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Two-dimensional Signal Analysis - René Garello - 2013-03-01
This title sets out to show that 2-D signal analysis has its own role to play alongside signal processing and image processing. Concentrating its coverage on those 2-D signals coming from physical sensors (such as radars and sonars), the discussion explores a 2-D spectral approach but develops the modeling of 2-D signals and proposes several data-oriented analysis techniques for dealing with them. Coverage is also given to potential future developments in this area.

An Innovative Approach to Multidimensional Signals and Systems Theory for Image and Video Processing In this volume, Eric Dubois further develops the theory of multi-D signal processing wherein input and output are vector-value signals. With this framework, he introduces the reader to crucial concepts in signal processing such as continuous- and discrete-domain signals and systems,
Extensive treatment of signals, sampling and reconstruction, light and color, random field models, image representation and more. While most treatments use normalized representations for non-rectangular sampling, this approach obscures much of the geometrical and scale information of the signal. In contrast, Dr. Dubois uses actual units of space-time and frequency. Basis-independent representations appear as much as possible, and the basis is introduced where needed to perform calculations or implementations. Thus, lattice theory is developed from the beginning and rectangular sampling is treated as a special case. This is especially significant in the treatment of color and color image processing and for discrete transform representations based on symmetry groups, including fast computational algorithms. Other features include: An entire chapter on lattices, giving the reader a thorough grounding in the use of lattices in signal processing lattices as used to describe discrete-domain signals and signal periodicities Chapters on sampling and reconstruction, random field models, symmetry invariant signals and systems and multidimensional Fourier transformation properties Supplemented throughout with MATLAB examples and accompanying downloadable source code Graduate and doctoral students as well as senior undergraduates and professionals working in signal processing or video/image processing and imaging will appreciate this fresh approach to multidimensional signals and systems theory, both as a thorough introduction to the subject and as inspiration for future research.

**Multidimensional Signal and Color Image Processing Using Lattices**

Eric Dubois - 2019-03-19

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Important new topics include introductory random processes, image enhancement and analysis, and the new MPEG scalable video coding standard.
Biomedical Signal and Image Processing - Kayvan Najarian - 2016-04-19
Written for senior-level and first year graduate students in biomedical signal and image processing, this book describes fundamental signal and image processing techniques that are used to process biomedical information. The book also discusses application of these techniques in the processing of some of the main biomedical signals and images, such as EEG, ECG, MRI, and CT. New features of this edition include the technical updating of each chapter along with the addition of many more examples, the majority of which are MATLAB based.

Two-dimensional Signal Processing with Application to Image Restoration - T. Assefi - 1974

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Two-Dimensional Wavelets and their Relatives - Jean-Pierre Antoine - 2008-06-12
Two-dimensional wavelets offer a number of advantages over discrete wavelet transforms when processing rapidly varying functions and signals. In particular, they offer benefits for real-time applications such as medical imaging, fluid dynamics, shape recognition, image enhancement and target tracking. This book introduces the reader to 2-D wavelets via 1-D continuous wavelet transforms, and includes a long list of useful applications. The authors then describe in detail the underlying mathematics before moving on to more advanced topics.
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**Digital Signal and Image Processing** - Tamal Bose - 2004

Introducing the first text to integrate the topics of digital signal processing (DSP), digital image processing
and advanced algorithms. The processing (ASP)! Digital Signal and Image Processing helps students develop a well-rounded understanding of these key areas by focusing on fundamental concepts, mathematical foundations, and advanced algorithms. The presentation is mathematically thorough with clear explanations, numerous examples, illustrations, and applications. In addition to problems, MATLAB-based computer projects are assigned at the end of each chapter, making this book ideal for laboratory-based courses.

**Two-dimensional Imaging** - Ronald Newbold Bracewell - 1995
Telecommunication by radio shrunk the world to a global village, and the satellite and computer have made imagery the language of that village. The creation of images was once mainly in the hands of artists and scribes. Two-dimensional images also occur naturally: a shadow, the dappled light pattern under a tree, the optical image on a retina. Nature provided the motif for much abstract ornamentation, and our written letters and ideograms trace back to representations of nature.

