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Correlative LearningBayesian Signal ProcessingAdvances in Intelligent Data Analysis XIIDigital Signal Processing with Matlab Examples, Volume 2Artificial Intelligence and Soft ComputingA Rapid Introduction to Adaptive FilteringData-driven Design of Fault Diagnosis and Fault-tolerant Control SystemsImage Processing for Remote SensingTechnological Innovation for Value CreationSignal and Image Processing for Remote SensingNetworked Filtering and Fusion in Wireless Sensor NetworksAdaptive Filtering and Change DetectionAnalysis and Synthesis of Fault-Tolerant Control SystemsFault Diagnosis of Nonlinear Systems Using a Hybrid ApproachKapazitive Elektroden zur Messung bioelektrischer SignaleLearning in Non-Stationary EnvironmentsFahrdynamik-RegelungRecurrent Neural Networks and Soft ComputingFault Detection and Fault-Tolerant Control for Nonlinear SystemsModel-Based Fault Diagnosis TechniquesBeyond the Kalman Filter: Particle Filters for Tracking ApplicationsSystems and Human Science, for Safety, Security, and DependabilityAdvances in Industrial Engineering and Operations ResearchAdvances in Aerospace Guidance, Navigation and ControlHybrid System IdentificationNew Trends and Developments in Automotive IndustryMultitemporal Remote SensingEncyclopedia of Environmental ChangeModel-Based ProcessingNew Directions in Intelligent Interactive MultimediaKalman FilterBig Data Analytics for Cyber-Physical SystemsImage Analysis, Classification and Change Detection in Remote SensingIntelligence for Embedded SystemsMachine Learning Methods for Behaviour Analysis and Anomaly Detection in VideoFault Detection, Supervision and Safety of Technical Processes 2006Computer Information Systems and Industrial ManagementComplex SystemsAcademic Press Library in Signal ProcessingAdaptive Filtering

Correlative Learning

The aim of this book is to provide an overview of recent developments in Kalman filter theory and their applications in engineering and scientific fields. The book is divided into 24 chapters and organized in five blocks corresponding to recent advances in Kalman filtering theory, applications in medical and biological sciences, tracking and positioning systems, electrical engineering and, finally, industrial processes and communication networks.

Bayesian Signal Processing

Most data from satellites are in image form, thus most books in the remote sensing field deal exclusively with image processing. However, signal processing can contribute significantly in extracting information from the remotely sensed waveforms or time series data. Pioneering the combination of the two processes, Signal and Image Processing for Re

Advances in Intelligent Data Analysis XII

Data-driven Design of Fault Diagnosis and Fault-tolerant Control Systems presents basic statistical process monitoring, fault diagnosis, and control methods and introduces advanced data-driven schemes for the design of fault diagnosis and fault-tolerant control systems catering to the needs of dynamic industrial processes. With ever increasing demands for reliability, availability and safety in technical processes and assets, process monitoring and fault-tolerance have become important issues surrounding the design of automatic control systems. This text shows the reader how, thanks to the rapid development of information technology, key techniques of data-driven and statistical process monitoring and control can now become widely used in industrial practice to address these issues. To allow for self-contained study and facilitate implementation in real applications, important mathematical and control theoretical knowledge and tools are included in this book. Major schemes are presented in algorithm form and demonstrated on industrial case systems. Data-driven Design of Fault Diagnosis and Fault-tolerant Control Systems will be of interest to process and control engineers, engineering students and researchers with a control engineering background.

Digital Signal Processing with Matlab Examples, Volume 2

This thesis proposes machine learning methods for understanding scenes via behaviour analysis and online anomaly detection in video. The book introduces novel Bayesian topic models for detection of events that are different from typical activities and a novel framework for change point detection for identifying sudden behavioural changes. Behaviour analysis and anomaly detection are key components of intelligent vision systems. Anomaly detection can be considered from two perspectives: abnormal events can be defined as those that violate typical activities or as a sudden change in behaviour. Topic modelling and change-point detection methodologies, respectively, are employed to achieve these objectives.

The thesis starts with the development of learning algorithms for a dynamic topic model, which extract topics that represent typical activities of a scene. These typical activities are used in a normality measure in anomaly detection decision-making. The book also proposes a novel anomaly localisation procedure. In the first topic model presented, a number of topics should be specified in advance. A novel dynamic nonparametric hierarchical Dirichlet process topic model is then developed where the number of topics is determined from data. Batch and online inference algorithms are developed. The latter part of the thesis considers behaviour analysis and anomaly detection within the change-point detection methodology. A novel general framework for change-point detection is introduced. Gaussian process time series data is considered. Statistical hypothesis tests are proposed for both offline and online data processing and multiple change point detection are proposed and theoretical properties of the tests are derived. The thesis is accompanied by open-source toolboxes that can be used by researchers and engineers.

