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Adaptive

Filter

Theory

4th

Edition

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

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main objective of this approach is to meet a difficult comprise: 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

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collects some theoretical approaches and practical applications in different areas that support expanding of adaptive systems.

Digital image processing and analysis is a field that continues to experience rapid growth, with applications in many facets of our lives.

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Areas such as medicine, agriculture, manufacturing, transportation, communication systems, and space exploration are just a few of the application areas. This book takes an engineering approach to image processing and analysis, including more examples and

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images throughout the text than the previous edition. It provides more material for illustrating the concepts, along with new PowerPoint slides. The application development has been expanded and updated, and the related chapter provides step-by-step tutorial examples for this type of

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development. The new edition also includes supplementary exercises, as well as MATLAB-based exercises, to aid both the reader and student in development of their skills.

The topic of this book is proportionate-type normalized least mean squares (PtNLMS) adaptive filtering

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algorithms, which attempt to estimate an unknown impulse response by adaptively giving gains proportionate to an estimate of the impulse response and the current measured error. These algorithms offer low computational complexity and fast convergence times for sparse impulse

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*responses in network
and acoustic echo
cancellation
applications. New
PtNLMS algorithms
are developed by
choosing gains that
optimize user-defined
criteria, such as mean
square error, at all
times. PtNLMS
algorithms are
extended from real-
valued signals to*

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complex-valued signals.

The computational complexity of the presented algorithms is examined. Contents 1. Introduction to PtNLMS Algorithms 2. LMS Analysis Techniques 3. PtNLMS Analysis Techniques 4. Algorithms Designed Based on Minimization of User Defined Criteria 5. Probability

*Density of WD for
PtLMS Algorithms 6.
Adaptive Step-size
PtNLMS Algorithms 7.
Complex PtNLMS
Algorithms 8.
Computational
Complexity for
PtNLMS Algorithms
About the Authors
Kevin Wagner has been
a physicist with the
Radar Division of the
Naval Research*

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*Laboratory,
Washington, DC, USA
since 2001. His
research interests are in
the area of adaptive
signal processing and
non-convex
optimization. Milos
Doroslovacki has been
with the Department of
Electrical and
Computer Engineering
at George Washington
University, USA since*

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*1995, where he is now
an Associate Professor.
His main research
interests are in the
fields of adaptive signal
processing,
communication signals
and systems, discrete-
time signal and system
theory, and wavelets
and their applications.
This book treats
important topics in
"Acoustic Echo and*

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Noise Control" and reports the latest developments. Methods for enhancing the quality of transmitted speech signals are gaining growing attention in universities and in industrial development laboratories. This book, written by an international team of highly qualified

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*experts, concentrates
on the modern and
advanced methods.
Adaptive Learning
Methods for Nonlinear
System Modeling
Correlative Learning
Proceedings of the 2009
International
Conference on Signals,
Systems and
Automation (ICSSA
2009)
Advances in*

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*Communication
Systems and Electrical
Engineering
Smart Antennas
QRD-RLS Adaptive
Filtering*

The aim of this book is to provide an overview of recent developments in Kalman filter theory and their

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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

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biological sciences,
tracking and
positioning systems,
electrical
engineering and,
finally, industrial
processes and
communication
networks.

Subband adaptive
filtering is rapidly
becoming one of

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the most effective techniques for reducing computational complexity and improving the convergence rate of algorithms in adaptive signal processing applications. This book provides an

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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

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subband adaptive filters. For advanced readers, a comprehensive coverage of recent developments, such as multiband tap-weight adaptation, delayless architectures, and filter-bank design

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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

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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

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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

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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

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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

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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,

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and computer
scientists.

Leading experts
present the latest
research results in
adaptive signal
processing Recent
developments in
signal processing
have made it clear
that significant
performance gains

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can be achieved beyond those achievable using standard adaptive filtering approaches.

Adaptive Signal Processing presents the next generation of algorithms that will produce these desired results,

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with an emphasis on important applications and theoretical advancements. This highly unique resource brings together leading authorities in the field writing on the key topics of significance, each

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at the cutting edge of its own area of specialty. It begins by addressing the problem of optimization in the complex domain, fully developing a framework that enables taking full advantage of the power of complex-

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valued processing.

