Record Nr.	UNINA9910825787703321
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Titolo	Mathematics of shape description [[electronic resource]] : a morphological approach to image processing and computer graphics / / Pijush K. Ghosh, Koichiro Deguchi
Pubbl/distr/stampa	Singapore ; ; Hoboken, NJ, : Wiley, c2008
ISBN	1-282-03141-4 9786612031410 0-470-82309-7 0-470-82308-9
Descrizione fisica	1 online resource (272 p.)
Altri autori (Persone)	DeguchiKoichiro
Disciplina	516.3/5
Soggetti	Geometry, Algebraic Minkowski geometry Image processing - Mathematical models
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 (p. [247]-250) and index.
Nota di contenuto	MATHEMATICS OF SHAPE DESCRIPTION; Contents; Foreword; Preface; 1 In Search of a Framework for Shape Description; 1.1 Shape Description: What It Means to Us; 1.2 Pure versus Pragmatic Approaches; 1.3 The In. uence of the Digital Computer on Our Approach to Shape Description; 1.4 A Metamodel for Shape Description; 1.4.1 A Mathematical Model for Shape Description and Associated Problems; 1.4.2 The Need for a Metamodel; 1.4.3 Reformulating the Metamodel to Adapt to the Pragmatic Approach; 1.5 The Metamodel within the Framework of Formal Language 1.5.1 An Introduction to Formal Languages and Grammars1.5.2 A Grammar for the Constructive Part of the Metamodel; 1.5.3 An Exploration of Shape Description Schemes in Terms of Formal Language Theory; 1.6 The Art of Model Making; 1.6.1 What is the Meaning of "Model"?; 1.6.2 A Few Guiding Principles; 1.7 Shape Description Schematics and the Tools of Mathematics; 1.7.1 Underlying Assumptions when Mapping from the Real World to a Mathematical System; 1.7.2 Fundamental Mathematical Structures and Their Various

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	Compositions; 2 Sets and Functions for Shape Description; 2.1 Basic Concepts of Sets 2.1.1 De.nition of Sets2.1.2 Membership; 2.1.3 Speci.cations for a Set to Describe Shapes; 2.1.4 Special Sets; 2.2 Equality and Inclusion of Sets; 2.3 Some Operations on Sets; 2.3.1 The Power Set; 2.3.2 Set Union; 2.3.3 Set Intersection; 2.3.4 Set Difference; 2.3.5 Set Complement; 2.3.6 Symmetric Difference; 2.3.7 Venn Diagrams; 2.3.8 Cartesian Products; 2.4 Relations in Sets; 2.4.1 Fundamental Concepts; 2.4.2 The Properties of Binary Relations in a Set; 2.4.3 Equivalence Relations and Partitions; 2.4.4 Order Relations; 2.5 Functions, Mappings, and Operations; 2.5.1 Fundamental Concepts 2.5.2 The Graphical Representations of a Function2.5.3 The Range of a Function, and Various Categories of Function; 2.5.4 Composition of Functions; 2.5.5 The Inverse Function; 2.5.6 The One-to-One Onto Functions; 2.5.8 Functions of Many Variables, n-ary Operations; 2.5.9 A Special Type of Function: The Analytic Function; 3 Algebraic Structures for Shape Description; 3.1 What is an Algebraic Structure?; 3.1.1 Algebraic Systems with Internal Composition Laws; 3.1.2 Algebraic Systems with External Composition Laws 3.2 Properties of Algebraic Systems3.2.1 Associativity; 3.2.2 Commutativity; 3.2.3 Distributivity; 3.2.4 The Existence of the Identity/Unit Element; 3.2.5 The Existence of an Inverse Element; 3.3 Morphisms of Algebraic Systems; 3.4 Semigroups and Monoids: Two Simple Algebraic Systems; 3.5 Groups; 3.5.1 Fundamentals; 3.5.2 The Advantages of Identifying a System as a Group; 3.6.3 Transformation Groups; 3.6 Symmetry Groups; 3.6.1 The Action of a Group on a Set; 3.6.2 Translations and the Euclidean Group; 3.6.3 The Matrix Group; 3.7 Proper Rotations of Regular Solids
Sommario/riassunto	Image processing problems are often not well defined because real images are contaminated with noise and other uncertain factors. In Mathematics of Shape Description, the authors take a mathematical approach to address these problems using the morphological and set- theoretic approach to image processing and computer graphics by presenting a simple shape model using two basic shape operators called Minkowski addition and decomposition. This book is ideal for professional researchers and engineers in Information Processing, Image Measurement, Shape Description, Shape Representation and