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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Optimization in Signal and Image Processing; Table of Contents; Introduction; Chapter 1. Modeling and Optimization in Image Analysis; 1.1. Modeling at the source of image analysis and synthesis; 1.2. From image synthesis to analysis; 1.3. Scene geometric modeling and image synthesis; 1.4. Direct model inversion and the Hough transform; 1.4.1. The deterministic Hough transform; 1.4.2. Stochastic exploration of parameters: evolutionary Hough; 1.4.3. Examples of generalization; 1.5. Optimization and physical modeling; 1.5.1. Photometric modeling; 1.5.2. Motion modeling; 1.6. Conclusion 1.7. Acknowledgements1.8. Bibliography; Chapter 2. Artificial Evolution and the Parisian Approach. Applications in the Processing of Signals and Images; 2.1. Introduction; 2.2. The Parisian approach for evolutionary algorithms; 2.3. Applying the Parisian approach to inverse IFS problems; 2.3.1. Choosing individuals for the evaluation process; 2.3.2. Retribution of individuals; 2.4. Results obtained on the inverse problems of IFS; 2.5. Conclusion on the usage of the Parisian approach for inverse IFS problems; 2.6. Collective representation: the Parisian approach and the Fly algorithm 2.6.1. The principles2.6.2. Results on real images; 2.6.3. Application to robotics: fly-based robot planning; 2.6.4. Sensor fusion; 2.6.5. Artificial evolution and real time; 2.6.6. Conclusion about the fly algorithm; 2.7. Conclusion; 2.8. Acknowledgements; 2.9. Bibliography; Chapter 3. Wavelets and Fractals for Signal and Image Analysis; 3.1. Introduction; 3.2. Some general points on fractals; 3.2.1. Fractals and paradox; 3.2.2. Fractal sets and self-similarity; 3.2.3. Fractal dimension; 3.3. Multifractal analysis of signals; 3.3.1. Regularity; 3.3.2. Multifractal spectrum 3.4. Distribution of singularities based on wavelets3.4.1. Qualitative approach; 3.4.2. A rough guide to the world of wavelet; 3.4.3. Wavelet Transform Modulus Maxima (WTMM) method; 3.4.4. Spectrum of singularities and wavelets; 3.4.5. WTMM and some didactic signals; 3.5. Experiments; 3.5.1. Fractal analysis of structures in images: applications in microbiology; 3.5.2. Using WTMM for the classification of textures - application in the field of medical imagery; 3.6. Conclusion; 3.7. Bibliography; Chapter 4. Information Criteria: Examples of Applications in Signal and Image Processing 4.1. Introduction and context4.2. Overview of the different criteria; 4.3. The case of auto-regressive (AR) models; 4.3.1. Origin, written form and performance of different criteria on simulated examples; 4.3.2. AR and the segmentation of images: a first approach; 4.3.3. Extension to 2D AR and application to the modeling of textures; 4.3.4. AR and the segmentation of images: second approach using 2D AR; 4.4. Applying the process to unsupervised clustering; 4.5. Law approximation with the help of histograms; 4.5.1. Theoretical aspects; 4.5.2. Two applications used for encoding images 4.6. Other applications
Sommario/riassunto	This book describes the optimization methods most commonly encountered in signal and image processing: artificial evolution and Parisian approach; wavelets and fractals; information criteria; training and quadratic programming; Bayesian formalism; probabilistic modeling; Markovian approach; hidden Markov models; and metaheuristics (genetic algorithms, ant colony algorithms, cross-entropy, particle swarm optimization, estimation of distribution algorithms, and artificial immune systems).