Wavelets and Fractals in Earth System Sciences

Abstract: “This report describes two seemingly distinct areas of work, wavelet analysis and fractal image compression. A review of these two areas is presented, a new algorithm outlined, and some results presented. Finally, some speculations concerning the future direction of this research is included.”

Constrained Networks for Fractal Image Compression
This second edition of The Illustrated Wavelet Transform Handbook: Introductory Theory and Applications in Science, Engineering, Medicine and Finance has been fully updated and revised to reflect recent developments in the theory and practical applications of wavelet transform methods. The book is designed specifically for the applied reader in science, engineering, medicine and finance. Newcomers to the subject will find an accessible and clear account of the theory of continuous and discrete wavelet transforms, while readers already acquainted with wavelets can use the book to broaden their perspective. One of the many strengths of the book is its use of several hundred illustrations, some in colour, to convey key concepts and their varied practical uses. Chapters exploring these practical applications highlight both the similarities and differences in wavelet transform methods across different disciplines and also provide a comprehensive list of over 1000 references that will serve as a valuable resource for further study. Paul Addison is a Technical Fellow with Medtronic, a global medical technology company. Previously, he was co-founder and CEO of start-up company, CardioDigital Ltd (and later co-founded its US subsidiary, CardioDigital Inc) - a company concerned with the development of novel wavelet-based methods for biosignal analysis. He has a master’s degree in engineering and a PhD in fluid mechanics, both from the University of Glasgow, Scotland (founded 1451). His former academic life as a tenured professor of fluids engineering included the output of a large number of technical papers, covering many aspects of engineering and bioengineering, and two textbooks: Fractals and Chaos: An Illustrated Course and the first edition of The Illustrated Wavelet Transform Handbook. At the time of publication, the author has over 100 issued US patents concerning a wide range of medical device technologies, many of these concerning the wavelet transform analysis of biosignals. He is both a Chartered Engineer and Chartered Physicist.

Fractal and Wavelet Image Compression Techniques
Wavelet analysis and its applications have been one of the fastest growing research areas in the past several years. Wavelet theory has been employed in numerous fields and applications, such as signal and image processing, communication systems, biomedical imaging, radar, air acoustics, and many other areas. Active media technology is concerned with the development of autonomous computational or physical entities capable of perceiving, reasoning, adapting, learning, cooperating, and delegating in a dynamic environment. This book captures the essence of the current state of the art in
Wavelet analysis and active media technology. It includes nine invited papers by distinguished researchers: P Zhang, T D Bui and C Y Suen from Concordia University, Canada; N A Strelkov and V L Dolnikov from Yaroslavl State University, Russia; Chin-Chen Chang and Ching-Yun Chang from Taiwan; S S Pandey from R D University, India; and I L Bloshanskii from Moscow State Regional University, Russia. The proceedings have been selected for coverage in: Index to Scientific & Technical Proceedings (ISTP CD ROM version / ISI Proceedings) CC Proceedings — Engineering & Physical Sciences Contents: Volume 1: Average Dimension of Wavelet Subspaces (N A Strelkov)Wavelet Based Particle Filters (G Rui & Z Wang)A New Editing Algorithm for Mesh Models (W Wang et al.)A Wavelet Transform Based Algorithm for Image Maximum Fusion (D Yin et al.)Resource Allocation Via Reinforcement Learning in Mass (Z Huang)A Float-Type Interface Meter (X Bai et al.)Application and Intelligent Conjunction of Different Function (H Ai et al.) Volume 2: Wavelet Subspaces and Lattice Packing (V L Dolnikov & N A Strelkov)The Study on Sampling Interval for Time Series (X W Meng et al.)Graph-Based Candidate Item Set Generating Algorithm (P Guo et al.)Image Contrast Enhancement Based on Wavelet Transform (D Liu & P Li)SIP in Multimedia Phone System Over IP (B B Wang et al.)Ontology-Based Resource Matchmaking in the Grid (G M Lu et al.)GIS Query Method Based on Qualitative Spatial Reasoning (P Guo et al.) Volume 3: A De-Noising Method Based on Wavelet (D Song & J He)Construction of Matrix Conjugate Quadrature Filters (L Sun et al.)Robust and Adaptive Digital Watermarking (J Zhang & S Hong)Home Automation System Based on Embedded Technology (C Qi & T Hang)Construction of a Novel Contourlet Transform (Q Lian & L Kong)Several Problems in the Wavelet-Based Local CT (X Wen et al.) and other papers Readership: Graduate students, academics, researchers and practitioners in the areas of pattern and handwriting recognition, image analysis, computer vision, and networking. Keywords:Wavelet Analysis;Image Processing;Signal Processing;Communications;Algorithms and Constructions;Intelligent Agent Technology;Multi-Agent Systems;Multi-Modal Processing;Detection