Artificial Intelligence and Soft Computing

Our society keeps growing with a large number of complicated machines and systems, while we are spending our diverse lives. The number of aged people has been increasing in the society. It is more likely than ever that we are involved in dangers, accidents, crimes, and disasters. Securing and supporting our daily life, building reliable infrastructures against large scale disasters, and preventing unexpected human errors are crucial issues in our highly developed complex society. The systems theory can provide "modelling, decision analysis and management for safety and security" as well as "fault detection and reliable control for the design of fail-safe, fool-proof machines and systems". If the human nature is analyzed and treated properly in the process of designing machines and systems, we could create safer, more reliable, and more intelligent machines and systems that can support our society and give us no anxiety and no uneasiness. "Hybrid systems modelling human behaviours" and "services for human" could give proper examples in this respect. "Robotics for safety and security", "safety recovery systems", "visual surveillance and monitoring", and "transportation systems for safety and security", those will provide powerful tools for safe, secure, and reliable systems to achieve peaceful society. Key features: - Towards a new science and its practical applications - Analysis of humans contributing to system designs - Evaluations of systems in the aspects of sense of security and

feeling of easiness. · Towards a new science and its practical applications · Analysis of humans contributing to system designs · Evaluations of systems in the aspects of sense of security and feeling of easiness

A Rapid Introduction to Adaptive Filtering

This book summarizes the works and new research results presented at the First International Symposium on Intelligent Interactive Multimedia Systems and Services (KES-IIMSS 2008), organized by the University of Piraeus and its Depa- ment of Informatics in conjunction with KES International (Piraeus, Greece, July 9-11, 2008). The aim of the symposium was to provide an internationally respected forum for scientific research into the technologies and applications of intelligent int- active multimedia systems and services. Besides the Preface, the book contains sixty four (64) chapters. The first four (4) chapters in the book are printed versions of the keynote addresses of the invited speakers of KES-IIMSS 2008. Besides the invited speaker chapters, the book contains fifteen (15) chapters on recent Advances in Multimedia Data Analysis, eleven (11) chapters on Reasoning Approaches, nine (9) chapters on Infrastructure of Intelligent Interactive Multimedia Systems and Services, fourteen (14) chapters on Multimedia Applications, and eleven (11) chapters on Quality of Interactive Multimedia Services.

Data-driven Design of Fault Diagnosis and Fault-tolerant Control Systems

This book is divided in five main parts (production technology, system production, machinery, design and materials) and tries to show emerging solutions in automotive industry fields related to OEMs and no-OEMs sectors in order to show the vitality of this leading industry for worldwide economies and related important impacts on other industrial sectors and their environmental sub-products.

Image Processing for Remote Sensing

This volume contains contributions from prominent researchers who participated in the 2007 IAENG International Conference on Operations Research. It presents theories and applications of modern industrial engineering and operations research to meet the needs of rapidly developing fields. The book reflects the tremendous advances in

communication systems and electrical engineering and also serves as an excellent reference work for researchers and graduate students.

Technological Innovation for Value Creation

For most tracking applications the Kalman filter is reliable and efficient, but it is limited to a relatively restricted class of linear Gaussian problems. To solve problems beyond this restricted class, particle filters are proving to be dependable methods for stochastic dynamic estimation. Packed with 867 equations, this cutting-edge book introduces the latest advances in particle filter theory, discusses their relevance to defense surveillance systems, and examines defense-related applications of particle filters to nonlinear and non-Gaussian problems. With this hands-on guide, you can develop more accurate and reliable nonlinear filter designs and more precisely predict the performance of these designs. You can also apply particle filters to tracking a ballistic object, detection and tracking of stealthy targets, tracking through the blind Doppler zone, bi-static radar tracking, passive ranging (bearings-only tracking) of maneuvering targets, range-only tracking, terrain-aided tracking of ground vehicles, and group and extended object tracking.

Signal and Image Processing for Remote Sensing

This third volume, edited and authored by world leading experts, gives a review of the principles, methods and techniques of important and emerging research topics and technologies in array and statistical signal processing. With this reference source you will: Quickly grasp a new area of research Understand the underlying principles of a topic and its application Ascertain how a topic relates to other areas and learn of the research issues yet to be resolved Quick tutorial reviews of important and emerging topics of research in array and statistical signal processing Presents core principles and shows their application Reference content on core principles, technologies, algorithms and applications Comprehensive references to journal articles and other literature on which to build further, more specific and detailed knowledge Edited by leading people in the field who, through their reputation, have been able to commission experts to write on a particular topic