Then, the challenges of multichannel processing of complex-valued signals are explored. This comprehensive volume goes on to cover Turbo processing,

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tracking in the
subspace domain,
nonlinear
sequential state
estimation, and
speech-bandwidth
extension.

Examines the seven
most important
topics in adaptive
filtering that will
define the next-

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generation adaptive
filtering solutions
Introduces the
powerful adaptive
signal processing
methods developed
within the last ten
years to account for
the characteristics
of real-life data:
non-Gaussianity,
non-circularity,

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non-stationarity,
and non-linearity
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contained chapters,
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to clarify concepts,
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problems to
reinforce
understanding of
the material
Contains

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contributions from
acknowledged
leaders in the field
Adaptive Signal
Processing is an
invaluable tool for
graduate students,
researchers, and
practitioners
working in the
areas of signal
processing,

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communications,
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sonar, and
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This handbook
plays a
fundamental role in
sustainable
progress in speech
research and
development. With

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an accessible
format and with
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students, professors
and active
researchers in
academia, and
engineers in

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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

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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.

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Adaptive
Systems
provides a
bridge between
three

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disciplines:
computational
neuroscience,
neural
networks, and
signal
processing.
First, the
authors lay
down the
preliminary
neuroscience

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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

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processing

world; unifies

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focusing on a particular correlative learning paradigm, ALOPEX; and presents case studies that illustrate how to use different computational

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tools and
ALOPEX to help
readers
understand
certain brain
functions or
fit specific
engineering
applications.
It is with
great pleasure
that I offer

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my reflections
on Professor
Anthony N.
Michel's
retirement
from the
University of
Notre Dame. I
have known
Tony since
1984 when he
joined the

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University of
Notre Dame's
faculty as
Chair of the
Department of
Electrical
Engineering.
Tony has had a
long and
outstanding
career. As a
researcher, he

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has made im
portant
contributions
in several
areas of
systems theory
and control
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stability
analysis of
large-scale

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dynamical
systems. The
numerous
awards he
received from
the
professional
societies,
particularly
the Institute
of Electrical
and

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Electronics

Engineers

(IEEE), are a testament to his accomplishments in

research. He received the IEEE Control Systems

Society's Best Transactions

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Paper Award
(1978), and
the IEEE
Circuits and
Systems
Society's Guil
lemain-Cauer
Prize Paper
Award (1984)
and Myril B.
Reed
Outstanding

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Paper Award
(1993), among
others. In
addition, he
was a
Fulbright
Scholar (1992)
and received
the Alexander
von Hum boldt
Forschungsprei
s (Alexander

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von Humboldt

Research Award
for Senior
U.S.

Scientists)

from the

German

government

(1997). To

date, he has

written eight

books and

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published over
150 archival
journal
papers. Tony
is also an
effective
administrator
who inspires
high academic
standards.

Adaptive
filtering is a

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topic of
immense
practical and
theoretical
value, having
applications
in areas
ranging from
digital and
wireless
communications
to biomedical

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systems. This book enables readers to gain a gradual and solid introduction to the subject, its applications to a variety of topical problems,

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existing
limitations,
and extensions
of current
theories. The
book consists
of eleven
parts?each
part
containing a
series of
focused

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lectures and
ending with
bibliographic
comments,
problems, and
computer
projects with
MATLAB
solutions.
This book
presents the
basic concepts

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of adaptive
signal
processing and
adaptive
filtering in a
concise and st
raightforward
manner, using
clear
notations that
facilitate
actual impleme

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ntation.