Wavelet Analysis and Active Media Technology An exciting new development has taken place in the digital era that has captured the imagination and talent of researchers around the globe- wavelet image compression. This technology has deep roots in theories of vision, and promises performance improvements over all other compression methods, such as those based on Fourier transforms, vectors quantizers, fractals, neural nets, and many others. It is this revolutionary new technology that is presented in Wavelet Image and Video Compression, in a form that is accessible to the largest audience possible. Wavelet Image and Video Compression is divided into four parts. Part I, Background Material, introduces the basic mathematical structures that underly image compression algorithms with the intention of providing an easy introduction to the mathematical concepts that are prerequisites for the remainder of the book. It explains such topics as change of bases, scalar and vector quantization, bit allocation and rate-distortion theory, entropy coding, the discrete-cosine transform, wavelet filters and other related topics. Part II, Still Image Coding, presents a spectrum of wavelet still image coding techniques. Part III, Special Topics in Still Image Coding, provides a variety of example coding schemes with a special flavor in either approach or application domain. Part IV, Video Coding, examines wavelet and pyramidal coding techniques for video data. Wavelet Image and Video Compression serves as an excellent reference and may be used as a text for advanced courses covering the subject.


A Wavelet Tour of Signal Processing The International conference series on Computer Science, Engineering & Applications (ICCSEA) aims to bring together researchers and practitioners from academia and industry to focus on understanding computer science, engineering and applications and to establish new collaborations in these areas. The Second International Conference on Computer Science, Engineering & Applications (ICCSEA-2012), held in Delhi, India, during May 25-27, 2012 attracted many local and international delegates, presenting a balanced mixture of intellect and research both from the East and from the
West. Upon a strenuous peer-review process the best submissions were selected leading to an exciting, rich and a high quality technical conference program, which featured high-impact presentations in the latest developments of various areas of computer science, engineering and applications research.

The 8th International Conference on Robotic, Vision, Signal Processing & Power Applications An exciting new development has taken place in the digital era that has captured the imagination and talent of researchers around the globe - wavelet image compression. This technology has deep roots in theories of vision, and promises performance improvements over all other compression methods, such as those based on Fourier transforms, vectors quantizers, fractals, neural nets, and many others. It is this revolutionary new technology that is presented in Wavelet Image and Video Compression, in a form that is accessible to the largest audience possible. Wavelet Image and Video Compression is divided into four parts. Part I, Background Material, introduces the basic mathematical structures that underly image compression algorithms with the intention of providing an easy introduction to the mathematical concepts that are prerequisites for the remainder of the book. It explains such topics as change of bases, scalar and vector quantization, bit allocation and rate-distortion theory, entropy coding, the discrete-cosine transform, wavelet filters and other related topics. Part II, Still Image Coding, presents a spectrum of wavelet still image coding techniques. Part III, Special Topics in Still Image Coding, provides a variety of example coding schemes with a special flavor in either approach or application domain. Part IV, Video Coding, examines wavelet and pyramidal coding techniques for video data. Wavelet Image and Video Compression serves as an excellent reference and may be used as a text for advanced courses covering the subject.

Adaptive Fractal Image Compression in the Spatial and Wavelet Domains The present book is based on the research papers presented in the International Conference on Soft Computing for Problem Solving (SoCProS 2012), held at JK Lakshmipat University, Jaipur, India. This book provides the latest developments in the area of soft computing and covers a variety of topics, including mathematical modeling, image processing, optimization, swarm intelligence, evolutionary algorithms, fuzzy logic, neural networks, forecasting, data mining, etc. The objective of the book is to familiarize the reader with the latest scientific developments that are taking place in various fields and the latest sophisticated problem solving tools that are being developed to deal with the complex and intricate problems that are otherwise difficult to solve by the usual and traditional methods. The book is directed to the researchers and scientists engaged in various fields of Science and Technology.

