

1. Record Nr.	UNINA9910255017803321
Autore	Abidi Mongi A
Titolo	Optimization Techniques in Computer Vision : Ill-Posed Problems and Regularization / / by Mongi A. Abidi, Andrei V. Gribok, Joonki Paik
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2016
ISBN	3-319-46364-0
Edizione	[1st ed. 2016.]
Descrizione fisica	1 online resource (XV, 293 p. 127 illus., 23 illus. in color.)
Collana	Advances in Computer Vision and Pattern Recognition, , 2191-6586
Disciplina	006.6 006.37
Soggetti	Optical data processing Signal processing Image processing Speech processing systems Algorithms Computer science—Mathematics Computer science - Mathematics Image Processing and Computer Vision Signal, Image and Speech Processing Algorithm Analysis and Problem Complexity Mathematical Applications in Computer Science
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	III-Posed Problems in Imaging and Computer Vision -- Selection of the Regularization Parameter -- Introduction to Optimization -- Unconstrained Optimization -- Constrained Optimization -- Frequency-Domain Implementation of Regularization -- Iterative Methods -- Regularized Image Interpolation Based on Data Fusion -- Enhancement of Compressed Video -- Volumetric Description of Three-Dimensional Objects for Object Recognition -- Regularized 3D Image Smoothing -- Multi-Modal Scene Reconstruction Using Genetic Algorithm-Based Optimization -- Appendix A: Matrix-Vector Representation for Signal Transformation -- Appendix B: Discrete

Sommario/riassunto

This book presents practical optimization techniques used in image processing and computer vision problems. Ill-posed problems are introduced and used as examples to show how each type of problem is related to typical image processing and computer vision problems. Unconstrained optimization gives the best solution based on numerical minimization of a single, scalar-valued objective function or cost function. Unconstrained optimization problems have been intensively studied, and many algorithms and tools have been developed to solve them. Most practical optimization problems, however, arise with a set of constraints. Typical examples of constraints include: (i) pre-specified pixel intensity range, (ii) smoothness or correlation with neighboring information, (iii) existence on a certain contour of lines or curves, and (iv) given statistical or spectral characteristics of the solution. Regularized optimization is a special method used to solve a class of constrained optimization problems. The term regularization refers to the transformation of an objective function with constraints into a different objective function, automatically reflecting constraints in the unconstrained minimization process. Because of its simplicity and efficiency, regularized optimization has many application areas, such as image restoration, image reconstruction, optical flow estimation, etc. Optimization plays a major role in a wide variety of theories for image processing and computer vision. Various optimization techniques are used at different levels for these problems, and this volume summarizes and explains these techniques as applied to image processing and computer vision.