

Adaptive Filter Theory

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Adaptive Filtering Primer with MATLAB - Alexander D. Poularikas 2017-06-29

Because of the wide use of adaptive filtering in digital signal processing and, because most of the modern electronic devices include some type of an adaptive filter, a text that brings forth the fundamentals of this field was necessary. The material and the principles presented in this book are easily accessible to engineers, scientists, and students who would like to learn the fundamentals of this field and have a background at the bachelor level. Adaptive Filtering Primer with MATLAB clearly explains the fundamentals of adaptive filtering supported by numerous examples and computer simulations. The authors introduce discrete-time signal processing, random variables and stochastic processes, the Wiener filter, properties of the error surface, the steepest descent method, and the least mean square (LMS) algorithm. They also supply many MATLAB functions and m-files along with computer experiments to illustrate how to apply the concepts to real-world problems. The book includes problems along with hints, suggestions, and solutions for solving them. An appendix on matrix computations completes the self-contained coverage. With applications across a wide range of areas, including radar, communications, control, medical instrumentation, and seismology, Adaptive Filtering Primer with MATLAB is an ideal companion for quick reference and a perfect, concise introduction to the field.

Subband Adaptive Filtering - Kong-Aik Lee 2009-07-06

Subband adaptive filtering is rapidly becoming one of the most effective techniques for reducing computational complexity and improving the convergence rate of algorithms in adaptive signal processing applications. This book provides an introductory, yet extensive guide on the theory of various subband adaptive filtering techniques. For beginners, the authors discuss the basic principles that underlie the design and implementation of subband adaptive filters. For advanced readers, a comprehensive coverage of recent developments, such as multiband tap-weight adaptation, delayless architectures, and filter-bank design methods for reducing band-edge effects are included. Several analysis techniques and complexity evaluation are also introduced in this book to provide better understanding of subband adaptive filtering. This book bridges the gaps between the mixed-domain natures of subband adaptive filtering techniques and provides enough depth to the material augmented by many MATLAB® functions and examples. Key Features: Acts as a timely introduction for researchers, graduate students and engineers who want to design and deploy subband adaptive filters in their research and applications. Bridges the gaps between two distinct domains: adaptive filter theory and multirate signal processing. Uses a practical approach through MATLAB®-based source programs on the accompanying CD. Includes more than 100 M-files, allowing readers to modify the code for different algorithms and applications and to gain more insight into the theory and concepts of subband adaptive filters. Subband Adaptive Filtering is aimed primarily at practicing engineers, as well as senior undergraduate and graduate students. It will also be of interest to researchers, technical managers, and computer scientists.

Adaptive Filtering - Paulo S. R. Diniz 2008-05-22

This book presents the basic concepts of adaptive signal processing and adaptive filtering in a concise and straightforward manner, using clear notations that facilitate actual implementation. Important algorithms are described in detailed tables which allow the reader to verify learned concepts. The book covers the family of LMS and algorithms as well as set-membership, sub-band, blind, IIR adaptive filtering, and more. The book is also supported by a web page maintained by the author.

Feedback-Based Orthogonal Digital Filters - Mukund Padmanabhan 1996

Feedback-Based Orthogonal Digital Filters: Theory, Applications, and Implementation develops the theory of a feedback-based orthogonal digital filter and examines several applications where the filter topology leads to a simple and efficient solution. The development of the filter structure is linked to concepts in observer theory. Several signal processing problems can be represented as estimation problems, where a parametric representation of the input is used, to try and replicate it locally. This estimation problem can be solved using an identity observer, and the filter topology falls in this framework. Hence the filter topology represents a universal building block that can find application in several problems, such as spectral estimation, time-recursive computation of transforms, etc. Further, because of the orthogonality constraints satisfied by the structure, it also represents a robust solution under finite precision conditions. The book also presents the observer-based viewpoint of several signal processing problems, and shows that problems that are typically treated independently in the literature are in fact linked and can be cast in a single unified framework. In addition to examining the theoretical issues, the book describes practical issues related to a hardware implementation of the building block, in both the digital and analog domain. On the digital side, issues relating to implementation using semi-custom chips (FPGA's), and ASIC design are examined. On the analog side, the design and testing of a fabricated chip, that functions as a multi-sinusoidal phase-locked-loop, are described. Feedback-Based Orthogonal Digital Filters serves as an excellent reference. May be used as a text for advanced courses on the subject.