Networked Filtering and Fusion in Wireless Sensor Networks

New Bayesian approach helps you solve tough problems in signal processing with ease Signal processing is based on this fundamental concept—the extraction of critical information from noisy, uncertain data. Most techniques rely on underlying Gaussian assumptions for a solution, but what happens when these assumptions are erroneous? Bayesian techniques circumvent this limitation by offering a completely different approach that can easily incorporate non-Gaussian and nonlinear processes along with all of the usual methods currently available. This text enables readers to fully exploit the many advantages of the "Bayesian approach" to model-based signal processing. It clearly demonstrates the features of this powerful approach compared to the pure statistical methods found in other texts. Readers will discover how easily and effectively the Bayesian approach, coupled with the hierarchy of physics-based models developed throughout, can be applied to signal processing problems that previously seemed unsolvable. Bayesian Signal Processing features the latest generation of processors (particle filters) that have been enabled by the advent of high-speed/high-throughput computers. The Bayesian approach is uniformly developed in this book's algorithms, examples, applications, and case studies. Throughout this book, the emphasis is on nonlinear/non-Gaussian problems; however, some classical techniques (e.g. Kalman filters, unscented Kalman filters, Gaussian sums, grid-based filters, et al) are included to enable readers familiar with those methods to draw parallels between the two approaches. Special features include: Unified Bayesian treatment starting from the basics (Bayes's rule) to the more advanced (Monte Carlo sampling), evolving to the next-generation techniques (sequential Monte Carlo sampling) Incorporates "classical" Kalman filtering for linear, linearized, and nonlinear systems; "modern" unscented Kalman filters; and the "next-generation" Bayesian particle filters Examples illustrate how theory can be applied directly to a variety of processing problems Case studies demonstrate how the Bayesian approach solves real-world problems in practice MATLAB notes at the end of each chapter help readers solve complex problems using readily available software commands and point out software packages available Problem sets test readers' knowledge and help them put their new skills into practice The basic Bayesian approach is emphasized throughout this text in order to enable the processor to rethink the approach to formulating and solving signal processing problems from the Bayesian perspective. This text brings readers from the classical methods of model-based signal processing to the next generation of processors that will clearly dominate the future of signal processing for years to come. With its many illustrations demonstrating the applicability of the

Bayesian approach to real-world problems in signal processing, this text is essential for all students, scientists, and engineers who investigate and apply signal processing to their everyday problems.

Adaptive Filtering and Change Detection

By exploiting the synergies among available data, information fusion can reduce data traffic, filter noisy measurements, and make predictions and inferences about a monitored entity. Networked Filtering and Fusion in Wireless Sensor Networks introduces the subject of multi-sensor fusion as the method of choice for implementing distributed systems. The book examines the state of the art in information fusion. It presents the known methods, algorithms, architectures, and models of information fusion and discusses their applicability in the context of wireless sensor networks (WSNs). Paying particular attention to the wide range of topics that have been covered in recent literature, the text presents the results of a number of typical case studies. Complete with research supported elements and comprehensive references, this teaching-oriented volume uses standard scientific terminology, conventions, and notations throughout. It applies recently developed convex optimization theory and highly efficient algorithms in estimation fusion to open up discussion and provide researchers with an ideal starting point for further research on distributed estimation and fusion for WSNs. The book supplies a cohesive overview of the key results of theory and applications of information-fusion-related problems in networked systems in a unified framework. Providing advanced mathematical treatment of fundamental problems with information fusion, it will help you broaden your understanding of prospective applications and how to address such problems in practice. After reading the book, you will gain the understanding required to model parts of dynamic systems and use those models to develop distributed fusion control algorithms that are based on feedback control theory.

Analysis and Synthesis of Fault-Tolerant Control Systems

Accessibly written by a team of international authors, the Encyclopedia of Environmental Change provides a gateway to the complex facts, concepts, techniques, methodology and philosophy of environmental change. This three-volume set illustrates and examines topics within this dynamic and rapidly changing interdisciplinary field. The encyclopedia includes all of the following aspects of environmental change: Diverse evidence of environmental change, including climate

change and changes on land and in the oceans Underlying natural and anthropogenic causes and mechanisms Wide-ranging local, regional and global impacts from the polar regions to the tropics Responses of geo-ecosystems and human-environmental systems in the face of past, present and future environmental change Approaches, methodologies and techniques used for reconstructing, dating, monitoring, modelling, projecting and predicting change Social, economic and political dimensions of environmental issues, environmental conservation and management and environmental policy Over 4,000 entries explore the following key themes and more: Conservation Demographic change Environmental management Environmental policy Environmental security Food security Glaciation Green Revolution Human impact on environment Industrialization Landuse change Military impacts on environment Mining and mining impacts Nuclear energy Pollution Renewable resources Solar energy Sustainability Tourism Trade Water resources Water security Wildlife conservation The comprehensive coverage of terminology includes layers of entries ranging from one-line definitions to short essays, making this an invaluable companion for any student of physical geography, environmental geography or environmental sciences.