Third International Congress on Information and Communication Technology The proceeding is a collection of research papers presented, at the 8th International Conference on Robotics, Vision, Signal Processing and Power Applications (ROVISP 2013), by researchers, scientists, engineers, academicians as well as industrial professionals from all around the globe. The topics of interest are as follows but are not limited to: Robotics, Control, Mechatronics and Automation Vision, Image, and Signal Processing Artificial Intelligence and Computer Applications Electronic Design and Applications Telecommunication Systems and Applications Power System and Industrial Applications

Document and Image Compression The subject of wavelet analysis and fractal analysis is fast developing and has drawn a great deal of attention in varied disciplines of science and engineering. Over the past couple of decades, wavelets, multiresolution, and multifractal analyses have been formalized into a thorough mathematical framework and have found a variety of applications w
Handbook of Research on Pattern Engineering System Development for Big Data Analytics

This book presents select proceedings of the International Conference on Future Learning Aspects of Mechanical Engineering (FLAME 2018). The book discusses interdisciplinary areas such as automobile engineering, mechatronics, applied and structural mechanics, bio-mechanics, biomedical instrumentation, ergonomics, biodynamic modeling, nuclear engineering, agriculture engineering, and farm machineries. The contents of the book will benefit both researchers and professionals.

Fractal Imaging In the 50 years since Mandelbrot identified the fractality of coastlines, mathematicians and physicists have developed a rich and beautiful theory describing the interplay between analytic, geometric and probabilistic aspects of the mathematics of fractals. Using classical and abstract analytic tools developed by Cantor, Hausdorff, and Sierpinski, they have sought to address fundamental questions: How can we measure the size of a fractal set? How do waves and heat travel on irregular structures? How are analysis, geometry and stochastic processes related in the absence of Euclidean smooth structure? What new physical phenomena arise in the fractal-like settings that are ubiquitous in nature?

This book introduces background and recent progress on these problems, from both established leaders in the field and early career researchers. The book gives a broad introduction to several foundational techniques in fractal mathematics, while also introducing some specific new and significant results of interest to experts, such as that waves have infinite propagation speed on fractals. It contains sufficient introductory material that it can be read by new researchers or researchers from other areas who want to learn about fractal methods and results.

Analysis and Probability

Interest in image compression for internet and other multimedia applications has spurred research into compression techniques that will increase storage capabilities and transmission speed. This tutorial provides a practical guide to fractal and wavelet approaches—two techniques with exciting potential. It is intended for scientists, engineers, researchers, and students. It provides both introductory information and implementation details. Three Windows-compatible software systems are included so that readers can explore the new technologies in depth. Complete C/C++ source code is provided, enabling readers to go beyond the accompanying software. The mathematical presentation is accessible to advanced undergraduate or beginning graduate students in technical fields.

Examining Fractal Image Processing and Analysis

Combines analysis and tools from probability, harmonic analysis, operator theory, and engineering (signal/image processing). Interdisciplinary focus with hands-on approach, generous motivation and new pedagogical techniques. Numerous exercises reinforce fundamental concepts and hone computational skills. Separate sections explain engineering terms to mathematicians and operator theory to engineers. Fills a gap in the literature.

Advances in Imaging and Electron Physics

Advances in Imaging and Electron Physics merges two long-running serials—Advances in Electronics and Electron Physics and Advances in Optical and Electron Microscopy. This series features extended articles on the physics of electron devices (especially semiconductor devices), particle optics at high and low energies, microlithography, image science and digital image processing, electromagnetic wave propagation, electron microscopy, and the computing methods used in all these domains.

The Illustrated Wavelet Transform Handbook

Fractal image compression technology, one of the major digital image compression techniques, has been a well-kept secret for many years. While there are many books written on other technologies, such as DCT/JPEG and wavelet theory, few books touch the subject of fractal
image compression. Fractal Imaging presents the logic, technology, and various uses of fractal imaging by analyzing a complete, usable fractal image representation system. This detailed work will be a must for engineers interested in building fractal imaging systems. It will also be of interest to the general public, showing how mathematics once again plays a central role in our lives, where art and science intersect. Included is a CD-ROM containing fractal images and a freeware version of Iterated Systems fractal imaging utility. Key Features: * Modeling realistic images * Efficient, fractal image representation and enhancement * Data compression and coding algorithms with Sample C code * 16-page color insert * Includes Fractal Imager Software * Fractal Imager is an award-winning Windows’ product that produces Fractal Image Format (FIF) files. This software helps you to create interactive Web page images that download fast and look sharp. * Put interactive images on your Web site * Give great image quality and resolution independent zoomability * Super fast Internet progressive display * More content without taking more space!

