Wavelets Made Easy

Yves Nievergelt

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Wavelets Made Easy:

   Wavelets Made Easy Yves Nievergelt,2013-11-27 This book explains the nature and computation of mathematical wavelets which provide a framework and methods for the analysis and the synthesis of signals images and other arrays of data The material presented here addresses the au dience of engineers financiers scientists and students looking for explanations of wavelets at the undergraduate level It requires only a working knowledge or memories of a first course in linear algebra and calculus The first part of the book answers the following two questions What are wavelets Wavelets extend Fourier analysis How are wavelets computed Fast transforms compute them To show the practical significance of wavelets the book also provides transitions into several applications analysis detection of crashes edges or other events compression reduction of storage smoothing attenuation of noise and syn thesis reconstruction after compression or other modification Such applications include one dimensional signals sounds or other time series two dimensional arrays pictures or maps and three dimensional data spatial diffusion The ap plications demonstrated here do not constitute recipes for real implementations but aim only at clarifying and strengthening the understanding of the mathematics of wavelets

   Wavelets Made Easy Yves Nievergelt,2012-11-09 Originally published in 1999 Wavelets Made Easy offers a lucid and concise explanation of mathematical wavelets Written at the level of a first course in calculus and linear algebra its accessible presentation is designed for undergraduates in a variety of disciplines computer science engineering mathematics mathematical sciences as well as for practicing professionals in these areas The present softcover reprint retains the corrections from the second printing 2001 and makes this unique text available to a wider audience The first chapter starts with a description of the key features and applications of wavelets focusing on Haar s wavelets but using only high school mathematics The next two chapters introduce one two and three dimensional wavelets with only the occasional use of matrix algebra The second part of this book provides the foundations of least squares approximation the discrete Fourier transform and Fourier series The third part explains the Fourier transform and then demonstrates how to apply basic Fourier analysis to designing and analyzing mathematical wavelets Particular attention is paid to Daubechies wavelets Numerous exercises a bibliography and a comprehensive index combine to make this book an excellent text for the classroom as well as a valuable resource for self study   **Wavelets Made Easy** Yves Nievergelt,1999-04-28 This book explains the nature and computation of mathematical wavelets which provide a framework and methods for the analysis and the synthesis of signals images and other arrays of data The material presented here addresses the au dience of engineers financiers scientists and students looking for explanations of wavelets at the undergraduate level It requires only a working knowledge or memories of a first course in linear algebra and calculus The first part of the book answers the following two questions What are wavelets Wavelets extend Fourier analysis How are wavelets computed Fast transforms compute them To show the practical significance of wavelets the book also provides transitions into several applications analysis detection of crashes edges or

other events compression reduction of storage smoothing attenuation of noise and syn thesis reconstruction after compression or other modification Such applications include one dimensional signals sounds or other time series two dimensional arrays pictures or maps and three dimensional data spatial diffusion The ap plications demonstrated here do not constitute recipes for real implementations but aim only at clarifying and strengthening the understanding of the mathematics of wavelets   *An Introduction to Wavelet Analysis* David F. Walnut,2013-12-11 An Introduction to Wavelet Analysis provides a comprehensive presentation of the conceptual basis of wavelet analysis including the construction and application of wavelet bases The book develops the basic theory of wavelet bases and transforms without assuming any knowledge of Lebesgue integration or the theory of abstract Hilbert spaces The book motivates the central ideas of wavelet theory by offering a detailed exposition of the Haar series and then shows how a more abstract approach allows us to generalize and improve upon the Haar series Once these ideas have been established and explored variations and extensions of Haar construction are presented The mathematical pre requisites for the book are a course in advanced calculus familiarity with the language of formal mathematical proofs and basic linear algebra concepts Features Rigorous proofs with consistent assumptions on the mathematical background of the reader does not assume familiarity with Hilbert spaces or Lebesgue measure Complete background material on Fourier Analysis topics Fourier Analysis Wavelets are presented first on the continuous domain and later restricted to the discrete domain for improved motivation and understanding of discrete wavelet transforms and applications Special appendix Excursions in Wavelet Theory provides a guide to current literature on the topic Over 170 exercises guide the reader through the text The book is an ideal text reference for a broad audience of advanced students and researchers in applied mathematics electrical engineering computational science and physical sciences It is also suitable as a self study reference guide for professionals All readers will find   *Wavelets* Peter Nickolas,2017-01-11 This text offers an excellent introduction to the mathematical theory of wavelets for senior undergraduate students Despite the fact that this theory is intrinsically advanced the author s elementary approach makes it accessible at the undergraduate level Beginning with thorough accounts of inner product spaces and Hilbert spaces the book then shifts its focus to wavelets specifically starting with the Haar wavelet broadening to wavelets in general and culminating in the construction of the Daubechies wavelets All of this is done using only elementary methods bypassing the use of the Fourier integral transform Arguments using the Fourier transform are introduced in the final chapter and this less elementary approach is used to outline a second and quite different construction of the Daubechies wavelets The main text of the book is supplemented by more than 200 exercises ranging in difficulty and complexity   **Wavelet and Wave Analysis as Applied to Materials with Micro Or Nanostructure** Carlo Cattani,I?A?rema I?A?roslavovich Rushchit?s?ki?,2007 This seminal book unites three different areas of modern science the micromechanics and nanomechanics of composite materials wavelet analysis as applied to physical problems and the propagation of a new type of solitary wave in composite materials