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Two-Dimensional Digital Filters - Wu-Sheng Lu - 2020-08-12
Presents basic theories, techniques, and procedures used to analyze, design, and implement two-dimensional filters; and surveys a number of applications in image and seismic data processing that demonstrate their use in real-world signal processing. For graduate students in electrical and computer e

A Wavelet Tour of Signal Processing - Stephane Mallat - 1999-09-14
This book is intended to serve as an invaluable reference for anyone concerned with the application of wavelets to signal processing. It has evolved from material used to teach "wavelet signal processing" courses in electrical engineering departments at Massachusetts Institute of Technology and Tel Aviv University, as well as applied mathematics departments at the Courant Institute of New York University and École Polytechnique in Paris. Provides a broad perspective
engineering and applied applications of transient signal processing with wavelets Emphasizes intuitive understanding, while providing the mathematical foundations and description of fast algorithms Numerous examples of real applications to noise removal, deconvolution, audio and image compression, singularity and edge detection, multifractal analysis, and time-varying frequency measurements Algorithms and numerical examples are implemented in Wavelab, which is a Matlab toolbox freely available over the Internet Content is accessible on several level of complexity, depending on the individual reader's needs New to the Second Edition Optical flow calculation and video compression algorithms Image models with bounded variation functions Bayes and Minimax theories for signal estimation 200 pages rewritten and most illustrations redrawn More problems and topics for a graduate course in wavelet signal processing, in
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**The Analysis of Multichannel Two-Dimensional Random Signals** - Charles W. Therrien - 1986

The analysis of multiple correlated two-dimensional random signals or multichannel 2-D signals is described. The emphasis is on estimation (linear prediction) and modeling of the 2-D random signals. Applications to spectrum analysis and image processing are considered. Keywords include: Multi-dimensional signal processing; Multichannel image processing; 2-D spectral analysis; Two-dimensional linear prediction, 2-D AR modeling.

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**Quaternion Fourier Transforms for Signal and Image Processing** - Todd A. Ell - 2014-06-23

Based on updates to signal and image processing technology made in the last two decades, this text examines the most recent research results pertaining to Quaternion Fourier Transforms. QFT is a central component of processing color images and complex valued signals. The book’s attention to mathematical concepts, imaging applications, and MATLAB compatibility render it an irreplaceable resource for students, scientists, researchers, and engineers.

**Image Analysis and Recognition** - Mohamed Kamel - 2007-08-07

This book constitutes the refereed proceedings of the
poster papers presented were on Image Analysis and Recognition, ICIAR 2007, held in Montreal, Canada, in August 2007. The 71 revised full papers and 44 revised poster papers presented were carefully reviewed and selected from 261 submissions. The papers are organized in topical sections on image restoration and enhancement, image and video processing and analysis, image segmentation, computer vision, pattern recognition for image analysis, shape and matching, motion analysis, tracking, image retrieval and indexing, image and video coding and encryption, biometrics, biomedical image analysis, and applications.

**3D Image Processing** - D. Caramella - 2012-12-06
Few fields have witnessed such impressive advances as the application of computer technology to radiology. The progress achieved has revolutionized diagnosis and greatly facilitated treatment selection and accurate planning of procedures. This book, written by leading experts from many different countries, provides a comprehensive and up-to-date overview of the role of 3D image processing. The first
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**Underwater Acoustics and Signal Processing** - L. Bjørnø - 2012-12-06
The comprehensive research activity around the World in the fields of Underwater Acoustics and Signal Processing being strongly supported by new experimental technique and equipment and by the parallel fast developments in computer technology and solid state devices, which has led to a rapidly reducing cost of digital processing thus enabling more complex processing to be carried out economically, emphasize how necessary it is at intervals of a few years through a NATO Advanced Study Institute (NATO ASI) and guided by
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Two-Dimensional Signal Processing, Optical Information Storage and Processing, and Electromagnetic Measurements - 1992