Adaptive Filter Theory - Simon S. Haykin 2002

Adaptive Filter Theory, 4e, is ideal for courses in Adaptive Filters. Haykin examines both the mathematical theory behind various linear adaptive filters and the elements of supervised multilayer perceptrons. In its fourth edition, this highly successful book has been updated and refined to stay current with the field and develop concepts in as unified and accessible a manner as possible.

Adaptive Filtering - Lefteris Tyler 2016-04-01

An adaptive filter is a computational device that iteratively models the relationship between the input and output signals of the filter. An adaptive filter self-adjusts the filter coefficients according to an adaptive algorithm. Over the past three decades, digital signal processors have made great advances in increasing speed and complexity, and reducing power consumption. As a result, real-time adaptive filtering algorithms are quickly becoming practical and essential for the future of communications, both wired and wireless. An adaptive filter designs itself based on the characteristics of the input signal to the filter and a signal that represents the desired behaviour of the filter on its input. Because of the complexity of the optimization algorithms, almost all adaptive filters are digital filters. Adaptive filters are required for some applications because some parameters of the desired processing operation are not known in advance or are changing. The closed loop adaptive filter uses feedback in the form of an error signal to refine its transfer function. Adaptive filtering can be used to characterize unknown systems in time-variant environments. Commonly, the closed loop adaptive process involves the use of a cost function, which is a criterion for optimum performance of the filter, to feed an algorithm, which determines how to modify filter transfer function to minimize the cost on the next iteration. The most common cost function is the mean square of the error signal. This book, Adaptive Filtering - Theories and Applications, offers some theoretical approaches and practical applications in diverse areas that support increasing of adaptive systems. The book reflect the latest advances in this field; particularly an increased coverage given to the practical applications of the theory to illustrate the much broader range of adaptive filters applications developed in recent years.

DSP for MATLAB and LabVIEW: LMS adaptive filtering - Forester W. Isen 2009

This book is Volume IV of the series DSP for MATLAB[®] and LabVIEW[®]. Volume IV is an introductory treatment of LMS Adaptive Filtering and applications, and covers cost functions, performance surfaces, coefficient perturbation to estimate the gradient, the LMS algorithm, response of the LMS algorithm to narrow-band signals, and various topologies such as ANC (Active Noise Cancelling) or system modeling, Noise Cancellation, Interference Cancellation, Echo Cancellation (with single- and dual-H topologies), and Inverse Filtering/Deconvolution. The entire series consists of four volumes that collectively cover basic digital signal processing in a practical and accessible manner, but which nonetheless include all essential foundation mathematics. As the series title implies, the scripts (of which there are more than 200) described in the text and supplied in code form (available via the internet at www.morganclaypool.com/page/isen) will run on both MATLAB[®] and LabVIEW[®]. The text for all volumes contains many examples, and many useful computational scripts, augmented by demonstration scripts and LabVIEW[®] Virtual Instruments (VIs) that can be run to illustrate various signal processing concepts graphically on the user's computer screen. Volume I consists of four chapters that collectively set forth a brief overview of the field of digital signal processing, useful signals and concepts (including convolution, recursion, difference equations, LTI systems, etc), conversion from the continuous to discrete domain and back (i.e., analog-to-digital and digital-to-analog conversion), aliasing, the Nyquist rate, normalized frequency, sample rate conversion and Mu-law compression, and signal processing principles including correlation, the correlation sequence, the Real DFT, correlation by convolution, matched filtering, simple FIR filters, and simple IIR filters. Chapter 4 of Volume I, in particular, provides an intuitive or "first principle" understanding of how digital filtering and frequency transforms work. Volume II provides detailed coverage of discrete frequency transforms, including a brief overview of common frequency transforms, both discrete and continuous, followed by detailed treatments of the Discrete Time Fourier Transform (DTFT), the z-Transform (including definition and properties, the inverse z-transform, frequency response via z-transform, and alternate filter realization topologies including Direct Form, Direct Form Transposed, Cascade Form, Parallel Form, and Lattice Form), and the Discrete Fourier Transform (DFT) (including Discrete Fourier Series, the DFT-IDFT pair, DFT of common signals, bin width, sampling duration, and sample rate, the FFT, the Goertzel Algorithm, Linear, Periodic, and Circular convolution, DFT Leakage, and computation of the Inverse DFT). Volume III covers digital filter design, including the specific topics of FIR design via windowed-ideal-lowpass filter, FIR highpass, bandpass, and bandstop filter design from windowed-ideal lowpass filters, FIR design using the transition-band-optimized Frequency Sampling technique (implemented by Inverse-DFT or Cosine/Sine Summation Formulas), design of equiripple FIRs of all standard types including Hilbert Transformers and Differentiators via the Remez Exchange Algorithm, design of Butterworth, Chebyshev (Types I and II), and Elliptic analog prototype lowpass filters, conversion of analog lowpass prototype filters to highpass, bandpass, and bandstop filters, and conversion of analog filters to digital filters using the Impulse Invariance and Bilinear Transform techniques. Certain filter topologies specific to FIRs are also discussed, as are two simple FIR types, the Comb and Moving Average filters.

