of plenary and other lectures given at The First International Workshop on Multidimensional (nD) Systems (NDS-98) held in 1998 in Poland, and is written by leading world specialists in the field.

Multidimensional Systems Theory and Applications

Proceedings of the European Control Conference 1991, July 2-5, 1991, Grenoble, France

Multidimensional Signals, Circuits and Systems

This book gives a concise introduction to both image and video processing, providing a balanced coverage between theory, applications and standards. It gives an introduction to both 2-D and 3-D

signal processing theory, supported by an introduction to random processes and some essential results from information theory, providing the necessary foundation for a full understanding of the image and video processing concepts that follow. A significant new feature is the explanation of practical network coding methods for image and video transmission. There is also coverage of new approaches such as: super-resolution methods, non-local processing, and directional transforms. This book also has on-line support that contains many short MATLAB programs that complement examples and exercises on multidimensional signal, image, and video processing. There are numerous short video clips showing applications in video processing and coding, plus a copy of the vidview video player for playing .yuv video files on a Windows PC and an illustration of the effect of packet loss on H.264/AVC coded bitstreams. New to this edition: New appendices on random processes, information theory New coverage of image analysis – edge detection, linking, clustering, and segmentation Expanded coverage on image sensing and perception, including color spaces. Now summarizes the new MPEG coding standards: scalable video coding (SVC) and multiview video coding (MVC), in addition to coverage of H.264/AVC. Updated video processing material including new example on scalable video coding and more material on object- and region-based video coding. More on video coding for networks including practical network coding (PNC), highlighting the significant advantages of PNC for both video downloading and streaming. New coverage of super-resolution methods for image and video. Only R&D level tutorial that gives an integrated treatment of image and video processing - topics that are interconnected. New chapters on introductory random processes, information theory, and image enhancement and analysis Coverage and discussion of the latest standards in video coding: H.264/AVC and the new scalable video standard (SVC)

European Control Conference 1991

Recent Advances in Information Science and Technology brings you a balanced, state-of-the-art presentation of the latest concepts, methods, algorithms, techniques, procedures and applications of the fascinating field of Computer Science and Engineering. Written by eminent, leading, international experts, the contributors provide up-to-date aspects of topics discussed and present fresh, original insights into their own experience with Information Science and Technology.This rich “anthology of papers” which compose this volume, contains the latest developments and reflects the experience of many eminent researchers working in different environments (universities, research centers and industry).The book is composed of five parts:• Software Engineering in which new trends and recent scientific results in software engineering, data structures, algorithms, knowledge based systems, VLSI design, computer languages and industrial computer applications are presented.• Signal Processing in which modern topics in signal processing, identification, recognition, speech processing and detection are included.• Multi-Dimensional (m-D) Systems Theory and Applications which contains new research results in m-D systems theory and impressive applications of multidimensional systems mainly in signal processing.• Communication Systems containing modern topics of communication as Digital systems of communication, computer networks theory, ATM networks, optical networks, hybrid fibber coaxial networks, Internet etc.• Modern Numerical Techniques and Related Topics which covers some aspects of the modern computation science and technology.

Multidimensional Signal, Image, and Video Processing and Coding

This book introduces readers to various signal processing models that have been used in analyzing periodic data, and discusses the statistical and computational methods involved. Signal processing can broadly be considered to be the recovery of information from physical observations. The received signals are usually disturbed by thermal, electrical, atmospheric or intentional interferences, and due to their random nature, statistical techniques play an important role in their analysis. Statistics is also used in the formulation of appropriate models to describe the behavior of systems, the development of appropriate techniques for estimation of model parameters and the assessment of the model performances. Analyzing different real-world data sets to illustrate how different models can be used in practice, and highlighting open problems for future research, the book is a valuable resource for senior undergraduate and graduate students specializing in mathematics or statistics.

Recent Advances In Information Science And Technology

Praise for the Series: "This book will be a useful reference to control engineers and researchers. The papers contained cover well the recent advances in the field of modern control theory." -IEEE Group

Correspondence "This book will help all those researchers who valiantly try to keep abreast of what is new in the theory and practice of optimal control." --Control

Statistical Signal Processing

Revised and updated, this concise new edition of the pioneering book on multidimensional signal processing is ideal for a new generation of students. Multidimensional systems or m-D systems are the necessary mathematical background for modern digital image processing with applications in biomedicine, X-ray technology and satellite communications. Serving as a firm basis for graduate engineering students and researchers seeking applications in mathematical theories, this edition eschews detailed mathematical theory not useful to students. Presentation of the theory has been revised to make it more readable for students, and introduce some new topics that are emerging as multidimensional DSP topics in the interdisciplinary fields of image processing. New topics include Groebner bases, wavelets, and filter banks.