nonlinear waves Each of the three areas is described in a simple and understandable form focusing on the many perspectives of the links among the three All of the techniques and procedures are described here in the clearest and most open form enabling the reader to quickly learn and use them when faced with the new and more advanced problems that are proposed in this book By combining these new scientific concepts into a unitary model and enlightening readers on this pioneering field of research readers will hopefully be inspired to explore the more advanced aspects of this promising scientific direction The application of wavelet analysis to nanomaterials and waves in nanocomposites can be very appealing to both specialists working on theoretical developments in wavelets as well as specialists applying these methods and experiments in the mechanics of materials   Wavelet Applications in Signal and Image Processing ,1995   *The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science* ,1905   **Philosophical Magazine** ,1905   **Conceptual Wavelets in Digital Signal Processing** D. Lee Fugal,2009   Storage and Retrieval Methods and Applications for Multimedia 2004 Rainer W. Lienhart,Chung-Sheng Li,2004 Proceedings of SPIE present the original research papers presented at SPIE conferences and other high quality conferences in the broad ranging fields of optics and photonics These books provide prompt access to the latest innovations in research and technology in their respective fields Proceedings of SPIE are among the most cited references in patent literature   **The Mathematical Gazette** ,2001   Journal of the American Statistical Association American Statistical Association,2000   High-speed Networks and Internets William Stallings,2002 William Stallings offers the most comprehensive technical book to address a wide range of design issues of high speed TCP IP and ATM networks in print to date High Speed Networks and Internets presents both the professional and advanced student an up to date survey of key issues The Companion Website and the author s Web page offer unmatched support for students and instructors The book features the prominent use of figures and tables and an up to date bibliography In this second edition this award winning and best selling author steps up to the leading edge of integrated coverage of key issues in the design of high speed TCP IP and ATM networks to include the following topics Unified coverage of integrated and differentiated services Up to date and comprehensive coverage of TCP performance Thorough coverage of next generation Internet protocols including RSVP MPLS RTP and the use of Ipv6 Unified treatment of congestion in data networks packet switching frame relay ATM networks and IP based internets Broad and detailed coverage of routing unicast and multicast Comprehensive coverage of ATM basic technology and the newest traffic control standards Solid easy to absorb mathematical background enabling understanding of the issues related to high speed network performance and design Up to date treatment of gigabit Ethernet The first treatment of self similar traffic for performance assessment in a textbook on networks Explains the mathematics behind self similar traffic and shows the performance implications and how to estimate performance parameters Up to date coverage of compression A comprehensive survey Coverage of gigabit networks Gigabit design issues permeate the book   *Journal of analysis and its application* ,2000   *Contour-guided Denoising of*

Radiological Dose Profiles Samuela J. Pollack,2005   UMAP Modules Paul J. Campbell,1999   UMAP Journal Modules, Tools for Teaching ,1999   **Electrochemical Impedance and Noise** Robert Cottis,Stephen Turgoose,1999   **Elements of Data Compression** Adam Drozdek,2002 Today s increased use of digital sound and video makes data compression crucial to computer technology because of its vast storage and transmission requirements The question in many applications is now not whether to compress data but what compression method should be applied Most data compression books have been written for professionals and require a strong background in data compression techniques as well as an understanding of algorithms based on sophisticated mathematical models This book is one of a handful of textbooks to present Data Compression for readers in an academic environment This is not a simple task since most of the widely used algorithms rely on sophisticated mathematical models ELEMENTS OF DATA COMPRESSION addresses the needs of readers who will use these techniques on a daily basis The author accomplishes this through the use of elementary level representative methods of text audio and video compression Drozdek presents these methods with pseudocode tables diagrams and many worked out examples all the while employing commonly used techniques that build upon the mathematics readers have been exposed to in earlier courses

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