Fractals in Multimedia Digital image business applications are expanding rapidly, driven by recent advances in the technology and breakthroughs in the price and performance of hardware and firmware. This ever increasing need for the storage and transmission of images has in turn driven the technology of image compression: image data rate reduction to save storage space and reduce transmission rate requirements. Digital image compression offers a solution to a variety of imaging applications that require a vast amount of data to represent the images, such as document imaging management systems, facsimile transmission, image archiving, remote sensing, medical imaging, entertainment, HDTV, broadcasting, education and video teleconferencing. Digital Image Compression: Algorithms and Standards introduces the reader to compression algorithms, including the CCITT facsimile standards T.4 and T.6, JBIG, CCITT H.261, and MPEG standards. The book provides comprehensive explanations of the principles and concepts of the algorithms, helping the readers' understanding and allowing them to use the standards in business, product development and R&D. Audience: A valuable reference for the graduate student, researcher and engineer. May also be used as a text for a course on the subject.

The Image Processing Handbook

Advances in Interdisciplinary Engineering

Fractal Image Compression 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 on the principles and 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 engineering and applied mathematics.
A Wavelet Fractal Method for Content Based Image and Video Compression This thesis presents two novel coding schemes and applications to both two- and three-dimensional image compression. Image compression can be viewed as methods of functional approximation under a constraint on the amount of information allowable in specifying the approximation. Two methods of approximating functions are discussed: Iterated Function Systems (IFS) and wavelet-based approximations. IFS methods approximate a function by the fixed point of an iterated operator, using consequences of the Banach contraction mapping principle. Natural images under a wavelet basis have characteristic coefficient magnitude decays which may be used to aid approximation. The relationship between quantization, modelling, and encoding in a compression scheme is examined. Context-based adaptive arithmetic coding is described. This encoding method is used in the coding schemes developed. A coder with explicit separation of the modelling and encoding roles is presented: an embedded wavelet bitplane coder based on hierarchical context in the wavelet coefficient trees. Fractal (spatial IFSM) and fractal-wavelet (coefficient tree), or IFSW, coders are discussed. A second coder is proposed, merging the IFSW approaches with the embedded bitplane coder. Performance of the coders, and applications to two- and three-dimensional images are discussed. Applications include two-dimensional still images in greyscale and colour, and three-dimensional streams (video).
been surprising. Benoit Mandelbrot, creator of fractal geometry, would have been surprised by the use of fractal analysis presented in this book. Here we present the use of fractal geometry, in particular, fractal analysis in two sciences: health sciences and social sciences and humanities. Part 1 is Health Science. In it, we present the latest advances in cardiovascular signs, kidney images to determine cancer growth, EEG signals, magnetoencephalography signals, and photosensitive epilepsy. We show how it is possible to produce ultrasonic lenses or even sound focusing. In Part 2, we present the use of fractal analysis in social sciences and humanities. It includes anthropology, hierarchical scaling, human settlements, language, fractal dimension of different cultures, cultural traits, and Mesoamerican complexity. And in Part 3, we present a few useful tools for fractal analysis, such as graphs and correlation, self-affine and self-similar graphs, and correlation function. It is impossible to picture today’s research without fractal geometry.

A Hybrid Fractal-wavelet Transform Image Data Compression Algorithm This IMA Volume in Mathematics and its Applications FRAC TALS IN MULTIMEDIA is a result of a very successful three-day minisymposium on the same title. The event was an integral part of the IMA annual program on Mathematics in Multimedia, 2000-2001. We would like to thank Michael F. Barnsley (Department of Mathematics and Statistics, University of Melbourne), Di etmar Saupe (Institut fUr Informatik, UniversiUt Leipzig), and Edward R. Vrscay (Department of Applied Mathematics, University of Waterloo) for their excellent work as organizers of the meeting and for editing the proceedings. We take this opportunity to thank the National Science Foundation for their support of the IMA. Series Editors Douglas N. Arnold, Director of the IMA Fadil Santosa, Deputy Director of the IMA v PREFACE This volume grew out of a meeting on Fractals in Multimedia held at the IMA in January 2001. The meeting was an exciting and intense one, focused on fractal image compression, analysis, and synthesis, iterated function systems and fractals in education. The central concerns of the meeting were to establish within these areas where we are now and to develop a vision for the future.