Adaptive Filters - Ali H. Sayed 2011-10-11

Adaptive filtering is a topic of immense practical and theoretical value, having applications in areas ranging from digital and wireless communications to biomedical systems. This book enables readers to gain a gradual and solid introduction to the subject, its applications to a variety of topical problems, existing limitations, and extensions of current theories. The book consists of eleven parts, each part containing a series of focused lectures and ending with bibliographic comments, problems, and computer projects with MATLAB solutions.

Adaptive Filtering - Alexander D. Poularikas 2017-12-19

Adaptive filters are used in many diverse applications, appearing in everything from military instruments to cellphones and home appliances. Adaptive Filtering: Fundamentals of Least Mean Squares with MATLAB[®] covers the core concepts of this important field, focusing on a vital part of the statistical signal processing area—the least mean square (LMS) adaptive filter. This largely self-contained text: Discusses random variables, stochastic processes, vectors, matrices, determinants, discrete random signals, and probability

distributions Explains how to find the eigenvalues and eigenvectors of a matrix and the properties of the error surfaces Explores the Wiener filter and its practical uses, details the steepest descent method, and develops the Newton's algorithm Addresses the basics of the LMS adaptive filter algorithm, considers LMS adaptive filter variants, and provides numerous examples Delivers a concise introduction to MATLAB[®], supplying problems, computer experiments, and more than 110 functions and script files Featuring robust appendices complete with mathematical tables and formulas, Adaptive Filtering: Fundamentals of Least Mean Squares with MATLAB[®] clearly describes the key principles of adaptive filtering and effectively demonstrates how to apply them to solve real-world problems.

Adaptive Filtering and Change Detection - Fredrik Gustafsson 2000-10-03

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. [Introduction to Adaptive Filters](#) - Simon S. Haykin 1984

Adaptive Filtering - Paulo Sergio Ramirez Diniz 2002

Adaptive Filtering: Algorithms and Practical Implementation, Second Edition, presents a concise overview of adaptive filtering, covering as many algorithms as possible in a unified form that avoids repetition and simplifies notation. It is suitable as a textbook for senior undergraduate or first-year graduate courses in adaptive signal processing and adaptive filters. The philosophy of the presentation is to expose the material with a solid theoretical foundation, to concentrate on algorithms that really work in a finite-precision implementation, and to provide easy access to working algorithms. Hence, practicing engineers and scientists will also find the book to be an excellent reference. This second edition contains a substantial amount of new material: -Two new chapters on nonlinear and subband adaptive filtering; -Linearly constrained Wiener filters and LMS algorithms; -LMS algorithm behavior in fast adaptation; -Affine projection algorithms; -Derivation smoothing; -MATLAB codes for algorithms. An instructor's manual, a set of master transparencies, and the MATLAB codes for all of the algorithms described in the text are also available. Useful to both professional researchers and students, the text includes 185 problems; over 38 examples, and over 130 illustrations. It is of primary interest to those working in signal processing, communications, and circuits and systems. It will also be of interest to those working in power systems, networks, learning systems, and intelligent systems.

Adaptive Signal Processing - Thomas S. Alexander 2012-12-06

The creation of the text really began in 1976 with the author being involved with a group of researchers at Stanford University and the Naval Ocean Systems Center, San Diego. At that time, adaptive techniques were more laboratory (and mental) curiosities than the accepted and pervasive categories of signal processing that they have become. Over the last 10 years, adaptive filters have become standard components in telephony, data communications, and signal detection and tracking systems. Their use and consumer acceptance will undoubtedly only increase in the future. The mathematical principles underlying adaptive signal processing were initially fascinating and were my first experience in seeing applied mathematics work for a paycheck. Since that time, the application of even more advanced mathematical techniques have kept the area of adaptive signal processing as exciting as those initial days. The text seeks

to be a bridge between the open literature in the professional journals, which is usually quite concentrated, concise, and advanced, and the graduate classroom and research environment where underlying principles are often more important.