Stochastic Digital Control System Techniques

Praise for the Series "This book will be a useful reference to control engineers and researchers. The papers contained cover well the recent advances in the field of modern control theory." --IEEE Group Correspondence "This book will help all those researchers who valiantly try to keep abreast of what is new in the theory and practice of optimal control." --Control

Multidimensional Systems

This book fills a critical gap in biomedical data analysis in making the connection between signal processing and physiological modelling. Based on the premise that the use of signal processing techniques is predicated on explicit or implicit models, this book provides a foundation in systems analysis and signal processing techniques for physiological data. The book comprises two main parts: namely, signal processing techniques for linear systems, and physiological modelling. Beginning with a broad introduction to signals and systems, the book proceeds to contemporary techniques in digital signal processing. While maintaining continuity of mathematical concepts, the emphasis is on practical implementation and applications. The signal processing topics covered include Fourier transform, the wavelet transform, and optimal filtering techniques. The book presumes only knowledge of college mathematics and is suitable for a beginner in the subject; however, a student with a previous course in analog and digital signal processing will find that only a third of the book contains a bare treatment of classical signal processing.

Applied Multidimensional Systems Theory

The artificial intelligence subset machine learning has become a popular technique in professional fields as many are finding new ways to apply this trending technology into their everyday practices. Two fields that have majorly benefited from this are pattern recognition and information security. The ability of these intelligent algorithms to learn complex patterns from data and attain new performance techniques has created a wide variety of uses and applications within the data security industry. There is a need for research on the specific uses machine learning methods have within these fields, along with future perspectives. The Handbook of Research on Machine Learning Techniques for Pattern Recognition and Information Security is a collection of innovative research on the current impact of machine learning methods within data security as well as its various applications and newfound challenges. While highlighting topics including anomaly detection systems, biometrics, and intrusion management, this book is ideally designed for industrial experts, researchers, IT professionals, network developers, policymakers, computer scientists, educators, and students seeking current research on implementing machine learning tactics to enhance the performance of information security.

Multidimensional Systems Signal Processing Algorithms and Application Techniques

The book presents selected, extended and peer reviewed papers from the International Multicon-ference on System, Automation and Control held Leipzig in 2018. These are complemented with solicited contributions by international experts. Main topics are automatic control, robotics, synthesis of automation systems. Application examples range from man-machine interaction, mechatronics, on to biological and economical models.

Signals and Systems in Biomedical Engineering

This book contains papers presented at the Noblesse Workshop on Non-linear model based image analysis held in Glasgow, 1-3 July 1998. Current models have mainly been developed for image coding purposes. They are rather simple and far away from being optimal and do not contribute to more complex tasks like those needed in image databases. This book meets the challenging tasks in multimedia applications by discussing new sophisticated model-based schemes for a high-level description of images and image sequences. Novel results are covered in the papers presented in this book, opening new potential fields of application like the support for building databases in multimedia applications, image archiving and image sequence coding, including such topics as:- 3D Image Models; Image/Video Restoration; Segmentation and Object Oriented Coding; Colour Image Processing; Database Retrieval; Image Models; Video Pre- and Post processing.

Stochastic Digital Control System Techniques

A realistic and comprehensive review of joint approaches to machine learning and signal processing algorithms, with application to communications, multimedia, and biomedical engineering systems Digital Signal Processing with Kernel Methods reviews the milestones in the mixing of classical digital signal processing models and advanced kernel machines statistical learning tools. It explains the fundamental concepts from both fields of machine learning and signal processing so that readers can quickly get up to speed in order to begin developing the concepts and application software in their own research. Digital Signal Processing with Kernel Methods provides a comprehensive overview of kernel methods in signal processing, without restriction to any application field. It also offers example applications and detailed benchmarking experiments with real and synthetic datasets throughout. Readers can find further worked examples with Matlab source code on a website developed by the authors: http://github.com/DSPKM • Presents the necessary basic ideas from both digital signal processing and machine learning concepts • Reviews the state-of-the-art in SVM algorithms for classification and detection problems in the context of signal processing • Surveys advances in kernel signal processing beyond SVM algorithms to present other highly relevant kernel methods for digital signal processing An excellent book for signal processing researchers and practitioners, Digital Signal Processing with Kernel Methods will also appeal to those involved in machine learning and pattern recognition.

Handbook of Research on Machine Learning Techniques for Pattern Recognition and Information Security

High-Resolution and Robust Signal Processing describes key methodological and theoretical advances achieved in this domain over the last twenty years, placing emphasis on modern developments and recent research pursuits. Applications-grounded, this sophisticated resource links theoretical background with high-resolution methods used in wireless communications, brain signal analysis, and space-time radar signal processing. Chapter extras include theorem proofs, derivations, and computational shortcuts, as well as open problems, numerical measurement, and performance examples, and simulation results Sixteen illustrious field leaders invest High-Resolution and Robust Signal Processing with: in-depth reviews of parametric high-resolution estimation and detection techniques; robust array processing solutions for adaptive beam forming and high-resolution direction finding; Parafac techniques for high-resolution array processing and specific areas of application; high-resolution nonparametric methods and implementation tactics for spectral analysis; multidimensional high-resolution data models and discussion of R-D unitary ESPRIT with colored noise; multidimensional high-resolution parameter estimation techniques applicable to channel sounding; estimation procedures for high-resolution space-time radar signal processing using 2-D or 1-D/1-D models; and models and methods for EEG/MEG space-time dipole source estimation and sensory array design.