Fault Diagnosis of Nonlinear Systems Using a Hybrid Approach

In this book, the authors provide insights into the basics of adaptive filtering, which are particularly useful for students taking their first steps into this field. They start by studying the problem of minimum mean-square-error filtering, i.e., Wiener filtering. Then, they analyze iterative methods for solving the optimization problem, e.g., the Method of Steepest Descent. By proposing stochastic approximations, several basic adaptive algorithms are derived, including Least Mean Squares (LMS), Normalized Least Mean Squares (NLMS) and Sign-error algorithms. The authors provide a general framework to study the stability and steady-state performance of these algorithms. The affine Projection Algorithm (APA) which provides faster convergence at the expense of computational complexity (although fast implementations can be used) is also presented. In addition, the Least Squares (LS) method and its recursive version (RLS), including fast implementations are discussed. The book closes with the discussion of several topics of interest in the adaptive filtering field.

Kapazitive Elektroden zur Messung bioelektrischer Signale

A bridge between the application of subspace-based methods for parameter

estimation in signal processing and subspace-based system identification in control systems Model-Based Processing: An Applied Subspace Identification Approach provides expert insight on developing models for designing model-based signal processors (MBSP) employing subspace identification techniques to achieve model-based identification (MBID) and enables readers to evaluate overall performance using validation and statistical analysis methods. Focusing on subspace approaches to system identification problems, this book teaches readers to identify models quickly and incorporate them into various processing problems including state estimation, tracking, detection, classification, controls, communications, and other applications that require reliable models that can be adapted to dynamic environments. The extraction of a model from data is vital to numerous applications, from the detection of submarines to determining the epicenter of an earthquake to controlling an autonomous vehicles—all requiring a fundamental understanding of their underlying processes and measurement instrumentation. Emphasizing real-world solutions to a variety of model development problems, this text demonstrates how model-based subspace identification system identification enables the extraction of a model from measured data sequences from simple time series polynomials to complex constructs of parametrically adaptive, nonlinear distributed systems. In addition, this resource features: Kalman filtering for linear, linearized, and nonlinear systems; modern unscented Kalman filters; as well as Bayesian particle filters Practical processor designs including comprehensive methods of performance analysis Provides a link between model development and practical applications in model-based signal processing Offers in-depth examination of the subspace approach that applies subspace algorithms to synthesized examples and actual applications Enables readers to bridge the gap from statistical signal processing to subspace identification Includes appendices, problem sets, case studies, examples, and notes for MATLAB Model-Based Processing: An Applied Subspace Identification Approach is essential reading for advanced undergraduate and graduate students of engineering and science as well as engineers working in industry and academia.

Learning in Non-Stationary Environments

The safe and reliable operation of technical systems is of great significance for the protection of human life and health, the environment, and of the vested economic value. The correct functioning of those systems has a profound impact also on production cost and product quality. The early detection of faults is critical in avoiding

performance degradation and damage to the machinery or human life. Accurate diagnosis then helps to make the right decisions on emergency actions and repairs. Fault detection and diagnosis (FDD) has developed into a major area of research, at the intersection of systems and control engineering, artificial intelligence, applied mathematics and statistics, and such application fields as chemical, electrical, mechanical and aerospace engineering. IFAC has recognized the significance of FDD by launching a triennial symposium series dedicated to the subject. The SAFEPROCESS Symposium is organized every three years since the first symposium held in Baden-Baden in 1991. SAFEPROCESS 2006, the 6th IFAC Symposium on Fault Detection, Supervision and Safety of Technical Processes was held in Beijing, PR China. The program included three plenary papers, two semi-plenary papers, two industrial talks by internationally recognized experts and 258 regular papers, which have been selected out of a total of 387 regular and invited papers submitted. * Discusses the developments and future challenges in all aspects of fault diagnosis and fault tolerant control * 8 invited and 36 contributed sessions included with a special session on the demonstration of process monitoring and diagnostic software tools

Fahrdynamik-Regelung

The two first CEAS (Council of European Aerospace Societies) Specialist Conferences on Guidance, Navigation and Control (CEAS EuroGNC) were held in Munich, Germany in 2011 and in Delft, The Netherlands in 2013. ONERA The French Aerospace Lab, ISAE (Institut Supérieur de l'Aéronautique et de l'Espace) and ENAC (Ecole Nationale de l'Aviation Civile) accepted the challenge of jointly organizing the 3rd edition. The conference aims at promoting new advances in aerospace GNC theory and technologies for enhancing safety, survivability, efficiency, performance, autonomy and intelligence of aerospace systems. It represents a unique forum for communication and information exchange between specialists in the fields of GNC systems design and operation, including air traffic management. This book contains the forty best papers and gives an interesting snapshot of the latest advances over the following topics: l Control theory, analysis, and design l Novel navigation, estimation, and tracking methods l Aircraft, spacecraft, missile and UAV guidance, navigation, and control l Flight testing and experimental results l Intelligent control in aerospace applications l Aerospace robotics and unmanned/autonomous systems l Sensor systems for guidance, navigation and control l Guidance, navigation, and control concepts in air traffic control systems For the 3rd CEAS Specialist Conference on Guidance,

Navigation and Control the International Program Committee conducted a formal review process. Each paper was reviewed in compliance with standard journal practice by at least two independent and anonymous reviewers. The papers published in this book were selected from the conference proceedings based on the results and recommendations from the reviewers.