Computer Analysis of Images and Patterns Digital image processing is a field that is constantly improving. Gaining high-level understanding from digital images is a key requirement for computing. One aspect of study that is assisting with this advancement is fractal theory. This new science has gained momentum and popularity as it has become a key topic of research in the area of image analysis. Examining Fractal Image Processing and Analysis is an essential reference source that discusses fractal theory applications and analysis, including box-counting analysis, multi-fractal analysis, 3D fractal analysis, and chaos theory, as well as recent trends in other soft computing techniques. Featuring research on topics such as image compression, pattern matching, and artificial neural networks, this book is ideally designed for system engineers, computer engineers, professionals, academicians, researchers, and students seeking coverage on problem-oriented processing techniques and imaging technologies.

Fractal Analysis The book includes selected high-quality research papers presented at the Third International Congress on Information and Communication Technology held at Brunel University, London on February 27-28, 2018. It discusses emerging topics pertaining to information and communication technology (ICT) for managerial applications, e-governance, e-agriculture, e-education and computing technologies, the Internet of Things (IOT), and e-mining. Written by experts and researchers working on ICT, the book is suitable for new researchers involved in advanced studies.

Hybrid Fractal/wavelet Methods for Image Compression Whether obtained by microscopes, space probes, or the human eye, the same basic tools can be applied to acquire, process, and analyze the data contained in images. Ideal for self study, The Image Processing Handbook, Sixth Edition, first published in 1992, raises the
bar once again as the gold-standard reference on this subject. Using extensive new illustrations and diagrams, it offers a logically organized exploration of the important relationship between 2D images and the 3D structures they reveal. Provides Hundreds of Visual Examples in FULL COLOR! The author focuses on helping readers visualize and compare processing and measurement operations and how they are typically combined in fields ranging from microscopy and astronomy to real-world scientific, industrial, and forensic applications. Presenting methods in the order in which they would be applied in a typical workflow—from acquisition to interpretation—this book compares a wide range of algorithms used to: Improve the appearance, printing, and transmission of an image Prepare images for measurement of the features and structures they reveal Isolate objects and structures, and measure their size, shape, color, and position Correct defects and deal with limitations in images Enhance visual content and interpretation of details This handbook avoids dense mathematics, instead using new practical examples that better convey essential principles of image processing. This approach is more useful to develop readers’ grasp of how and why to apply processing techniques and ultimately process the mathematical foundations behind them. Much more than just an arbitrary collection of algorithms, this is the rare book that goes beyond mere image improvement, presenting a wide range of powerful example images that illustrate techniques involved in color processing and enhancement. Applying his 50-year experience as a scientist, educator, and industrial consultant, John Russ offers the benefit of his image processing expertise for fields ranging from astronomy and biomedical research to food science and forensics. His valuable insights and guidance continue to make this handbook a must-have reference.

Advances in Computer Science, Engineering & Applications

Wavelet Image and Video Compression This book provides a comprehensive overview of deep learning (DL) in medical and healthcare applications, including the fundamentals and current advances in medical image analysis, state-of-the-art DL methods for medical image analysis and real-world, deep learning-based clinical computer-aided diagnosis systems. Deep learning (DL) is one of the key techniques of artificial intelligence (AI) and today plays an important role in numerous academic and industrial areas. DL involves using a neural network with many layers (deep structure) between input and output, and its main advantage of is that it can automatically learn data-driven, highly representative and hierarchical features and perform feature extraction and classification on one network. DL can be used to model or simulate an intelligent system or process using annotated training data. Recently, DL has become widely used in medical applications, such as anatomic modelling, tumour detection, disease classification, computer-aided diagnosis and surgical planning. This book is intended for computer science and engineering students and researchers, medical professionals and anyone interested using DL techniques.