Important algorithms are described in detailed tables which allow the reader to verify learned concepts. The book covers the family of

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LMS and
algorithms as
well as set-
membership,
sub-band,
blind, IIR
adaptive
filtering, and
more. The book
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of the basic
information required
for a deep**

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**understanding of
each area. It also
devotes a section to
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devices and
explores the
emerging fields of
microlithography
and power
electronics.**

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needed for a
thorough
understanding of
these areas. It also
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emerging areas of
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languages, and
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in detail. Systems,
Controls, Embedded
Systems, Energy,
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explores in detail
the fields of energy
devices, machines,
and systems as well
as control systems.
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concepts needed for
thorough, in-depth
understanding of
each area and
devotes special
attention to the
emerging area of
embedded systems.
Encompassing the
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**Adaptive Learning
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Nonlinear System
Modeling presents
some of the recent
advances on
adaptive algorithms
and machine
learning methods
designed for
nonlinear system
modeling and
identification. Real-
life problems always**

entail a certain degree of nonlinearity, which makes linear models a non-optimal choice. This book mainly focuses on those methodologies for nonlinear modeling that involve any adaptive learning approaches to process data

coming from an unknown nonlinear system. By learning from available data, such methods aim at estimating the nonlinearity introduced by the unknown system. In particular, the methods presented in this book are based on online learning

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approaches, which process the data example-by-example and allow to model even complex nonlinearities, e.g., showing time-varying and dynamic behaviors. Possible fields of applications of such algorithms includes distributed sensor networks, wireless

**communications,
channel
identification,
predictive
maintenance, wind
prediction, network
security, vehicular
networks, active
noise control,
information
forensics and
security, tracking
control in mobile
robots, power**

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**systems, and
nonlinear modeling
in big data, among
many others. This
book serves as a
crucial resource for
researchers, PhD
and post-graduate
students working in
the areas of
machine learning,
signal processing,
adaptive filtering,
nonlinear control,**

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system

identification,

cooperative

systems,

computational

intelligence. This

book may be also of

interest to the

industry market and

practitioners

working with a wide

variety of nonlinear

systems. Presents

the key trends and

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processing and
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methods in the very
exciting area of
online and adaptive
nonlinear
identification. Helps**

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**readers understand
important methods
that are effective in
nonlinear system
modelling,
suggesting the right
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address particular
issues.**

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the field. The only
book to cover these
topics together.
Speech processing
and speech
transmission
technology are
expanding fields of
active research. New
challenges arise
from the 'anywhere,
anytime' paradigm
of mobile**

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**communications,
the ubiquitous use
of voice
communication
systems in noisy
environments and
the convergence of
communication
networks toward
Internet based
transmission
protocols, such as
Voice over IP. As a
consequence, new**

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speech coding, new enhancement and error concealment, and new quality assessment methods are emerging. Advances in Digital Speech Transmission provides an up-to-date overview of the field, including topics such as speech coding in

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**heterogeneous
communication
networks, wideband
coding, and the
quality assessment
of wideband speech.
Provides an insight
into the latest
developments in
speech processing
and speech
transmission,
making it an
essential reference**

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to those working in these fields Offers a balanced overview of technology and applications
Discusses topics such as speech coding in heterogeneous communications networks, wideband coding, and the quality assessment of the wideband

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**speech Explains
speech signal
processing in
hearing instruments
and man-machine
interfaces from
applications point of
view Covers speech
coding for Voice
over IP, blind source
separation, digital
hearing aids and
speech processing
for automatic**

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**speech recognition
Advances in Digital
Speech
Transmission
serves as an
essential link
between the basics
and the type of
technology and
applications
(prospective)
engineers work on
in industry labs and
academia. The book**

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**will also be of
interest to advanced
students,
researchers, and
other professionals
who need to brush
up their knowledge
in this field.**

**Theory and
Implementation
Adaptive Signal
Processing in
Wireless
Communications**

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**Selected Methods
for the Cancellation
of Acoustical
Echoes, the
Reduction of
Background Noise,
and Speech
Processing
Communication
Systems
Subband Adaptive
Filtering
Computational
Intelligence -**

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Volume I

"Adaptive
Filter Theory"
looks at both
the
mathematical
theory behind
various linear
adaptive
filters with
finite-duration
impulse
response (FIR)

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and the
elements of
supervised
neural
networks. Up-to-
date and in-
depth treatment
of adaptive
filters
develops
concepts in a
unified and
accessible

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manner. This highly successful book provides comprehensive coverage of adaptive filters in a highly readable and understandable fashion.