Recurrent Neural Networks and Soft Computing

Written by world renowned scientists, this book provides an excellent overview of a wide array of methods and techniques for the processing and analysis of multitemporal remotely sensed images. These methods and techniques include change detection, multitemporal data fusion, coarse-resolution time series processing, and interferometric SAR multitemporal processing, among others. A broad range of multitemporal datasets are used in their methodology demonstrations and application examples, including multispectral, hyperspectral, SAR and passive microwave data. This book features a variety of application examples covering both land and aquatic environments. Land applications include urban, agriculture, habitat disturbance, vegetation dynamics, soil moisture, land surface albedo, land surface temperature, glacier and disaster recovery. Aquatic applications include monitoring water quality, water surface areas and water fluctuation in wetland areas, spatial distribution patterns and temporal fluctuation trends of global land surface water, as well as evaluation of water quality in several coastal and marine environments. This book will help scientists, practitioners, students gain a greater understanding of how multitemporal remote sensing could be effectively used to monitor our changing planet at local, regional, and global scales.

Fault Detection and Fault-Tolerant Control for Nonlinear Systems

Adaptive filtering is useful in any application where the signals or the modeled system vary over time. The configuration of the system and, in particular, the position where the adaptive processor is placed generate different areas or application fields such as prediction, system identification and modeling, equalization, cancellation of interference, etc., which are very important in many disciplines such as control systems, communications, signal processing, acoustics, voice, sound and image, etc. The book consists of noise and echo cancellation, medical applications, communications systems and others hardly joined by their

heterogeneity. Each application is a case study with rigor that shows weakness/strength of the method used, assesses its suitability and suggests new forms and areas of use. The problems are becoming increasingly complex and applications must be adapted to solve them. The adaptive filters have proven to be useful in these environments of multiple input/output, variant-time behaviors, and long and complex transfer functions effectively, but fundamentally they still have to evolve. This book is a demonstration of this and a small illustration of everything that is to come.

Model-Based Fault Diagnosis Techniques

In recent years, control systems have become more sophisticatedin order to meet increased performance and safety requirements formodern technological systems. Engineers are becoming more awarethat conventional feedback control design for a complex system mayresult in unsatisfactory performance, or even instability, in theevent of malfunctions in actuators, sensors or other systemcomponents. In order to circumvent such weaknesses, new approachesto control system design have emerged which can tolerate componentmalfunctions while maintaining acceptable stability andperformance. These types of control systems are often known asfault-tolerant control systems (FTCS). More precisely, FTCS arecontrol systems which possess the ability to accommodate componentfailure automatically. Analysis and Synthesis of Fault-Tolerant Control Systemscomprehensively covers the analysis and synthesis methods of faulttolerant control systems. It unifies the methods for developingcontrollers and filters for a wide class of dynamical systems andreports on the recent technical advances in design methodologies.MATLAB® is used throughout the book, to demonstrate methods ofanalysis and design. Key features: • Provides advanced theoretical methods and typicalpractical applications • Provides access to a spectrum of control design methodsapplied to industrial systems • Includes case studies and illustrative examples • Contains end-of-chapter problems Analysis and Synthesis of Fault-Tolerant Control Systemsis a comprehensive reference for researchers and practitionersworking in this area, and is also a valuable source of informationfor graduates and senior undergraduates in control, mechanical,aerospace, electrical and mechatronics engineering departments.

Beyond the Kalman Filter: Particle Filters for Tracking Applications

This book constitutes the refereed proceedings of the Third IFIP WG 5.5/SOCOLNET Doctoral Conference on Computing, Electrical and Industrial Systems, DoCEIS 2012, held in Costa de Caparica, Portugal, in February 2012. The 65 revised full papers were carefully reviewed and selected from numerous submissions. They cover a wide spectrum of topics ranging from collaborative enterprise networks to microelectronics. The papers are organized in topical sections on collaborative systems, service orientation, knowledge and content management, human interaction, Petri nets, smart systems, robotic systems, perceptional systems, signal processing, energy, renewable energy, energy smart grid, power electronics, electronics, optimization in electronics, telecommunications and electronics, and electronic materials. The book also includes papers from the Workshop on Data Anaylsis and Modeling Retina in Health and Disease.

Systems and Human Science, for Safety, Security, and Dependability

Guaranteeing a high system performance over a wide operating range is an important issue surrounding the design of automatic control systems with successively increasing complexity. As a key technology in the search for a solution, advanced fault detection and identification (FDI) is receiving considerable attention. This book introduces basic model-based FDI schemes, advanced analysis and design algorithms, and mathematical and control-theoretic tools. This second edition of Model-Based Fault Diagnosis Techniques contains: • new material on fault isolation and identification and alarm management; • extended and revised treatment of systematic threshold determination for systems with both deterministic unknown inputs and stochastic noises; • addition of the continuously-stirred tank heater as a representative process-industrial benchmark; and • enhanced discussion of residual evaluation which now deals with stochastic processes. Model-based Fault Diagnosis Techniques will interest academic researchers working in fault identification and diagnosis and as a text it is suitable for graduate students in a formal university-based course or as a self-study aid for practising engineers working with automatic control or mechatronic systems from backgrounds as diverse as chemical process and power engineering.

