1. Record Nr. UNISA996466380403316

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Titolo	A Theory of Shape Identification [[electronic resource] /] / by Frédéric Cao, José-Luis Lisani, Jean-Michel Morel, Pablo Musé, Frédéric Sur
Pubbl/distr/stampa	Berlin, Heidelberg : , : Springer Berlin Heidelberg : , : Imprint : Springer, , 2008
ISBN	3-540-68481-6
Edizione	[1st ed. 2008.]
Descrizione fisica	1 online resource (XII, 264 p. 171 illus., 12 illus. in color.)
Collana	Lecture Notes in Mathematics, , 0075-8434 ; ; 1948
Disciplina	595.789
Soggetti	Geometry Mathematics Visualization Optical data processing Artificial intelligence Game theory Image Processing and Computer Vision Artificial Intelligence Computer Imaging, Vision, Pattern Recognition and Graphics Game Theory, Economics, Social and Behav. Sciences
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Extracting Image boundaries -- Extracting Meaningful Curves from Images -- Level Line Invariant Descriptors -- Robust Shape Directions -- Invariant Level Line Encoding -- Recognizing Level Lines -- A Contrario Decision: the LLD Method -- Meaningful Matches: Experiments on LLD and MSER -- Grouping Shape Elements -- Hierarchical Clustering and Validity Assessment -- Grouping Spatially Coherent Meaningful Matches -- Experimental Results -- The SIFT Method -- The SIFT Method -- Securing SIFT with A Contrario Techniques.
Sommario/riassunto	Recent years have seen dramatic progress in shape recognition algorithms applied to ever-growing image databases. They have been applied to image stitching, stereo vision, image mosaics, solid object

recognition and video or web image retrieval. More fundamentally, the ability of humans and animals to detect and recognize shapes is one of the enigmas of perception. The book describes a complete method that starts from a query image and an image database and yields a list of the images in the database containing shapes present in the query image. A false alarm number is associated to each detection. Many experiments will show that familiar simple shapes or images can reliably be identified with false alarm numbers ranging from 10-5 to less than 10-300. Technically speaking, there are two main issues. The first is extracting invariant shape descriptors from digital images. The second is deciding whether two shape descriptors are identifiable as the same shape or not. A perceptual principle, the Helmholtz principle, is the cornerstone of this decision. These decisions rely on elementary stochastic geometry and compute a false alarm number. The lower this number, the more secure the identification. The description of the processes, the many experiments on digital images and the simple proofs of mathematical correctness are interlaced so as to make a reading accessible to various audiences, such as students, engineers, and researchers.