This is an annual report on research conducted under the auspices of the Joint Services Electronics Program. Specific topics covered are: multidimensional digital signal processing, signal restoration and detection, morphological systems for multidimensional signal processing, multidimensional processing for sensory arrays, multiprocessor systems and tools for digital signal processing, linear and nonlinear image processing, two-dimensional optical storage and processing, semiconductor quantum wave devices, electromagnetic measurements in the time and frequency domains, and automated radiation measurements for near- and far-field transformations.
Measurements - 1992

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3D Imaging Technologies—Multidimensional Signal Processing and Deep Learning - Lakhmi C. Jain - 2021-10-01
This book presents high-quality research in the field of 3D imaging technology. The International Conference on 3D Imaging Technology (3DDIT-MSP&DL) continues the good traditions already established by the first 3DIT conference (IC3DIT2019) to provide a wide scientific forum for researchers, academia and practitioners to exchange newest ideas and recent achievements in all aspects of image processing and analysis, together with their contemporary applications. The conference proceedings are published in 2 volumes. The main topics of the papers comprise famous trends as: 3D image representation, 3D image technology, 3D images and graphics, and computing and 3D information technology. In these proceedings, special attention is paid at the 3D tensor image representation, the 3D content generation technologies, big data analysis, and also deep learning, artificial intelligence, the 3D image analysis and video understanding, the 3D virtual and augmented reality, and many related areas. The first
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**Mathematical Methods for Signal and Image Analysis and Representation** - Luc Florack - 2012-01-12

Mathematical Methods for Signal and Image Analysis and Representation presents the mathematical methodology for generic image analysis tasks. In the context of this book an image may be any m-dimensional empirical signal living on an n-dimensional smooth manifold (typically, but not necessarily, a subset of spacetime). The existing literature on image methodology is rather either a deterministic or a statistical point of view. In contrast, this book brings together these seemingly different points of view in order to stress their conceptual relations and formal analogies. Furthermore, it does not focus on specific applications, although some are detailed for the sake of illustration, but on the methodological frameworks on which such applications are built, making it an ideal companion for those seeking a rigorous methodological basis for specific algorithms as well as for those interested in the fundamental methodology per se. Covering many topics at the forefront of current research, including anisotropic diffusion filtering of tensor fields, this book will be of particular interest to graduate and postgraduate students and researchers in the fields of computer vision, medical imaging and visual perception.

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This volume constitutes the refereed proceedings of the 10th International Conference on Energy Minimization Methods in Computer Vision and Pattern Recognition, EMMCVPR 2015, held in Hong Kong, China, in January 2015. The 36 revised full papers were carefully reviewed and selected from 45 submissions. The papers are organized in topical sections on discrete and continuous optimization; image restoration and inpainting; segmentation; PDE and variational methods; motion, tracking and multiview reconstruction; statistical methods and learning; and medical image analysis.

**Digital Signal Filtering, Analysis and Restoration** - Jiří Jan - 2000
In the belief that every engineer and scientist working with signals or data should have a knowledge of them, Jan (electrical engineering and computer science, Technical U. of Brno, Czech Republic) explains some of the theoretical concepts that underlie the methods now in common use to process and analyze signals and data. He examines such topics as classical digital filtering, averaging methods to improve the signal-to-noise ratio of repetitive signals, correlation and spectral analysis, methods to estimate and define unknown signals, non-linear processing and neural networks, and multidimensional signals and data. The Czech original Cislicova filtrace, analyza a resaurace signalu was published by Vutium Press, Brno, in 1997. c. Book News Inc.
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**Digital Image Processing and Analysis** - Scott E Umbaugh - 2010-11-19