Advances in Industrial Engineering and Operations Research

Correlative Learning: A Basis for Brain and Adaptive Systems provides a bridge between three disciplines: computational neuroscience, neural

networks, and signal processing. First, the authors lay down the preliminary neuroscience background for engineers. The book also presents an overview of the role of correlation in the human brain as well as in the adaptive signal processing world; unifies many well-established synaptic adaptations (learning) rules within the correlation-based learning framework, focusing on a particular correlative learning paradigm, ALOPEX; and presents case studies that illustrate how to use different computational tools and ALOPEX to help readers understand certain brain functions or fit specific engineering applications.

Advances in Aerospace Guidance, Navigation and Control

This book constitutes the refereed conference proceedings of the 12th International Conference on Intelligent Data Analysis, which was held in October 2013 in London, UK. The 36 revised full papers together with 3 invited papers were carefully reviewed and selected from 84 submissions handling all kinds of modeling and analysis methods, irrespective of discipline. The papers cover all aspects of intelligent data analysis, including papers on intelligent support for modeling and analyzing data from complex, dynamical systems.

Hybrid System Identification

New applications in recurrent neural networks are covered by this book, which will be required reading in the field. Methodological tools covered include ranking indices for fuzzy numbers, a neuro-fuzzy digital filter and mapping graphs of parallel programmes. The scope of the techniques profiled in real-world applications is evident from chapters on the recognition of severe weather patterns, adult and foetal ECGs in healthcare and the prediction of temperature time-series signals. Additional topics in this vein are the application of AI techniques to electromagnetic interference problems, bioprocess identification and I-term control and the use of BRNN-SVM to improve protein-domain prediction accuracy. Recurrent neural networks can also be used in virtual reality and nonlinear dynamical systems, as shown by two chapters.

New Trends and Developments in Automotive Industry

Edited by leaders in the field, with contributions by a panel of experts, Image Processing for Remote Sensing explores new and unconventional mathematics methods. The coverage includes the physics

and mathematical algorithms of SAR images, a comprehensive treatment of MRF-based remote sensing image classification, statistical approaches for

Multitemporal Remote Sensing

Die Mechatronik im Fahrzeug hat heute entscheidenden Einfluss auf die Gestaltung der Radaufhängungen, Bremsen und Lenkungen und die dadurch möglichen aktiven Eingriffe. Regelungen ermöglichen so eine Beeinflussung der Fahrdynamik. Der Entwurf und die Erprobung dieser mechatronischen Systeme erfordert ein modellgestütztes Vorgehen mit verschiedenen Arten der Simulation, modellbasierten Regelungen, Überwachungs- und Diagnosemethoden bis hin zum Test einer automatisierten Fahrzeugführung. Hier gibt das Buch einen detaillierten Überblick. Dabei werden besonders mechatronische Bremssysteme, aktive Radaufhängungen, aktive Stabilisatoren, aktive Lenksysteme, ABS-, ESP- und AFS-Regelungen und Fahrer-Assistenz-Systeme zur Abstandsregelung mit Stop-and-Go, zur Spurführung und ein Parkassistent betrachtet. Weitere Kapitel behandeln Diagnosesysteme für die Querdynamik-Regelung und aktive Fahrwerke.

Encyclopedia of Environmental Change

This book gives a wide-ranging description of the many facets of complex dynamic networks and systems within an infrastructure provided by integrated control and supervision: envisioning, design, experimental exploration, and implementation. The theoretical contributions and the case studies presented can reach control goals beyond those of stabilization and output regulation or even of adaptive control. Reporting on work of the Control of Complex Systems (COSY) research program, Complex Systems follows from and expands upon an earlier collection: Control of Complex Systems by introducing novel theoretical techniques for hard-to-control networks and systems. The major common feature of all the superficially diverse contributions encompassed by this book is that of spotting and exploiting possible areas of mutual reinforcement between control, computing and communications. These help readers to achieve not only robust stable plant system operation but also properties such as collective adaptivity, integrity and survivability at the same time retaining desired performance quality. Applications in the individual chapters are drawn from: • the general implementation of model-based diagnosis and systems engineering in medical technology, in communication, and in power and airport networks;

• the creation of biologically inspired control brains and safety-critical human-machine systems, • process-industrial uses; • biped robots; • large space structures and unmanned aerial vehicles; and • precision servomechanisms and other advanced technologies. Complex Systems provides researchers from engineering, applied mathematics and computer science backgrounds with innovative theoretical and practical insights into the state-of-the-art of complex networks and systems research. It employs physical implementations and extensive computer simulations. Graduate students specializing in complex-systems research will also learn much from this collection./pp