Includes an

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extensive use
of illustrative
examples; and
MATLAB
experiments,
which
illustrate the
practical
realities and
intricacies of
adaptive
filters, the
codes for which

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those

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learning about
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filters and the
theories behind
them.

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overview of
today's FPGA
technology,
devices, and
tools for
designing state-
of-the-art DSP

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systems. A case study in the first chapter is the basis for more than 30 design examples throughout. The following chapters deal with computer arithmetic concepts,

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theory and the
implementation
of FIR and IIR
filters,
multirate
digital signal
processing
systems, DFT
and FFT
algorithms, and
advanced
algorithms with
high future

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potential. Each chapter contains exercises. The VERILOG source code and a glossary are given in the appendices, while the accompanying CD-ROM contains the examples in

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VHDL and

Verilog code as
well as the

newest Altera

"Baseline"

software. This

edition has a

new chapter on

adaptive

filters, new

sections on

division and

floating point

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arithmetics, an up-date to the current Altera software, and some new exercises.

Artificial intelligence is increasingly finding its way into industrial and manufacturing

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contexts. The prevalence of AI in industry from stock market trading to manufacturing makes it easy to forget how complex artificial intelligence has become.

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Engineering

provides

various current

and prospective

applications of

these new and

complex

artificial

intelligence

technologies.

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Intelligence in

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Engineering is
a critical
research book
that examines
the advancing
developments in
artificial
intelligence
with a focus on
theory and
research and
their

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technology
developers, IT
specialists,
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this updated
and expanded
edition of the
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Digital Signal
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Handbook
continues to
provide the
engineering
community with
authoritative
coverage of the

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fundamental and specialized aspects of information-bearing signals in digital form. Encompassing essential background material, technical details, standards, and

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software, the
second edition
reflects
cutting-edge
information on
signal
processing
algorithms and
protocols
related to
speech, audio,
multimedia, and
video

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processing
technology
associated with
standards
ranging from
WiMax to MP3
audio, low-powe
r/high-
performance
DSPs, color
image
processing, and
chips on video.

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Drawing on the
experience of
leading
engineers,
researchers,
and scholars,
the three-
volume set
contains 29 new
chapters that
address
multimedia and
Internet

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technologies,
tomography,
radar systems,
architecture,
standards, and
future
applications in
speech,
acoustics,
video, radar,
and telecommuni
cations.

Emphasizing
Page 120/230

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theoretical
concepts,
Digital Signal
Processing
Fundamentals
provides
comprehensive
coverage of the
basic
foundations of
DSP and
includes the
following

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parts: Signals
and Systems;
Signal
Representation
and
Quantization;
Fourier
Transforms;
Digital
Filtering;
Statistical
Signal
Processing;

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Adaptive
Filtering;
Inverse
Problems and
Signal
Reconstruction;
and
Time-Frequency
and Multirate
Signal
Processing.
Channel
Equalization

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High
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Applications of
Artificial
Intelligence in
Electrical
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Least-Mean-

Square Adaptive
Filters

Stability and
Control of

Dynamical

Systems with
Applications

***This second edition
of Adaptive Filters:
Theory
and Applications has***

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*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*

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*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*

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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

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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

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*adaptive signal
processing;
incorporating new
material on
transform
domain, frequency
domain, subband
adaptive filters,
acoustic
echocancellation
and active noise
control. • Provides*

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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 MA
TLAB®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*

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algorithms.