Enhanced Fractal Image Compression Using Haar Wavelet Due to the growing use of web applications and communication devices, the use of data has increased throughout various industries. It is necessary to develop new techniques for managing data in order to ensure adequate usage. The Handbook of Research on Pattern Engineering System Development for Big Data Analytics is a critical scholarly resource that examines the incorporation of pattern management in business technologies as well as decision making and prediction process through the use of data management and analysis. Featuring coverage on a broad range of topics such as business intelligence, feature extraction, and data collection, this publication is geared towards professionals, academicians, practitioners, and researchers seeking current research on the development of pattern management systems for business applications.

Fractal Image Compression One half of the book is authored by Yuval Fisher himself, while articles from another 12 experts in the field present material from
different points of view. The focus here is solely on fractal image encoding, with the aim of providing a working code that is usable in applications, while containing the complete details of how to encode and decode images. An indispensable "how to" guide, combining the very latest results in the field. Of interest to a very wide audience, ranging from experts in image processing to high school students.

Deep Learning in Healthcare Traditional methods of image and video coding rely on linear transformations that focus primarily on high compression. With the increasing demand for digital imagery and video there is now a need for functionality of the compressed information. This dissertation develops a new framework for compression that uses a fractal wavelet method to break the imagery into shape, texture, color, and motion. With this new organization, image information is readily accessible to the user in compressed form. Based on this compression method, we then develop an object-oriented video format. Image analysts tend to break imagery into the categories of shape, texture, color, and motion. Thus, we begin our approach to image compression by finding mathematical methods that preserve shape and texture in an efficient manner. This new non-traditional method begins by using fractals. A fractal is an object which when observed at its smallest level of detail resembles the overall object itself. Some natural examples include ferns, snowflakes, clouds, and mountains. Recently, engineers have applied fixed point theory to describe a method of fractal image compression. Unfortunately fixed point theory only provides a partial description of fractal compression, since it says little about the spatial frequency structure behind the process.

Digital Image Compression The two-volume set LNAI 5711 and LNAI 5712 constitutes the refereed proceedings of the 13th International Conference on Knowledge-Based Intelligent Information and Engineering Systems, KES 2009, held in Santiago de Chile in September 2009. The 153 revised papers presented were carefully reviewed and selected from numerous submissions. The topics covered are: fuzzy and neuro-fuzzy systems, agent systems, knowledge-based and expert systems, miscellaneous generic intelligent systems topics, intelligent vision and image processing, knowledge management, ontologies and data mining, web intelligence, text and multimedia mining and retrieval, other advanced knowledge-based systems, innovations in chance discovery, advanced knowledge-based systems, multi-agent negotiation and coordination, innovations in intelligent systems, intelligent technology approach to management engineering, data mining and service science for innovation, knowledge-based systems for e-business, video surveillance, social networks, advanced engineering design techniques for adaptive systems, knowledge technology in learning support, advanced information system for supporting personal activity, design of intelligent society, knowledge-based interface systems, knowledge-based multi-criteria decision support, soft computing techniques and their applications, immunity-based systems. The book also includes three keynote speaker plenary presentations.

Image Analysis and Recognition Although it's true that image compression research is a mature field, continued improvements in computing power and image representation tools keep the field spry. Faster processors enable previously intractable compression algorithms and schemes, and certainly the demand for highly portable high-quality images will not abate. Document and Image Compression highlights the current state of the field along with the most probable and promising future research directions for image coding. Organized into three broad sections, the book examines the currently available techniques, future directions, and techniques for specific classes of images. It begins with an introduction to multiresolution image representation, advanced coding and modeling techniques, and the basics of perceptual image coding. This leads to discussions of the JPEG 2000 and JPEG-LS standards, lossless coding, and fractal image compression. New directions are highlighted that involve image coding and representation paradigms beyond the wavelet-based framework, the use of redundant dictionaries, the distributed source coding paradigm, and novel data-hiding techniques. The book concludes with techniques developed for classes of images where the general-
purpose algorithms fail, such as for binary images and shapes, compound documents, remote sensing images, medical images, and VLSI layout image data. Contributed by international experts, Document and Image Compression gathers the latest and most important developments in image coding into a single, convenient, and authoritative source.

Copyright code 9180b7f7bfcd9594d72d76d3156efce7