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Nota di contenuto	OBJECT DETECTION AND RECOGNITION IN DIGITAL IMAGES; Contents; Preface; Acknowledgements; Notations and Abbreviations; 1 Introduction; 1.1 A Sample of Computer Vision; 1.2 Overview of Book Contents; References; 2 Tensor Methods in Computer Vision; 2.1 Abstract; 2.2 Tensor - A Mathematical Object; 2.2.1 Main Properties of Linear Spaces; 2.2.2 Concept of a Tensor; 2.3 Tensor - A Data Object; 2.4 Basic Properties of Tensors; 2.4.1 Notation of Tensor Indices and Components; 2.4.2 Tensor Products; 2.5 Tensor Distance Measures; 2.5.1 Overview of Tensor Distances 2.5.1.1 Computation of Matrix Exponent and Logarithm Functions 2.5.2 Euclidean Image Distance and Standardizing Transform; 2.6 Filtering of Tensor Fields; 2.6.1 Order Statistic Filtering of Tensor Data; 2.6.2 Anisotropic Diffusion Filtering; 2.6.3 IMPLEMENTATION of Diffusion Processes; 2.7 Looking into Images with the Structural Tensor; 2.7.1 Structural Tensor in Two-Dimensional Image Space; 2.7.2 Spatio-Temporal Structural Tensor; 2.7.3 Multichannel and Scale-Space

Structural Tensor; 2.7.4 Extended Structural Tensor; 2.7.4.1 IMPLEMENTATION of the Linear and Nonlinear Structural Tensor 2.8 Object Representation with Tensor of Inertia and Moments 2.8.1 IMPLEMENTATION of Moments and their Invariants; 2.9 Eigendecomposition and Representation of Tensors; 2.10 Tensor Invariants; 2.11 Geometry of Multiple Views: The Multifocal Tensor; 2.12 Multilinear Tensor Methods; 2.12.1 Basic Concepts of Multilinear Algebra; 2.12.1.1 Tensor Flattening; 2.12.1.2 IMPLEMENTATION Tensor Representation; 2.12.1.3 The k-mode Product of a Tensor and a Matrix; 2.12.1.4 Ranks of a Tensor; 2.12.1.5 IMPLEMENTATION of Basic Operations on Tensors; 2.12.2 Higher-Order Singular Value Decomposition (HOSVD) 2.12.3 Computation of the HOSVD 2.12.3.1 Implementation of the HOSVD Decomposition; 2.12.4 HOSVD Induced Bases; 2.12.5 Tensor Best Rank-1 Approximation; 2.12.6 Rank-1 Decomposition of Tensors; 2.12.7 Best Rank-(R1, R2, . . . , RP) Approximation; 2.12.8 Computation of the Best Rank-(R1, R2, . . . , RP) Approximations; 2.12.8.1 IMPLEMENTATION - Rank Tensor Decompositions; 2.12.8.2 CASE STUDY - Data Dimensionality Reduction; 2.12.9 Subspace Data Representation; 2.12.10 Nonnegative Matrix Factorization; 2.12.11 Computation of the Nonnegative Matrix Factorization 2.12.12 Image Representation with NMF 2.12.13 Implementation of the Nonnegative Matrix Factorization; 2.12.14 Nonnegative Tensor Factorization; 2.12.15 Multilinear Methods of Object Recognition; 2.13 Closure; 2.13.1 Chapter Summary; 2.13.2 Further Reading; 2.13.3 Problems and Exercises; References; 3 Classification Methods and Algorithms; 3.1 Abstract; 3.2 Classification Framework; 3.2.1 IMPLEMENTATION Computer Representation of Features; 3.3 Subspace Methods for Object Recognition; 3.3.1 Principal Component Analysis; 3.3.1.1 Computation of the PCA 3.3.1.2 PCA for Multi-Channel Image Processing

Sommario/riassunto

Object detection, tracking and recognition in images are key problems in computer vision. This book provides the reader with a balanced treatment between the theory and practice of selected methods in these areas to make the book accessible to a range of researchers, engineers, developers and postgraduate students working in computer vision and related fields. Key features: Explains the main theoretical ideas behind each method (which are augmented with a rigorous mathematical derivation of the formulas), their implementation (in C++) and demonstrated working in real applications.