Adaptive Filtering Prediction and Control - Graham C Goodwin 2009-05-21

This unified survey focuses on linear discrete-time systems and explores the natural extensions to nonlinear systems. In keeping with the importance of computers to practical applications, the authors emphasize discrete-time systems. Their approach summarizes the theoretical and practical aspects of a large class of adaptive algorithms. 1984 edition.

Principles of Adaptive Filters and Self-learning Systems - Anthony Zaknich 2005-04-25

Teaches students about classical and nonclassical adaptive systems within one pair of covers Helps tutors with time-saving course plans, ready-made practical assignments and examination guidance The recently developed "practical sub-space adaptive filter" allows the reader to combine any set of classical and/or non-classical adaptive systems to form a powerful technology for solving complex nonlinear problems

Time-dependent Adaptive Filters for Interference Rejection - Jeffrey Hugh Reed 1987

Adaptive IIR Filtering in Signal Processing and Control - Phillip Regalia 2018-04-27

Integrates rational approximation with adaptive filtering, providing viable, numerically reliable procedures for creating adaptive infinite impulse response (IIR) filters. The choice of filter structure to adapt, algorithm design and the approximation properties for each type of algorithm are also addressed. This work recasts the theory of adaptive IIR filters by concentrating on recursive lattice filters, freeing systems from the need for direct-form filters. A solutions manual is available for instructors only. College or university bookstores may order five or more copies at a special student price which is available upon request.

Signal Processing and Data Analysis - Tianshuang Qiu 2018-07-09

This book presents digital signal processing theories and methods and their applications in data analysis, error analysis and statistical signal processing. Algorithms and Matlab programming are included to guide readers step by step in dealing with practical difficulties. Designed in a self-contained way, the book is suitable for graduate students in electrical engineering, information science and engineering in general.

Adaptive Filter Theory - Simon Haykin 2014-05-28

For courses in Adaptive Filters. Haykin examines both the mathematical theory behind various linear adaptive filters and the elements of supervised multilayer perceptrons. In its fifth edition, this highly successful book has been updated and refined to stay current with the field and develop concepts in a unified and accessible a manner as possible. The full text downloaded to your computer With eBooks you can: search for key concepts, words and phrases make highlights and notes as you study share your notes with friends eBooks are downloaded to your computer and accessible either offline through the Bookshelf (available as a free download), available online and also via the iPad and Android apps. Upon purchase, you'll gain instant access to this eBook. Time limit The eBooks products do not have an expiry date. You will continue to access your digital ebook products whilst you have your Bookshelf installed.

Adaptive Filters - Behrouz Farhang-Boroujeny 2013-04-02

This second edition of Adaptive Filters: Theory and Applications has been updated throughout to reflect the latest developments in this field; notably an increased coverage given to the practical applications of the theory to illustrate the much broader range of adaptive filters applications developed in recent years. The book offers an easy to understand approach to the theory and application of adaptive filters by clearly illustrating how the theory explained in the early chapters of the book is modified for the various applications discussed in detail in later chapters. This integrated approach makes the book a valuable resource for graduate students; and the inclusion of more advanced applications including antenna arrays and wireless communications makes it a suitable technical reference for engineers, practitioners and researchers. Key features: • Offers a thorough treatment of the theory of adaptive signal processing; incorporating new material on transform domain, frequency domain, subband adaptive filters, acoustic echocancellation and active noise control. • Provides an in-depth study of applications which now includes extensive coverage of OFDM, MIMO and smart antennas. • Contains exercises and computer simulation problems at the end of each chapter. • Includes a new companion website hosting MATLAB® simulation

programs which complement the theoretical analyses, enabling the reader to gain an in-depth understanding of the behaviours and properties of the various adaptive algorithms.