Model-Based Processing

Addressing current issues of which any engineer or computer scientist should be aware, this monograph is a response to the need to adopt a new computational paradigm as the methodological basis for designing pervasive embedded systems with sensor capabilities. The requirements of this paradigm are to control complexity, to limit cost and energy consumption and to provide adaptation and cognition abilities allowing the embedded system to interact proactively with the real world. The quest for such intelligence requires the formalization of a new generation of intelligent systems able to exploit advances in digital architectures and in sensing technologies. The book sheds light on the theory behind intelligence for embedded systems with specific focus on: · robustness (the robustness of a computational flow and its evaluation); · intelligence (how to mimic the adaptation and cognition abilities of the human brain), · the capacity to learn in non-stationary and evolving environments by detecting changes and reacting accordingly; and · a new paradigm that, by accepting results that are correct in probability, allows the complexity of the embedded application the be kept under control. Theories, concepts and methods are provided to motivate researchers in this exciting and timely interdisciplinary area. Applications such as porting a neural network from a high-precision platform to a digital embedded system and evaluatin g its robustness level are described. Examples show how the methodology introduced can be adopted in the case of cyber-physical systems to manage the interaction between embedded devices and physical world. Researchers and graduate students in computer science and various engineering-related disciplines will find the methods and approaches propounded in Intelligence for Embedded Systems of great interest. The book will also be an important resource for practitioners working on embedded systems and applications.

New Directions in Intelligent Interactive Multimedia

This book highlights research and survey articles dedicated to big data techniques for cyber-physical system (CPS), which addresses the close interactions and feedback controls between cyber components and physical components. The book first discusses some fundamental big data problems and solutions in large scale distributed CPSs. The book then addresses the design and control challenges in multiple CPS domains such as vehicular system, smart city, smart building, and digital microfluidic biochips. This book also presents the recent advances and trends in the maritime simulation system and the flood defence system.

Kalman Filter

?Hybrid System Identification helps readers to build mathematical models of dynamical systems switching between different operating modes, from their experimental observations. It provides an overview of the interaction between system identification, machine learning and pattern recognition fields in explaining and analysing hybrid system identification. It emphasises the optimization and computational complexity issues that lie at the core of the problems considered and sets them aside from standard system identification problems. The book presents practical methods that leverage this complexity, as well as a broad view of state-of-the-art machine learning methods. The authors illustrate the key technical points using examples and figures to help the reader understand the material. The book includes an in-depth discussion and computational analysis of hybrid system identification problems, moving from the basic questions of the definition of hybrid systems and system identification to methods of hybrid system identification and the estimation of switched linear/affine and piecewise affine models. The authors also give an overview of the various applications of hybrid systems, discuss the connections to other fields, and describe more advanced material on recursive, state-space and nonlinear hybrid system identification. Hybrid System Identification includes a detailed exposition of major methods, which allows researchers and practitioners to acquaint themselves rapidly with state-of-the-art tools. The book is also a sound basis for graduate and undergraduate students studying this area of control, as the presentation and form of the book provides the background and coverage necessary for a full understanding of hybrid system identification, whether the reader is initially familiar with system identification related to hybrid systems or not.

Big Data Analytics for Cyber-Physical Systems

The two-volume set LNAI 10245 and LNAI 10246 constitutes the refereed proceedings of the 16th International Conference on Artificial Intelligence and Soft Computing, ICAISC 2017, held in Zakopane, Poland in June 2017. The 133 revised full papers presented were carefully reviewed and selected from 274 submissions. The papers included in the second volume are organized in the following five parts: data mining; artificial intelligence in modeling, simulation and control; various problems of artificial intelligence; special session: advances in single-objective continuous parameter optimization with nature-inspired algorithms; special session: stream data mining.

Image Analysis, Classification and Change Detection in Remote Sensing

Intelligence for Embedded Systems

This is the second volume in a trilogy on modern Signal Processing. The three books provide a concise exposition of signal processing topics, and a guide to support individual practical exploration based on MATLAB programs. This second book focuses on recent developments in response to the demands of new digital technologies. It is divided into two parts: the first part includes four chapters on the decomposition and recovery of signals, with special emphasis on images. In turn, the second part includes three chapters and addresses important data-based actions, such as adaptive filtering, experimental modeling, and classification.

Machine Learning Methods for Behaviour Analysis and Anomaly Detection in Video

Linlin Li addresses the analysis and design issues of observer-based FD and FTC for nonlinear systems. The author analyses the existence conditions for the nonlinear observer-based FD systems to gain a deeper insight into the construction of FD systems. Aided by the T-S fuzzy technique, she recommends different design schemes, among them the L_inf/L_2 type of FD systems. The derived FD and FTC approaches are verified by two benchmark processes.

