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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 transformation 3.1.4 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 solution 3.5.2 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
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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,