Pipelined Adaptive Digital Filters - Naresh R. Shanbhag 1994-06-30

Adaptive filtering is commonly used in many communication applications including speech and video predictive coding, mobile radio, ISDN subscriber loops, and multimedia systems. Existing adaptive filtering topologies are non-concurrent and cannot be pipelined. Pipelined Adaptive Digital Filters presents new pipelined topologies which are useful in reducing area and power and in increasing speed. If the adaptive filter portion of a system suffers from a power-speed-area bottleneck, a solution is provided. Pipelined Adaptive Digital Filters is required reading for all users of adaptive digital filtering algorithms. Algorithm, application and integrated circuit chip designers can learn how their algorithms can be tailored and implemented with lower area and power consumption and with higher speed. The relaxed look-ahead techniques are used to design families of new topologies for many adaptive filtering applications including least mean square and lattice adaptive filters, adaptive differential pulse code modulation coders, adaptive differential vector quantizers, adaptive decision feedback equalizers and adaptive Kalman filters. Those who use adaptive filtering in communications, signal and image processing algorithms can learn the basis of relaxed look-ahead pipelining and can use their own relaxations to design pipelined topologies suitable for their applications. Pipelined Adaptive Digital Filters is especially useful to designers of communications, speech, and video applications who deal with adaptive filtering, those involved with design of modems, wireless systems, subscriber loops, beam formers, and system identification applications. This book can also be used as a text for advanced courses on the topic.

Statistical and Adaptive Signal Processing - Dimitris G. Manolakis 2005

This authoritative volume on statistical and adaptive signal processing offers you a unified, comprehensive and practical treatment of spectral estimation, signal modeling, adaptive filtering, and array processing. Packed with over 3,000 equations and more than 300 illustrations, this unique resource provides you with balanced coverage of implementation issues, applications, and theory, making it a smart choice for professional engineers and students alike.

A Rapid Introduction to Adaptive Filtering - Leonardo Rey Vega 2012-08-07

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.

Online Learning and Adaptive Filters - Paulo S. R. Diniz 2022-12-08

Learn to solve the unprecedented challenges facing Online Learning and Adaptive Signal Processing in this concise, intuitive text. The ever-increasing amount of data generated every day requires new strategies to tackle issues such as: combining data from a large number of sensors; improving spectral usage, utilizing multiple-antennas with adaptive capabilities; or learning from signals placed on graphs, generating unstructured data. Solutions to all of these and more are described in a condensed and unified way, enabling you to expose valuable information from data and signals in a fast and economical way. The up-to-date techniques explained here can be implemented in simple electronic hardware, or as part of multi-purpose systems. Also featuring alternative explanations for online learning, including newly developed methods and data selection, and several easily implemented algorithms, this one-of-a-kind book is an ideal resource for graduate students, researchers, and professionals in online learning and adaptive filtering.

Adaptive Filtering - Lino Garcia Morales 2013-02-20

Adaptive filtering can be used to characterize unknown systems in time-variant environments. The main

objective of this approach is to meet a difficult compromise: maximum convergence speed with maximum accuracy. Each application requires a certain approach which determines the filter structure, the cost function to minimize the estimation error, the adaptive algorithm, and other parameters; and each selection involves certain cost in computational terms, that in any case should consume less time than the time required by the application working in real-time. Theory and application are not, therefore, isolated entities but an imbricated whole that requires a holistic vision. This book collects some theoretical approaches and practical applications in different areas that support expanding of adaptive systems.

Transform Domain Adaptive Filtering Using a Generalized Quadratic Residue Number System - Thomas G. Johnson 1988

Adaptive Filter - George Moschytz 2011-06-27

Dieses Lehrbuch vermittelt auf solide und verständliche Weise die Grundlagen der Theorie der adaptiven Filter, wobei nur elementares Wissen aus der Signalverarbeitung und der Linearen Algebra vorausgesetzt wird. Der Schwerpunkt liegt in der Herleitung und der Erläuterung der theoretischen Grundlagen.

Aufgaben mit ausführlichen Lösungen und Simulations-Übungen (MATLAB-Code auf CD-ROM) tragen zum intuitiven Verständnis des Stoffes bei. Das Buch wendet sich an Studenten im Fachstudium der Elektrotechnik und der Informatik aber auch an Ingenieure, Physiker und Mathematiker.