Whether for computer evaluation of otherworldly definition 3D blockbuster, digital image processing involves the acquisition, analysis, and processing of visual information by computer and requires a unique skill set that has yet to be defined a single text. Until now. Taking an applications-oriented, engineering approach, Digital Image Processing and Analysis provides the tools for developing and advancing computer and human vision applications and brings image processing and analysis together into a unified framework. Providing information and background in a logical, as-needed fashion, the author presents topics as they become necessary for understanding the practical imaging model under study. He offers a conceptual presentation of the material for a solid understanding of complex topics and discusses the theory and foundations of digital image processing and the algorithm development needed to advance the field. With liberal use of color
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Digital Image Processing and Analysis - Scott E
needed to advance the field. With liberal use of color through-out and more materials on the processing of color images than the previous edition, this book provides supplementary exercises, a new chapter on applications, and two major new tools that allow for batch processing, the analysis of imaging algorithms, and the overall research and development of imaging applications. It includes two new software tools, the Computer Vision and Image Processing Algorithm Test and Analysis Tool (CVIP-ATAT) and the CVIP Feature Extraction and Pattern Classification Tool (CVIP-FEPC). Divided into five major sections, this book provides the concepts and models required to analyze digital images and develop computer vision and human consumption applications as well as all the necessary information to use the CVIPtools environment for algorithm development, making it an ideal reference tool for this fast growing field.

Now in its fifth edition, John C. Russ’s monumental image processing reference is an even more complete, modern, and hands-on tool than ever before. The Image Processing Handbook, Fifth Edition is fully updated and expanded to reflect the latest developments in the field. Written by an expert with unequalled experience and authority, it offers clear guidance on how to create, select, and use the most appropriate algorithms for a specific application. What’s new in the Fifth Edition? · A new chapter on the human visual process that explains which visual cues elicit a response from the viewer · Description of the latest hardware and software for image acquisition and printing, reflecting the proliferation of the digital camera · New material on multichannel images, including a major section on principal components analysis · Expanded sections on...
appropriate algorithms for a
dynamic range images, and
image enlargement and
interpolation · More than 600
new and revised figures and
illustrations for a total of
more than 2000 illustrations ·
20% more references to the
most up-to-date literature
Written in a relaxed and
reader-friendly style, The
Image Processing Handbook,
Fifth Edition guides you
through the myriad tools
available for image processing
and helps you understand how
to select and apply each one.

The Image Processing
Handbook, Fifth Edition ·
John C. Russ · 2006-12-19
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specific application. What’s
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new chapter on the human
visual process that explains
which visual cues elicit a
response from the viewer ·
Description of the latest
hardware and software for
image acquisition and
printing, reflecting the
proliferation of the digital
camera · New material on
multichannel images,
including a major section on
principal components analysis
· Expanded sections on
deconvolution, extended
dynamic range images, and
image enlargement and
interpolation · More than 600
new and revised figures and
illustrations for a total of
more than 2000 illustrations ·
20% more references to the
most up-to-date literature
Written in a relaxed and
reader-friendly style, The
Image Processing Handbook,
Fifth Edition guides you
through the myriad tools
available for image processing
and helps you understand how
to select and apply each one.

One- and Multidimensional

two-dimensional-signal-and-image-processing
With the constant increase in applications involving image processing and multimedia procedures digital signal processing (DSP) is important for modern information engineering. One- and Multidimensional Signal Processing provides an introduction to the algorithmic basics of image and TV communication systems as well as for systems in automation and robotic applications using sensor based imaging techniques. This novel combination of both one- and multidimensional signal processing discusses the similarities between the two and aids the understanding of one theory over the other. * Presents an applications-oriented approach to image processing including TV signal processing and discusses image scanning and the use of DSP procedures or digital filters * Provides clear and comprehensive coverage of basic concepts such as spatial frequency, spatio-temporal signal processing representation of motion and tracking of moving objects * Features examples of applications including image pick-up and display as well as still image filtering and image sequence interpolation * Introduces new design strategies for finite-impulse response (FIR) filters for image processing applications using spatial and frequency design constraints * Includes an introduction to nonlinear image processing techniques applying edge detection operators, morphological operators and rank order filters Such a practical book will have wide-ranging appeal as a valuable resource for researchers and developers and as an ideal introductory text for senior undergraduate and postgraduate students.

