1. Record Nr. UNINA9910816990103321

Autore	Flusser Jan
Titolo	Moments and moment invariants in pattern recognition / / Jan Flusser, Tomas Suk, Barbara Zitov
Pubbl/distr/stampa	Chichester, West Sussex, U.K. ; ; Hoboken, N.J., : J. Wiley, 2009
ISBN	1-282-38033-8 9786612380334 0-470-68475-5 0-470-68476-3
Edizione	[1st ed.]
Descrizione fisica	1 online resource (314 p.)
Altri autori (Persone)	SukTomas ZitovaBarbara
Disciplina	515/.42
Soggetti	Optical pattern recognition - Mathematics Moment problems (Mathematics) Invariants
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 and index.
Nota di contenuto	Contents; Authors' biographies; Preface; Acknowledgments; 1 Introduction to moments; 1.1 Motivation; 1.2 What are invariants?; 1.2.1 Categories of invariant; 1.3 What are moments?; 1.3.1 Geometric and complex moments; 1.3.2 Orthogonal moments; 1.4 Outline of the book; References; 2 Moment invariants to translation, rotation and scaling; 2.1 Introduction; 2.1.1 Invariants to translation; 2.1.2 Invariants to uniform scaling; 2.1.3 Traditional invariants to rotation; 2.2 Rotation invariants from complex moments; 2.2.1 Construction of rotation invariants; 2.2.2 Construction of the basis 2.2.3 Basis of invariants of the second and third orders2.2.4 Relationship to the Hu invariants; 2.3 Pseudoinvariants; 2.4 Combined invariants to TRS and contrast changes; 2.5 Rotation invariants for recognition of symmetric objects; 2.5.1 Logo recognition; 2.5.2 Recognition of simple shapes; 2.5.3 Experiment with a baby toy; 2.6 Rotation invariants via image normalization; 2.7 Invariants to nonuniform scaling; 2.8 TRS invariants in 3D; 2.9 Conclusion; References; 3 Affine moment invariants; 3.1 Introduction; 3.1.1

Projective imaging of a 3D world; 3.1.2 Projective moment invariants
3.1.3 Affine transformation3.1.4 AMIs; 3.2 AMIs derived from the Fundamental theorem; 3.3 AMIs generated by graphs; 3.3.1 The basic concept; 3.3.2 Representing the invariants by graphs; 3.3.3 Independence of the AMIs; 3.3.4 The AMIs and tensors; 3.3.5 Robustness of the AMIs; 3.4 AMIs via image normalization; 3.4.1 Decomposition of the affine transform; 3.4.2 Violation of stability; 3.4.3 Relation between the normalized moments and the AMIs; 3.4.4 Affine invariants via half normalization; 3.4.5 Affine invariants from complex moments; 3.5 Derivation of the AMIs from the Cayley-Aronhold equation
3.5.1 Manual solution3.5.2 Automatic solution; 3.6 Numerical experiments; 3.6.1 Digit recognition; 3.6.2 Recognition of symmetric patterns; 3.6.3 The children's mosaic; 3.7 Affine invariants of color images; 3.8 Generalization to three dimensions; 3.8.1 Method of geometric primitives; 3.8.2 Normalized moments in 3D; 3.8.3 Half normalization in 3D; 3.8.4 Direct solution of the Cayley-Aronhold equation; 3.9 Conclusion; Appendix; References; 4 Implicit invariants to elastic transformations; 4.1 Introduction; 4.2 General moments under a polynomial transform; 4.3 Explicit and implicit invariants
4.4 Implicit invariants as a minimization task4.5 Numerical experiments; 4.5.1 Invariance and robustness test; 4.5.2 ALOI classification experiment; 4.5.3 Character recognition on a bottle; 4.6 Conclusion; References; 5 Invariants to convolution; 5.1 Introduction; 5.2 Blur invariants for centrosymmetric PSFs; 5.2.1 Template matching experiment; 5.2.2 Invariants to linear motion blur; 5.2.3 Extension to n dimensions; 5.2.4 Possible applications and limitations; 5.3 Blur invariants for N-fold symmetric PSFs; 5.3.1 Blur invariants for circularly symmetric PSFs
5.3.2 Blur invariants for Gaussian PSFs

Sommario/riassunto

Moments as projections of an image's intensity onto a proper polynomial basis can be applied to many different aspects of image processing. These include invariant pattern recognition, image normalization, image registration, focus/ defocus measurement, and watermarking. This book presents a survey of both recent and traditional image analysis and pattern recognition methods, based on image moments, and offers new concepts of invariants to linear filtering and implicit invariants. In addition to the theory, attention is paid to efficient algorithms for moment computation in a discrete domain,