Systems, Automation, and Control

This second edition describes the fundamentals of modelling and simulation of continuous-time, discrete time, discrete-event and large-scale systems. Coverage new to this edition includes: a chapter on non-linear systems analysis and modelling, complementing the treatment of of continuous-time and discrete-time systems and a chapter on the computer animation and visualization of dynamical systems motion.

Noblesse Workshop on Non-Linear Model Based Image Analysis

The second volume will deal with a presentation of the main matrix and tensor decompositions and their properties of uniqueness, as well as very useful tensor networks for the analysis of massive data. Parametric estimation algorithms will be presented for the identification of the main tensor decompositions. After a brief historical review of the compressed sampling methods, an overview of the main methods of retrieving matrices and tensors with missing data will be performed under the low rank hypothesis. Illustrative examples will be provided.

Digital Signal Processing with Kernel Methods

A unique treatment of signal processing using a model-basedperspective Signal processing is primarily aimed at extracting usefulinformation, while rejecting the extraneous from noisy data. Ifsignal levels are high, then basic techniques can be applied.However, low signal levels require using the underlying physics tocorrect the problem causing these low levels and extracting thedesired information. Model-based signal processing incorporates thephysical phenomena, measurements, and noise in the form ofmathematical models to solve this problem. Not only does theapproach enable signal processors to work directly in terms of theproblem's physics, instrumentation, and uncertainties, but itprovides far superior performance over the standard techniques.Model-based signal processing is both a modeler's as well as asignal processor's tool. Model-Based Signal Processing develops the model-based approach ina unified manner and follows it through the text in the algorithms,examples, applications, and case studies. The approach, coupledwith the hierarchy of physics-based models that the authordevelops, including linear as well as nonlinear representations,makes it a unique contribution to the field of signalprocessing. The text includes parametric (e.g., autoregressive or all-pole),sinusoidal, wave-based, and state-space models as some of the modelsets with its focus on how they may be used to solve signalprocessing problems. Special features are provided that assistreaders in understanding the material and learning how to applytheir new knowledge to solving real-life problems. * Unified treatment of well-known signal processing modelsincluding physics-based model sets * Simple applications demonstrate how the model-based approachworks, while detailed case studies demonstrate problem solutions intheir entirety from concept to model development, throughsimulation, application to real data, and detailed performanceanalysis * Summaries provided with each chapter ensure that readersunderstand the key points needed to move forward in the text aswell as MATLAB(r) Notes that describe the key commands andtoolboxes readily available to perform the algorithmsdiscussed * References lead to more in-depth coverage of specializedtopics * Problem sets test readers' knowledge and help them put their newskills into practice The author demonstrates how the basic idea of model-based signalprocessing is a highly effective and natural way to solve bothbasic as well as complex processing problems. Designed as agraduate-level text, this book is also essential reading forpracticing signal-processing professionals and scientists, who willfind the variety of case studies to be invaluable. An Instructor's Manual presenting detailed solutions to all theproblems in the book is available from the Wiley editorialdepartment

High-Resolution and Robust Signal Processing

This timely, authoritative reference covers a breadth of topics in the fields of circuit-switched communications and data networks. It focuses on methodologies for developing network models and techniques for analyzing numerous types and aspects of networks. Bringing together in one complete source a vast amount of information on recent technological advances, Network Modeling, Simulation, and Analysis examines applications of compartmental models to engineering ... network models for the performance analysis of local area computer networks ... closed-form solutions for the evaluation of network performance measures ... adaptive routing and design algorithms for reliable distributed networks ... mixed voice/data networks ... and more. Illustrating concepts with examples from actual case studies, more than 650 display equations, and numerous figures and tables, this exemplary resource is invaluable reading for electrical and electronics, communications, performance, control, industrial, systems, and manufacturing engineers; computer scientists/engineers; operations research scientists; applied mathematicians; and advanced undergraduate and graduate students in these disciplines. Book jacket.

Systems Modeling and Computer Simulation

"Integrates a broad range of physics, algorithms, and sensing techniques for development of intelligent systems. Highlights adaptive least-squared error modeling. Covers complex sampling, physical system modeling using digital filters, frequency domain processing, beamforming, and much more."

Multidimensional Systems and Signal Processing

Unlike any other source in the field, this valuable reference clearly examines key aspects of the finite element method (FEM) for electromagnetic analysis of low-frequency electrical devices. The authors examine phenomena such as nonlinearity, mechanical force, electrical circuit coupling, vibration, heat, and movement for applications in the elect

Matrix and Tensor Decompositions in Signal Processing, Volume 2

Recent Developments in Time-Frequency Analysis brings together in one place important contributions and up-to-date research results in this fast moving area. Recent Developments in Time-Frequency Analysis serves as an excellent reference, providing insight into some of the most challenging research issues in the field.

Model-Based Signal Processing

Proceedings of the ... Midwest Symposium on Circuits and Systems