Fault Detection, Supervision and Safety of Technical Processes

2006

Image Analysis, Classification and Change Detection in Remote Sensing: With Algorithms for ENVI/IDL and Python, Third Edition introduces techniques used in the processing of remote sensing digital imagery. It emphasizes the development and implementation of statistically motivated, data-driven techniques. The author achieves this by tightly interweaving theory, algorithms, and computer codes. See What's New in the Third Edition: Inclusion of extensive code in Python, with a cloud computing example New material on synthetic aperture radar (SAR) data analysis New illustrations in all chapters Extended theoretical development The material is self-contained and illustrated with many programming examples in IDL. The illustrations and applications in the text can be plugged in to the ENVI system in a completely transparent fashion and used immediately both for study and for processing of real imagery. The inclusion of Python-coded versions of the main image analysis algorithms discussed make it accessible to students and teachers without expensive ENVI/IDL licenses. Furthermore, Python platforms can take advantage of new cloud services that essentially provide unlimited computational power. The book covers both multispectral and polarimetric radar image analysis techniques in a way that makes both the differences and parallels clear and emphasizes the importance of choosing appropriate statistical methods. Each chapter concludes with exercises, some of which are small programming projects, intended to illustrate or justify the foregoing development, making this self-contained text ideal for self-study or classroom use.

Computer Information Systems and Industrial Management

Theincreasingcomplexityofspacevehiclessuchassatellites,andthecostreduction measures that have affected satellite operators are increasingly driving the need for more autonomy in satellite diagnostics and control systems. Current methods for detecting and correcting anomalies onboard the spacecraft as well as on the ground are primarily manual and labor intensive, and therefore, tend to be slow. Operators inspect telemetry data to determine the current satellite health. They use various statisticaltechniques andmodels,buttheanalysisandevaluation ofthelargevolume of data still require extensive human intervention and expertise that is prone to error. Furthermore, for spacecraft and most of these satellites, there can be potentially unduly long delays in round-trip communications between the ground station and the satellite. In this context, it is desirable to have onboard fault-diagnosis system

that is capable of detecting, isolating, identifying or classifying faults in the system withouttheinvolvementandinterventionofoperators.Towardthisend,theprinciple goal here is to improve the ef?ciency, accuracy, and reliability of the trend analysis and diagnostics techniques through utilization of intelligent-based and hybrid-based methodologies.

Complex Systems

This book constitutes the proceedings of the 15th IFIP TC8 International Conference on Computer Information Systems and Industrial Management, CISIM 2016, held in Vilnius, Lithuania, in September 2016. The 63 regular papers presented together with 1 inivted paper and 5 keynotes in this volume were carefully reviewed and selected from about 89 submissions. The main topics covered are rough set methods for big data analytics; images, visualization, classification; optimization, tuning; scheduling in manufacturing and other applications; algorithms; decisions; intelligent distributed systems; and biometrics, identification, security.

Academic Press Library in Signal Processing

Adaptive filtering is a branch of digital signal processing which enables the selective enhancement of desired elements of a signal and the reduction of undesired elements. Change detection is another kind of adaptive filtering for non-stationary signals, and is the basic tool in fault detection and diagnosis. This text takes the unique approach that change detection is a natural extension of adaptive filtering, and the broad coverage encompasses both the mathematical tools needed for adaptive filtering and change detection and the applications of the technology. Real engineering applications covered include aircraft, automotive, communication systems, signal processing and automatic control problems. The unique integration of both theory and practical applications makes this book a valuable resource combining information otherwise only available in separate sources Comprehensive coverage includes many examples and case studies to illustrate the ideas and show what can be achieved Uniquely integrates applications to airborne, automotive and communications systems with the essential mathematical tools Accompanying Matlab toolbox available on the web illustrating the main ideas and enabling the reader to do simulations using all the figures and numerical examples featured This text would prove to be an essential reference for postgraduates and researchers studying digital signal processing as well as practising digital signal processing

engineers.

Adaptive Filtering

Recent decades have seen rapid advances in automatization processes, supported by modern machines and computers. The result is significant increases in system complexity and state changes, information sources, the need for faster data handling and the integration of environmental influences. Intelligent systems, equipped with a taxonomy of data-driven system identification and machine learning algorithms, can handle these problems partially. Conventional learning algorithms in a batch off-line setting fail whenever dynamic changes of the process appear due to non-stationary environments and external influences. Learning in Non-Stationary Environments: Methods and Applications offers a wide-ranging, comprehensive review of recent developments and important methodologies in the field. The coverage focuses on dynamic learning in unsupervised problems, dynamic learning in supervised classification and dynamic learning in supervised regression problems. A later section is dedicated to applications in which dynamic learning methods serve as keystones for achieving models with high accuracy. Rather than rely on a mathematical theorem/proof style, the editors highlight numerous figures, tables, examples and applications, together with their explanations. This approach offers a useful basis for further investigation and fresh ideas and motivates and inspires newcomers to explore this promising and still emerging field of research.

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