Adaptive Filtering Primer with MATLAB - Alexander D. Poularikas 2017-12-19

Because of the wide use of adaptive filtering in digital signal processing and, because most of the modern electronic devices include some type of an adaptive filter, a text that brings forth the fundamentals of this field was necessary. The material and the principles presented in this book are easily accessible to engineers, scientists, and students who would like to learn the fundamentals of this field and have a background at the bachelor level. Adaptive Filtering Primer with MATLAB® clearly explains the fundamentals of adaptive filtering supported by numerous examples and computer simulations. The authors introduce discrete-time signal processing, random variables and stochastic processes, the Wiener filter, properties of the error surface, the steepest descent method, and the least mean square (LMS) algorithm. They also supply many MATLAB® functions and m-files along with computer experiments to illustrate how to apply the concepts to real-world problems. The book includes problems along with hints, suggestions, and solutions for solving them. An appendix on matrix computations completes the self-contained coverage. With applications across a wide range of areas, including radar, communications, control, medical instrumentation, and seismology, Adaptive Filtering Primer with MATLAB® is an ideal companion for quick reference and a perfect, concise introduction to the field.

Complex Valued Nonlinear Adaptive Filters - Danilo P. Mandic 2009-04-20

This book was written in response to the growing demand for a text that provides a unified treatment of linear and nonlinear complex valued adaptive filters, and methods for the processing of general complex signals (circular and noncircular). It brings together adaptive filtering algorithms for feedforward (transversal) and feedback architectures and the recent developments in the statistics of complex variable, under the powerful frameworks of CR (Wirtinger) calculus and augmented complex statistics. This offers a number of theoretical performance gains, which is illustrated on both stochastic gradient algorithms, such as the augmented complex least mean square (ACLMS), and those based on Kalman filters. This work is supported by a number of simulations using synthetic and real world data, including the noncircular and intermittent radar and wind signals.

Springer Handbook of Speech Processing - Jacob Benesty 2007-11-28

This handbook plays a fundamental role in sustainable progress in speech research and development. With an accessible format and with accompanying DVD-Rom, it targets three categories of readers: graduate students, professors and active researchers in academia, and engineers in industry who need to understand or implement some specific algorithms for their speech-related products. It is a superb source of application-oriented, authoritative and comprehensive information about these technologies, this work combines the established knowledge derived from research in such fast evolving disciplines as Signal Processing and Communications, Acoustics, Computer Science and Linguistics.

Digital Signal Processing Handbook on CD-ROM - VIJAY MADISSETTI 1999-02-26

A best-seller in its print version, this comprehensive CD-ROM reference contains unique, fully searchable coverage of all major topics in digital signal processing (DSP), establishing an invaluable, time-saving resource for the engineering community. Its unique and broad scope includes contributions from all DSP specialties, including: telecommunications, computer engineering, acoustics, seismic data analysis, DSP software and hardware, image and video processing, remote sensing, multimedia applications, medical technology, radar and sonar applications

Optimal and Adaptive Signal Processing - Peter M. Clarkson 1993-02-10

Optimal and Adaptive Signal Processing covers the theory of optimal and adaptive signal processing using examples and computer simulations drawn from a wide range of applications, including speech and audio, communications, reflection seismology and sonar systems. The material is presented without a heavy reliance on mathematics and focuses on one-dimensional and array processing results, as well as a wide range of adaptive filter algorithms and implementations. Topics discussed include random signals and optimal processing, adaptive signal processing with the LMS algorithm, applications of adaptive filtering, algorithms and structures for adaptive filtering, spectral analysis, and array signal processing. Optimal and Adaptive Signal Processing is a valuable guide for scientists and engineers, as well as an excellent text for senior undergraduate/graduate level students in electrical engineering.

Unervised Adaptive Filtering, Blind Deconvolution - Simon Haykin 2000-04-06

A complete, one-stop reference on the state of the art of unsupervised adaptive filtering While unsupervised adaptive filtering has its roots in the 1960s, more recent advances in signal processing, information theory, imaging, and remote sensing have made this a hot area for research in several diverse fields. This book brings together cutting-edge information previously available only in disparate papers and articles, presenting a thorough and integrated treatment of the two major classes of algorithms used in the field, namely, blind signal separation and blind channel equalization algorithms. Divided into two volumes for ease of presentation, this important work shows how these algorithms, although developed independently, are closely related foundations of unsupervised adaptive filtering. Through contributions by the foremost experts on the subject, the book provides an up-to-date account of research findings, explains the underlying theory, and discusses potential applications in diverse fields. More than 100 illustrations as well as case studies, appendices, and references further enhance this excellent resource. Following coverage begun in Volume I: Blind Source Separation, this volume discusses: * The core of FSE-CMA behavior theory * Relationships between blind deconvolution and blind source separation * Blind separation of independent sources based on multiuser kurtosis optimization criteria

Adaptive Filter Theory - Simon Haykin 2014

Includes bibliographical references (pages 846-878) and index.

