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Nota di contenuto	Front Cover; A Wavelet Tour of Signal Processing; Copyright Page; Dedication Page; Table of Contents; Preface to the Sparse Edition; Notations; Chapter 1. Sparse Representations; 1.1 Computational Harmonic Analysis; 1.1.1 The Fourier Kingdom; 1.1.2 Wavelet Bases; 1.2 Approximation and Processing in Bases; 1.2.1 Sampling with Linear Approximations; 1.2.2 Sparse Nonlinear Approximations; 1.2.3 Compression; 1.2.4 Denoising; 1.3 Time-Frequency Dictionaries; 1.3.1 Heisenberg Uncertainty; 1.3.2 Windowed Fourier Transform; 1.3.3 Continuous Wavelet Transform; 1.3.4 Time-Frequency Orthonormal Bases 1.4 Sparsity in Redundant Dictionaries1.4.1 Frame Analysis and Synthesis; 1.4.2 Ideal Dictionary Approximations; 1.4.3 Pursuit in Dictionaries; 1.5 Inverse Problems; 1.5.1 Diagonal Inverse Estimation; 1.5.2 Super-resolution and Compressive Sensing; 1.6 Travel Guide; 1.6.1 Reproducible Computational Science; 1.6.2 Book Road Map; Chapter 2. The Fourier Kingdom; 2.1 Linear Time-Invariant Filtering;

2.1.1 Impulse Response; 2.1.2 Transfer Functions; 2.2 Fourier Integrals; 2.2.1 Fourier Transform in L1(R); 2.2.2 Fourier Transform in L2(R); 2.2.3 Examples; 2.3 Properties; 2.3.1 Regularity and Decay
2.3.2 Uncertainty Principle2.3.3 Total Variation; 2.4 Two-Dimensional Fourier Transform; 2.5 Exercises; Chapter 3. Discrete Revolution; 3.1 Sampling Analog Signals; 3.1.1 Shannon-Whittaker Sampling Theorem; 3.1.2 Aliasing; 3.1.3 General Sampling and Linear Analog Conversions; 3.2 Discrete Time-Invariant Filters; 3.2.1 Impulse Response and Transfer Function; 3.2.2 Fourier Series; 3.3 Finite Signals; 3.3.1 Circular Convolutions; 3.3.2 Discrete Fourier Transform; 3.3.3 Fast Fourier Transform; 3.3.4 Fast Convolutions; 3.4 Discrete Image Processing; 3.4.1 Two-Dimensional Sampling Theorems
3.4.2 Discrete Image Filtering3.4.3 Circular Convolutions and Fourier Basis; 3.5 Exercises; Chapter 4. Time Meets Frequency; 4.1 Time-Frequency Atoms; 4.2 Windowed Fourier Transform; 4.2.1 Completeness and Stability; 4.2.2 Choice of Window; 4.2.3 Discrete Windowed Fourier Transform; 4.3 Wavelet Transforms; 4.3.1 Real Wavelets; 4.3.2 Analytic Wavelets; 4.3.3 Discrete Wavelets; 4.4 Time-Frequency Geometry of Instantaneous Frequencies; 4.4.1 Analytic Instantaneous Frequency; 4.4.2 Windowed Fourier Ridges; 4.4.3 Wavelet Ridges; 4.5 Quadratic Time-Frequency Energy; 4.5.1 Wigner-Ville Distribution
4.5.2 Interferences and Positivity4.5.3 Cohen's Class; 4.5.4 Discrete Wigner-Ville Computations; 4.6 Exercises; Chapter 5. Frames; 5.1 Frames and Riesz Bases; 5.1.1 Stable Analysis and Synthesis Operators; 5.1.2 Dual Frame and Pseudo Inverse; 5.1.3 Dual-Frame Analysis and Synthesis Computations; 5.1.4 Frame Projector and Reproducing Kernel; 5.1.5 Translation-Invariant Frames; 5.2 Translation-Invariant Dyadic Wavelet Transform; 5.2.1 Dyadic Wavelet Design; 5.2.2 Algorithme a Trous; 5.3 Subsampled Wavelet Frames; 5.4 Windowed Fourier Frames; 5.4.1 Tight Frames; 5.4.2 General Frames
5.5 Multiscale Directional Frames For Images

Sommario/riassunto

Mallat's book is the undisputed reference in this field - it is the only one that covers the essential material in such breadth and depth. - Laurent Demanet, Stanford UniversityThe new edition of this classic book gives all the major concepts, techniques and applications of sparse representation, reflecting the key role the subject plays in today's signal processing. The book clearly presents the standard representations with Fourier, wavelet and time-frequency transforms, and the construction of orthogonal bases with fast algorithms. The central concept of sparsity is explaine