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Nota di contenuto	Color in Computer Vision; Contents; Preface; 1 Introduction; 1.1 From Fundamental to Applied; 1.2 Part I: Color Fundamentals; 1.3 Part II: Photometric Invariance; 1.3.1 Invariance Based on Physical Properties; 1.3.2 Invariance By Machine Learning; 1.4 Part III: Color Constancy; 1.5 Part IV: Color Feature Extraction; 1.5.1 From Luminance to Color; 1.5.2 Features, Descriptors, and Saliency; 1.5.3 Segmentation; 1.6 Part V: Applications; 1.6.1 Retrieval and Visual Exploration; 1.6.2 Color Naming; 1.6.3 Multispectral Applications; 1.7 Summary; PART I Color Fundamentals; 2 Color Vision 2.1 Introduction2.2 Stages of Color Information Processing; 2.2.1 Eye and Optics; 2.2.2 Retina: Rods and Cones; 2.2.3 Ganglion Cells and Receptive Fields; 2.2.4 LGN and Visual Cortex; 2.3 Chromatic Properties

of the Visual System; 2.3.1 Chromatic Adaptation; 2.3.2 Human Color Constancy; 2.3.3 Spatial Interactions; 2.3.4 Chromatic Discrimination and Color Deficiency; 2.4 Summary; 3 Color Image Formation; 3.1 Lambertian Reflection Model; 3.2 Dichromatic Reflection Model; 3.3 Kubelka-Munk Model; 3.4 The Diagonal Model; 3.5 Color Spaces; 3.5.1 XYZ System; 3.5.2 RGB System; 3.5.3 Opponent Color Spaces; 3.5.4 Perceptually Uniform Color Spaces; 3.5.5 Intuitive Color Spaces; 3.6 Summary; PART II Photometric Invariance; 4 Pixel-Based Photometric Invariance; 4.1 Normalized Color Spaces; 4.2 Opponent Color Spaces; 4.3 The HSV Color Space; 4.4 Composed Color Spaces; 4.4.1 Body Reflectance Invariance; 4.4.2 Body and Surface Reflectance Invariance; 4.5 Noise Stability and Histogram Construction; 4.5.1 Noise Propagation; 4.5.2 Examples of Noise Propagation through Transformed Colors; 4.5.3 Histogram Construction by Variable Kernel Density Estimation; 4.6 Application: Color-Based Object Recognition; 4.6.1 Dataset and Performance Measure; 4.6.2 Robustness Against Noise: Simulated Data; 4.7 Summary; 5 Photometric Invariance from Color Ratios; 5.1 Illuminant Invariant Color Ratios; 5.2 Illuminant Invariant Edge Detection; 5.3 Blur-Robust and Color Constant Image Description; 5.4 Application: Image Retrieval Based on Color Ratios; 5.4.1 Robustness to Illuminant Color; 5.4.2 Robustness to Gaussian Blur; 5.4.3 Robustness to Real-World Blurring Effects; 5.5 Summary; 6 Derivative-Based Photometric Invariance; 6.1 Full Photometric Invariants; 6.1.1 The Gaussian Color Model; 6.1.2 The Gaussian Color Model by an RGB Camera; 6.1.3 Derivatives in the Gaussian Color Model; 6.1.4 Differential Invariants for the Lambertian Reflection Model; 6.1.5 Differential Invariants for the Dichromatic Reflection Model; 6.1.6 Summary of Full Color Invariants; 6.1.7 Geometrical Color Invariants in Two Dimensions; 6.2 Quasi-Invariants; 6.2.1 Edges in the Dichromatic Reflection Model; 6.2.2 Photometric Variants and Quasi-Invariants; 6.2.3 Relations of Quasi-Invariants with Full Invariants; 6.2.4 Localization and Discriminative Power of Full and Quasi-Invariants

Sommario/riassunto

While the field of computer vision drives many of today's digital technologies and communication networks, the topic of color has emerged only recently in most computer vision applications. One of the most extensive works to date on color in computer vision, this book provides a complete set of tools for working with color in the field of image understanding. Based on the authors' intense collaboration for more than a decade and drawing on the latest thinking in the field of computer science, the book integrates topics from color science and computer vision, clearly linking theories,