*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*

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*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

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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*

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*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,*

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*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*

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*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,*

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*networks, learning
systems, and
intelligent systems.*

*Adaptive techniques
play a key role in
modern wireless
communication
systems. The concept
of adaptation is
emphasized in the
Adaptation in
Wireless*

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Communications

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*This specific
volume, Adaptive
Signal Processing in
Wireless
Communications is
devoted to
adaptation in the
physical layer. It
gives an in-depth
survey of adaptive
signal processing
techniques used in*

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*current and future
generations of
wireless
communication
systems. Featuring
the work of leading
international
experts, it covers
adaptive channel
modeling,
identification and
equalization,*

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*adaptive modulation
and coding, adaptive
multiple-input-
multiple-output
(MIMO) systems,
and cooperative
diversity. It also
addresses other
important aspects of
adaptation in
wireless
communications*

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such as hardware implementation, reconfigurable processing, and cognitive radio. A second volume in the series, Adaptation and Cross-layer Design in Wireless Networks(cat no.46039) is devoted to adaptation in the

*data link, network,
and application
layers.*

*This book is a
collection of papers
from the 2009
International
Conference on
Signals, Systems and
Automation (ICSSA
2009). The
conference at a*

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*glance: - Pre-
conference*

*Workshops/Tutorial
s on 27th Dec, 2009*

- Five Plenary talks

- Paper/Poster

*Presentation: 28-29
Dec, 2009 -*

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Delegates from 16
states of India -
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3000 persons across
the world (27
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cities)*

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and Applications

Kalman Filter

Fundamentals of

Least Mean Squares

with MATLAB®

Applications with

MATLAB and

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Cliffs, N.J. : Prentice-

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"This book provides a comprehensive approach of signal processing tools regarding the enhancement, recognition, and protection of speech and audio signals. It offers researchers and practitioners the information they need to develop and

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*implement efficient
signal processing
algorithms in the
enhancement
field"--Provided by
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*Computational
intelligence is a
component of
Encyclopedia of
Technology,
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*Resources in the global
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(EOLSS), which is an
integrated compendium
of twenty one
Encyclopedias.
Computational
intelligence is a rapidly
growing research field
including a wide
variety of problem-
solving techniques*

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inspired by nature.

*Traditionally
computational
intelligence consists of
three major research
areas: Neural
Networks, Fuzzy
Systems, and
Evolutionary
Computation. Neural
networks are
mathematical models
inspired by brains.*

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Neural networks have massively parallel network structures with many neurons and weighted connections.

Whereas each neuron has a simple input-output relation, a neural network with many neurons can realize a highly non-linear complicated mapping. Connection

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weights between neurons can be adjusted in an automated manner by a learning algorithm to realize a non-linear mapping required in a particular application task. Fuzzy systems are mathematical models proposed to handle inherent fuzziness in natural language. For

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example, it is very difficult to mathematically define the meaning of “cold” in everyday conversations such as “It is cold today” and “Can I have cold water”. The meaning of “cold” may be different in a different situation. Even in the same situation, a

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different person may have a different meaning. Fuzzy systems offer a mathematical mechanism to handle inherent fuzziness in natural language. As a result, fuzzy systems have been successfully applied to real-world problems by extracting linguistic knowledge

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from human experts in the form of fuzzy IF-THEN rules.

Evolutionary computation includes various population-based search algorithms inspired by evolution in nature.

Those algorithms usually have the following three mechanisms: fitness

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evaluation to measure the quality of each solution, selection to choose good solutions from the current population, and variation operators to generate offspring from parents.

Evolutionary computation has high applicability to a wide range of optimization

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problems with different characteristics since it does not need any explicit mathematical formulations of objective functions. For example, simulation-based fitness evaluation is often used in evolutionary design. Subjective fitness evaluation by a human

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*user is also often used
in evolutionary art and
music. These volumes
are aimed at the
following five major
target audiences:*

*University and College
students Educators,
Professional
practitioners, Research
personnel and Policy
analysts, managers,
and decision makers.*

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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

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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

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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

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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.