Least-Mean-Square Adaptive Filters - Simon Haykin 2003-09-08

Edited by the original inventor of the technology. Includes contributions by the foremost experts in the field. The only book to cover these topics together.

Theory and Design of Adaptive Filters - John R. Treichler 1987-09-09

A comprehensive compilation of adaptive filtering concepts, algorithm forms, behavioral insights, and application guidelines useful for the engineer interested in designing appropriate adaptive filters for various applications and for students needing a cohesive pedagogy for initiation of basic research in adaptive theory. The analysis and design of three basic classes of adaptive filters are presented: adaptive finite-impulse-response (FIR) filters; adaptive infinite-impulse-response (IRR) filters; and adaptive property restoring filters. For the widely used FIR filters, the book offers the most popular analytical tools and distills a tutorial collection of insightful design guidelines of proven utility. For the more recently developed filters, it focuses on emerging theoretical foundations and suggested applications. The material is supplemented with listings of FORTRAN codes for basic algorithms and a real-time solution to one adaptive FIR filter problem using a Texas Instruments signal processing chip.

QRD-RLS Adaptive Filtering - JOSE APOLINARIO JR 2009-04-05

I feel very honoured to have been asked to write a brief foreword for this book on QRD-RLS Adaptive Filtering—a subject which has been close to my heart for many years. The book is well written and very timely – I look forward personally to seeing it in print. The editor is to be congratulated on assembling such a

highly esteemed team of contributing authors able to span the broad range of topics and concepts which underpin this subject. In many respects, and for reasons well expounded by the authors, the LMS algorithm has reigned supreme since its inception, as the algorithm of choice for practical applications of adaptive filtering. However, as a result of the relentless advances in electronic technology, the demand for stable and efficient RLS algorithms is growing rapidly - not just because the higher computational load is no longer such a serious barrier, but also because the technological pull has grown much stronger in the modern commercial world of 3G mobile communications, cognitive radio, high speed imagery, and so on.

Kernel Adaptive Filtering - Weifeng Liu 2011-09-20

Online learning from a signal processing perspective There is increased interest in kernel learning algorithms in neural networks and a growing need for nonlinear adaptive algorithms in advanced signal processing, communications, and controls. Kernel Adaptive Filtering is the first book to present a comprehensive, unifying introduction to online learning algorithms in reproducing kernel Hilbert spaces. Based on research being conducted in the Computational Neuro-Engineering Laboratory at the University of Florida and in the Cognitive Systems Laboratory at McMaster University, Ontario, Canada, this unique resource elevates the adaptive filtering theory to a new level, presenting a new design methodology of nonlinear adaptive filters. Covers the kernel least mean squares algorithm, kernel affine projection algorithms, the kernel recursive least squares algorithm, the theory of Gaussian process regression, and the extended kernel recursive least squares algorithm Presents a powerful model-selection method called maximum marginal likelihood Addresses the principal bottleneck of kernel adaptive filters—their growing

structure Features twelve computer-oriented experiments to reinforce the concepts, with MATLAB codes downloadable from the authors' Web site Concludes each chapter with a summary of the state of the art and potential future directions for original research Kernel Adaptive Filtering is ideal for engineers, computer scientists, and graduate students interested in nonlinear adaptive systems for online applications (applications where the data stream arrives one sample at a time and incremental optimal solutions are desirable). It is also a useful guide for those who look for nonlinear adaptive filtering methodologies to solve practical problems.

Principles of Adaptive Filters and Self-learning Systems - Anthony Zaknich 2006-03-30

Teaches students about classical and nonclassical adaptive systems within one pair of covers Helps tutors with time-saving course plans, ready-made practical assignments and examination guidance The recently developed "practical sub-space adaptive filter" allows the reader to combine any set of classical and/or non-classical adaptive systems to form a powerful technology for solving complex nonlinear problems

Fundamentals of Adaptive Filtering - Ali H. Sayed 2003-06-13

This book is based on a graduate level course offered by the author at UCLA and has been classed tested there and at other universities over a number of years. This will be the most comprehensive book on the market today providing instructors a wide choice in designing their courses. * Offers computer problems to illustrate real life applications for students and professionals alike * An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.