One- and Multidimensional Signal Processing - Hartmut Schröder - 2000-12-19
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Signal Analysis - Ronald L. Allen - 2004-06-07
Offers a well-rounded, mathematical approach to problems in signal interpretation using the latest time, frequency, and mixed-domain methods. Equally useful as a reference, an up-to-date review, a learning tool, and a resource for signal analysis techniques. Provides a gradual introduction to the mathematics so that the less mathematically adept reader will not be overwhelmed with instant hard analysis. Covers Hilbert spaces, complex analysis, distributions, random signals, analog Fourier transforms, and more.
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**Medical Image Processing, Reconstruction and Analysis** - Jiri Jan - 2019-09-05
Differently oriented specialists and students involved in image processing and analysis need to have a firm grasp of concepts and methods used in this now widely utilized area. This book aims at being a single-source reference providing such foundations in the form of theoretical yet clear and easy to follow explanations of underlying generic concepts. Medical Image Processing, Reconstruction and Analysis – Concepts and Methods explains the general principles and methods of image processing and analysis, focusing namely on applications used in medical imaging. The content of this book is divided into three parts: Part I – Images as Multidimensional Signals

basic image processing theory, explaining it for both analogue and digital image representations. Part II - Imaging Systems as Data Sources offers a non-traditional view on imaging modalities, explaining their principles influencing properties of the obtained images that are to be subsequently processed by methods described in this book. Newly, principles of novel modalities, as spectral CT, functional MRI, ultrafast planar-wave ultrasonography and optical coherence tomography are included. Part III – Image Processing and Analysis focuses on tomographic image reconstruction, image fusion and methods of image enhancement and restoration; further it explains concepts of low-level image analysis as texture analysis, image segmentation and morphological transforms. A new chapter deals with selected areas of higher-level analysis, as principal and independent component analysis and particularly the
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Signals and Systems for Bioengineers - John L. Semmlow - 2012

This book guides the reader through the electrical engineering principles that can be applied to biological systems and are therefore important to biomedical studies. The basic engineering concepts that underlie biomedical systems, medical devices, biocontrol, and biosignal analysis are explained in detail. This textbook is perfect for the one-semester bioengineering course usually offered in conjunction with a laboratory on signals and measurements which presents the fundamentals of systems and signal analysis. The target course occupies a pivotal position in the bioengineering curriculum and will play a critical role in the future development of bioengineering students. There are extensive questions and problems that are available through a companion site to enhance the learning experience. New to this edition: Reorganized to emphasize signal and system analysis Increased coverage of time-domain signal analysis Expanded coverage of biomeasurement, using examples in ultrasound and electrophysiology New applications in biocontrol, with examples from physiological systems modeling such as the respiratory system Double the number of Matlab and non-Matlab exercises to provide ample practice solving problems - by hand and with computational tools More Biomedical and real-world examples More biomedical figures throughout For instructors using this text in which presents the fundamentals of systems and signal analysis. The target course comprises a pivotal position in the bioengineering curriculum and will play a critical role in the future development of bioengineering students. There are extensive questions and problems that are available through a companion site to enhance the learning experience. New to this edition: Reorganized to emphasize signal and system analysis Increased coverage of time-domain signal analysis Expanded coverage of biomeasurement, using examples in ultrasound and electrophysiology New applications in biocontrol, with examples from physiological systems modeling such as the respiratory system Double the number of Matlab and non-Matlab exercises to provide ample practice solving problems - by hand and with computational tools More Biomedical and real-world examples More biomedical figures throughout For
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**Two-Dimensional Phase Unwrapping** - Dennis C. Ghiglia - 1998-04-28
A resource like no other-the first comprehensive guide to phase unwrapping Phase unwrapping is a mathematical problem-solving technique increasingly used in synthetic aperture radar (SAR) interferometry, optical interferometry, adaptive optics, and medical imaging. In Two-Dimensional Phase Unwrapping, two internationally recognized experts sort through the multitude of ideas and algorithms cluttering current research, explain clearly how to solve phase unwrapping problems, and provide practicable algorithms that can be applied to problems encountered in diverse disciplines. Complete with case studies and examples as well as hundreds of images and figures illustrating the concepts, this book features: *

A thorough introduction to the
Eight algorithms that constitute the state of the art in phase unwrapping *
Detailed description and analysis of each algorithm and its performance in a number of phase unwrapping problems *
C language software that provides a complete implementation of each algorithm *
Comparative analysis of the algorithms and techniques for evaluating results *
A discussion of future trends in phase unwrapping research *
Foreword by former NASA scientist Dr. John C. Curlander
Two-Dimensional Phase Unwrapping skillfully integrates concepts, algorithms, software, and examples into a powerful benchmark against which new ideas and algorithms for phase unwrapping can be tested. This unique introduction to a dynamic, rapidly evolving field is essential for professionals and graduate students in SAR interferometry, optical interferometry, adaptive optics, and medical imaging.

