1. Record Nr. UNINA9910299467403321

Autore	Averbuch Amir Z
Titolo	Spline and Spline Wavelet Methods with Applications to Signal and Image Processing : Volume I: Periodic Splines / / by Amir Z. Averbuch, Pekka Neittaanmaki, Valery A. Zheludev
Pubbl/distr/stampa	Dordrecht : , : Springer Netherlands : , : Imprint : Springer, , 2014
ISBN	94-017-8926-6
Edizione	[1st ed. 2014.]
Descrizione fisica	1 online resource (514 p.)
Disciplina	621.3670151142
Soggetti	Signal processing Image processing Speech processing systems Optical data processing Computer science - Mathematics Signal, Image and Speech Processing Computer Imaging, Vision, Pattern Recognition and Graphics Computational Mathematics and Numerical Analysis
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	1 Introduction: Signals and transforms -- 2 Introduction: Periodic filters and filter banks -- 3 Mixed circular convolutions and Zak transforms -- 4 Periodic polynomial splines -- 5 Polynomial smoothing splines -- 6 Calculation of splines values by subdivision -- 7 Spline algorithms for deconvolution and inversion of heat equation -- 8 Periodic spline wavelets and wavelet packets -- 9 Discrete-time periodic wavelet packets -- 10 Deconvolution by regularized matching pursuit -- 11 Block-based inversion of the heat equations -- 12 Hydro-acoustic target detection -- 13 Periodic discrete splines -- 14 Discrete periodic spline wavelets and wavelet Packets -- 15 Biorthogonal wavelet transforms -- 16 Biorthogonal wavelet transforms originating from splines -- 17 Wavelet frames generated by spline based p-filter banks -- 18 Application of periodic frames to image restoration -- Appendix: Guide to SplineSoftP -- Glossary -- Index.

Sommario/riassunto

This volume provides universal methodologies accompanied by Matlab software to manipulate numerous signal and image processing applications. It is done with discrete and polynomial periodic splines. Various contributions of splines to signal and image processing from a unified perspective are presented. This presentation is based on Zak transform and on Spline Harmonic Analysis (SHA) methodology. SHA combines approximation capabilities of splines with the computational efficiency of the Fast Fourier transform. SHA reduces the design of different spline types such as splines, spline wavelets (SW), wavelet frames (SWF) and wavelet packets (SWP) and their manipulations by simple operations. Digital filters, produced by wavelets design process, give birth to subdivision schemes. Subdivision schemes enable to perform fast explicit computation of splines' values at dyadic and triadic rational points. This is used for signals and images upsampling. In addition to the design of a diverse library of splines, SW, SWP and SWF, this book describes their applications to practical problems. The applications include upsampling, image denoising, recovery from blurred images, hydro-acoustic target detection, to name a few. The SWF are utilized for image restoration that were degraded by noise, blurring and loss of significant number of pixels. The book is accompanied by a Matlab based software that demonstrates and implements all the presented algorithms. The book combines extensive theoretical exposure with detailed description of algorithms, applications and software. The Matlab software can be downloaded from http://extras.springer.com.