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*A Basis for Brain and
Adaptive Systems
Techniques for Noise
Robustness in
Automatic Speech
Recognition
Digital Signal
Processing
Fundamentals
Springer Handbook of
Speech Processing
Kernel Adaptive
Filtering*

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*Proportionate-type
Normalized Least
Mean Square
Algorithms*

Adaptive filters are used in many diverse applications, appearing in everything from military instruments to cellphones and home appliances. Adaptive Filtering:

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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

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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

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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

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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

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adaptive filtering and effectively demonstrates how to apply them to solve real-world problems. The widespread use of adaptation techniques has helped to meet the increased demand for new applications. From adaptive signal processing to cross layer design,

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Adaptation in
Wireless

Communications
covers all aspects of
adaptation in wireless
communications in a
two-volume set. Each
volume provides a
unified framework for
understanding
adaptation and relates
various
specializations
through common

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terminologies. In addition to simplified state-of-the-art cross layer design approaches, they also describe advanced techniques, such as adaptive resource management, 4G communications, and energy and mobility aware MAC protocols. This volume contains contributions from

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participants in the
2007 International
Multiconference of
Engineers and
Computer Scientists.
It covers a variety of
subjects in the
frontiers of intelligent
systems and
computer engineering
and their industrial
applications. The
book reflects the
tremendous advances

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in communication systems and electrical engineering. The book provides an excellent reference work for researchers and graduate students working in the field.

The book elaborates selected, extended and peer reviewed papers on

Communication and

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Signal Processing. As Vol. 8 of the series on "Advances on Signals, Systems and Devices" it presents main topics such as: content based video retrieval, wireless communication systems, biometry and medical imaging, adaptive and smart antennae.

Unsupervised Signal

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Processing

Adaptive Signal

Processing

A Tribute to Anthony

N. Michel

Communication and

Signal Processing

Adaptive Filters

Advanced Signal

Processing and

Digital Noise

Reduction

Automatic speech

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recognition (ASR)

systems are finding increasing use in everyday life. Many of the commonplace environments where the systems are used are noisy, for example users calling up a voice search system from a busy cafeteria or a

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street. This can result in degraded speech recordings and adversely affect the performance of speech recognition systems. As the use of ASR systems increases, knowledge of the state-of-the-art in techniques to deal

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with such problems becomes critical to system and application engineers and researchers who work with or on ASR technologies. This book presents a comprehensive survey of the state-of-the-art in techniques

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used to improve the robustness of speech recognition systems to these degrading external influences.

Key features:

Reviews all the main noise robust ASR approaches, including signal separation, voice activity detection,

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robust feature

extraction, model
compensation and
adaptation, missing
data techniques and
recognition of
reverberant speech.

Acts as a timely
exposition of the
topic in light of more
widespread use in
the future of ASR

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technology in
challenging
environments.

Addresses
robustness issues
and signal
degradation which
are both key
requirements for
practitioners of
ASR. Includes
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top ASR researchers
from leading
research units in the
field

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

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to illustrate real life
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wireless mobile
communications
depend on
adaptive "smart"

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antennas to provide maximum range and clarity. With therecent explosive growth of wireless applications, smart antennatechnology has achieved widespread commercial and militaryapplications.

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technology, this text
reflects the latest
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in smart antenna
technology and
offers timely
information
on fundamentals, as
well as new adaptive

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techniques

developed by
the authors. Coupling
electromagnetic
aspects of antenna
design with signal
processing
techniques designed
to promote accurate
and efficient
information
exchange, the text

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presents

various mechanisms
for characterizing
signal-path loss
associated
with signal
propagation,
particularly for
mobile wireless com
munication systems
based on such
techniques as joint

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space-frequency
adaptive processing.

In clear, accessible
language, the

authors: * explain
the difference

between adaptive
antennas and

adaptive signal
processing *

Illustrate the
procedures for

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adaptive processing
using
directive elements in
a conformal array *
clarify multistage
analysis procedure
which combines select
romagnetic analysis
with signal
processing * present
a survey of the
various models for

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characterizing

radiowave

propagation in urban
and rural

environments *

describe a method
wherein it is possible
to identify

and eliminate

multipath without
spatial diversity *

optimize the location

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of base stations in a
complex environment

The text is an
excellent resource
for researchers and
engineers working in
electromagnetics and
signal processing
who deal
with performance
improvement of
adaptive techniques,

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as well as those who are concerned with the characterization of propagation channels and applications of airborne phased arrays.