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Now C++ Algorithms for Digital Signal Processing as much as students, engineers, and programmers. It's the ideal bridge between programming and signal processing, and a valuable reference for experts in either field. Source code for all of the DSP programs and DSP data associated with the examples discussed in this book and Appendix B and the file README.TXT which provide more information about how to compile and run the programs can be downloaded from www.informit.com/title/9780131791442

Bring the power and flexibility of C++ to all your DSP applications The multimedia revolution has created hundreds of new uses for Digital Signal Processing, but most software guides have continued to focus on outdated languages such as FORTRAN and Pascal for managing new applications.

Digital Signal Processing applies object-oriented techniques to this growing field with software you can implement on your desktop PC. C++ Algorithms for Digital Signal Processing's programming methods can be used for applications as diverse as: Digital audio and video Speech and image processing Digital communications Radar, sonar, and ultrasound signal processing Complete coverage is provided, including: Overviews of DSP and C++ Hands-on study with dozens of exercises Extensive library of customizable source code Import and Export of Microsoft WAV and Matlab data files Multimedia professionals, managers, and even advanced hobbyists will appreciate C++ Algorithms for Digital Signal Processing as much as students, engineers, and programmers. It's the ideal bridge between programming and signal processing, and a valuable reference for experts in either field. Source code for all of the DSP programs and DSP
Vector Quantization and Signal Compression - Allen Gersho - 1991-11-30

Herb Caen, a popular columnist for the San Francisco Chronicle, recently quoted a Voice of America press release as saying that it was reorganizing in order to "eliminate duplication and redundancy." This quote both states a goal of data compression and illustrates its common need: the removal of duplication (or redundancy) can provide a more efficient representation of data and the quoted phrase is itself a candidate for such surgery. Not only can the number of words in the quote be reduced without losing information, but the statement would actually be enhanced by such compression since it will no longer exemplify the wrong examples discussed in this book and Appendix B and the file README.TXT which provide more information about how to compile and run the programs can be downloaded from www.informit.com/title/9780131791442

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**Motion Analysis and Image Sequence Processing** - M. Ibrahim Sezan - 2012-12-06

An image or video sequence is a series of two-dimensional (2-D) images sequentially ordered in time. Image sequences can be acquired, for instance, by video, motion picture, X-ray, or acoustic cameras, or they can be synthetically generated by sequentially ordering 2-D still images as in computer graphics and animation. The
described in Figure 1 below in areas such as entertainment, visual communications, multimedia, education, medicine, surveillance, remote control, and scientific research is constantly growing as the use of television and video systems are becoming more and more common. The boosted interest in digital video for both consumer and professional products, along with the availability of fast processors and memory at reasonable costs, has been a major driving force behind this growth. Before we elaborate on the two major terms that appear in the title of this book, namely motion analysis and image sequence processing, we like to place them in their proper contexts within the range of possible operations that involve image sequences. In this book, we choose to classify these operations into three major categories, namely (i) image sequence processing, (ii) image sequence analysis, and (iii) visualization. The interrelationship among these three categories is pictorially the form of an "image sequence triangle".

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**Ripples in Mathematics** - A. Jensen - 2001-06-06
This introduction to the discrete wavelet transform and its applications is based on a novel approach to discrete wavelets called lifting. After an elementary introduction, connections of filter theory are presented, and wavelet packet transforms are defined. The time-frequency plane is used for interpretation of signals, problems with finite length signals are detailed, and MATLAB is used for examples and implementation of transforms.