Describes an appropriate mix of theory and applications to help readers understand the process and problems of image and signal analysis.

Maintaining a comprehensive and accessible treatment of the concepts, methods, and applications of signal and image data transformation, this Second Edition of Discrete Fourier Analysis and Wavelets: Applications to Signal and Image Processing features updated and revised coverage throughout with an emphasis on key and recent developments in the field of signal and image processing. Topical coverage includes: vector spaces, signals, and images; the discrete Fourier transform; the discrete cosine transform; convolution and filtering; windowing and localization; spectrograms; frames; filter banks; lifting schemes; and wavelets.

Discrete Fourier Analysis and Wavelets introduces a new chapter on frames—a new technology in which signals, images, and other data are redundantly measured. This redundancy allows for more sophisticated signal analysis. The new coverage also expands upon the discussion on spectrograms using a frames approach. In addition, the book includes a new chapter on lifting schemes for wavelets and provides a variation on the original low-pass/high-pass filter bank approach to the design and implementation of wavelets. These new chapters also include appropriate exercises and MATLAB® projects for further experimentation and practice.

- Features updated and revised content throughout, continues to emphasize discrete and digital methods, and utilizes MATLAB® to illustrate these concepts.
Contains two new chapters on frames and lifting schemes, which take into account crucial new advances in the field of signal and image processing

Expands the discussion on spectrograms using a frames approach, which is an ideal method for reconstructing signals after information has been lost or corrupted (packet erasure)

Maintains a comprehensive treatment of linear signal processing for audio and image signals with a well-balanced and accessible selection of topics that appeal to a diverse audience within mathematics and engineering

Focuses on the underlying mathematics, especially the concepts of finite-dimensional vector spaces and matrix methods, and provides a rigorous model for signals and images based on vector spaces and linear algebra methods

Supplemented with a companion website containing solution sets and software exploration support for MATLAB and SciPy (Scientific Python)

Thoroughly class-tested over the past fifteen years, Discrete Fourier Analysis and Wavelets: Applications to Signal and Image Processing is an appropriately self-contained book ideal for a one-semester course on the subject.

S. Allen Broughton, PhD, is Professor Emeritus of Mathematics at Rose-Hulman Institute of Technology. Dr. Broughton is a member of the American Mathematical Society (AMS) and the Society for the Industrial Applications of Mathematics (SIAM), and his research interests include the mathematics of image and signal processing, and wavelets.

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