Unsupervised Signal Processing: Channel Equalization and Source Separation

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provides a unified, systematic, and synthetic presentation of the theory of unsupervised signal processing. Always maintaining the focus on a signal processing-oriented approach, this book describes how the

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subject has evolved and assumed a wider scope that covers several topics, from well-established blind equalization and source separation methods to novel approaches based on machine learning and bio-inspired algorithms.

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From the foundations of statistical and adaptive signal processing, the authors explore and elaborate on emerging tools, such as machine learning-based solutions and bio-inspired methods. With a

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fresh take on this
exciting area of
study, this book:
Provides a solid
background on the
statistical
characterization of
signals and systems
and on linear
filtering theory
Emphasizes the link
between supervised

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and unsupervised
processing from the
perspective of linear
prediction and
constrained filtering
theory Addresses
key issues
concerning
equilibrium
solutions and
equivalence
relationships in the

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context of
unsupervised
equalization criteria
Provides a
systematic
presentation of
source separation
and independent
component analysis
Discusses some
instigating
connections between

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the filtering problem
and computational
intelligence
approaches. Building
on more than a
decade of the
authors' work at
DSPCoM laboratory,
this book applies a
fresh conceptual
treatment and
mathematical

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formalism to
important existing
topics. The result is
perhaps the first
unified presentation
of unsupervised
signal processing
techniques—one that
addresses areas
including digital
filters, adaptive
methods, and

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statistical signal processing. With its remarkable synthesis of the field, this book provides a new vision to stimulate progress and contribute to the advent of more useful, efficient, and friendly intelligent systems.

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A Comprehensive
Introduction
Advances in Audio
and Speech Signal
Processing:
Technologies and
Applications
Topics in Acoustic
Echo and Noise
Control
Next Generation
Solutions

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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,

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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

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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

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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

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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

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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

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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

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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.

Over the past

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several decades,
applications
permeated by
advances in digital
signal processing
have undergone
unprecedented
growth in
capabilities. The
editors and authors
of High
Performance
Embedded

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Computing

Handbook: A

Systems

Perspective have

been significant

contributors to this

field, and the

principles and

techniques

presented in the

handbook are

reinforced by

examples drawn

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from their work. The chapters cover system components found in today's HPEC systems by addressing design trade-offs, implementation options, and techniques of the trade, then solidifying the concepts with

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specific HPEC
system examples.
This approach
provides a more
valuable learning
tool, Because
readers learn about
these subject areas
through factual
implementation
cases drawn from
the contributing
authors' own

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experiences.

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Key subsystems
and components

Computational
characteristics of
high performance
embedded

algorithms and
applications Front-

end real-time
processor

technologies such

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as analog-to-digital
conversion,
application-specific
integrated circuits,
field programmable
gate arrays, and
intellectual
property-based
design

Programmable
HPEC systems
technology,
including

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interconnection
fabrics, parallel and
distributed
processing,
performance metrics
and software
architecture, and
automatic code
parallelization and
optimization
Examples of
complex HPEC
systems

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representative of
actual prototype
developments
Application
examples, including
radar,
communications,
electro-optical, and
sonar applications
The handbook is
organized around a
canonical
framework that

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helps readers
navigate through the
chapters, and it
concludes with a
discussion of future
trends in HPEC
systems. The
material is covered
at a level suitable
for practicing
engineers and
HPEC
computational

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practitioners and is easily adaptable to their own implementation requirements.

In the fifth edition of this textbook, author Paulo S.R. Diniz presents updated text on the basic concepts of adaptive signal processing and

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adaptive filtering. He first introduces the main classes of adaptive filtering algorithms in a unified framework, using clear notations that facilitate actual implementation. Algorithms are described in tables, which are detailed

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enough to allow the reader to verify the covered concepts. Examples address up-to-date problems drawn from actual applications. Several chapters are expanded and a new chapter 'Kalman Filtering' is included. The book provides a concise

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background on adaptive filtering, including the family of LMS, affine projection, RLS, set-membership algorithms and Kalman filters, as well as nonlinear, sub-band, blind, IIR adaptive filtering, and more. Problems are included at the

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end of chapters. A MATLAB package is provided so the reader can solve new problems and test algorithms. The book also offers easy access to working algorithms for practicing engineers.