

1. Record Nr.	UNINA9910829911503321
Titolo	Optical and digital image processing [[electronic resource]] : fundamentals and applications // edited by Gabriel Cristobal, Peter Schelkens, and Hugo Thienpont
Pubbl/distr/stampa	Weinheim [Germany], : Wiley-VCH, 2011
ISBN	1-283-28325-5 9786613283252 3-527-63526-2 3-527-63524-6
Descrizione fisica	1 online resource (990 p.)
Altri autori (Persone)	CristobalGabriel SchelkensPeter ThienpontHugo
Disciplina	621.367
Soggetti	Optical data processing Image processing - Digital techniques
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	Optical and Digital Image Processing; Contents; Preface; List of Contributors; Color Plates; 1 Fundamentals of Optics; 1.1 Introduction; 1.2 The Electromagnetic Spectrum; 1.3 Geometrical Optics; 1.3.1 Ray Transfer Matrix; 1.3.2 Two-Lens Imaging System; 1.3.3 Aberrations; 1.4 Maxwell's Equations and the Wave Equation; 1.5 Wave Optics and Diffraction; 1.6 Fourier Optics and Applications; 1.6.1 Ideal Thin Lens as Optical Fourier Transformer; 1.6.2 Imaging and Optical Image Processing; 1.6.3 Optical Correlator; 1.7 The Human Visual System; 1.8 Conclusion; References; 2 Fundamentals of Photonics 2.1 Introduction2.2 Interference and Diffraction; 2.2.1 Interference; 2.2.2 Diffraction; 2.2.2.1 Diffraction at a One-Dimensional Slit; 2.2.2.2 Diffraction at a Circular Aperture; 2.2.3 Resolution; 2.2.3.1 Angular Resolution; 2.2.3.2 Spatial Resolution; 2.2.4 Coherence; 2.2.4.1 Temporal or Longitudinal Coherence; 2.2.4.2 Transverse or Spatial Coherence; 2.3 Terms and Units: The Measurement of Light; 2.3.1 Introduction: Radiometry versus Photometry; 2.3.2 Radiometric Terms

and Units; 2.3.2.1 Radiant Energy; 2.3.2.2 Radiant Flux; 2.3.2.3 Radiant Flux Density; 2.3.2.4 Radiant Intensity; 2.3.2.5 Radiance; 2.3.2.6 Radiant Exposure; 2.3.3 Photometric Terms; 2.3.3.1 Spectral Terms; 2.3.3.2 Spectral Sensitivity of the Eye; 2.3.3.3 Luminous Terms; 2.3.4 Photometric Units; 2.3.4.1 Other Visual Terms and Units; 2.4 Color; 2.4.1 Introduction; 2.4.2 The Spectrum of Light; 2.4.3 Tristimulus Theory; 2.4.3.1 The Tristimulus; 2.4.3.2 The 1931 CIE Standard; 2.4.3.3 CIE 1976 UCS Diagram; 2.4.4 Theory of the Opponent Colors; 2.4.4.1 Describing the Visual Observations; 2.4.4.2 Saturation or Chroma; 2.4.4.3 Hue; 2.4.4.4 The CIELAB Diagram; 2.5 Basic Laser Physics; 2.5.1 Introduction; 2.5.2 Normal or Spontaneous Emission of Light; 2.5.3 Absorption; 2.5.4 Stimulated Emission of Light; 2.5.5 Amplification; 2.5.6 Basic Setup; 2.6 Basic Properties of Laser Light; 2.6.1 Laser Light Has One Direction; 2.6.2 Laser Light Is Monochromatic; 2.6.3 Laser Light Is Coherent; 2.6.4 Laser Light Is Intense; 2.7 Conclusions; References; 3 Basics of Information Theory; 3.1 Introduction; 3.2 Probability; 3.2.1 Several Events; 3.2.2 Conditional Probabilities: Independent and Dependent Events; 3.2.3 Random Variable; 3.2.4 Distribution Function; 3.2.5 Discrete Distribution; 3.2.6 Continuous Distribution; 3.2.7 Expected Value; 3.3 Entropy and Mutual Information; 3.3.1 Historical Notes; 3.3.2 Entropy; 3.3.2.1 Some Properties of Entropy; 3.3.3 Joint Entropy; 3.3.4 Mutual Information; 3.3.5 Kullback-Leibler Divergence; 3.3.6 Other Types of Entropies; 3.4 Information Channel; 3.4.1 Discrete Channel; 3.4.2 Channel Capacity; 3.4.3 Symmetric Channel; 3.4.4 Binary Symmetric Channel; 3.4.5 Gaussian Channel; 3.5 Conclusion; Appendix 3.A: Application of Mutual Information; References; 4 Fundamentals of Image Processing; 4.1 Introduction; 4.2 Digital Image Representation; 4.2.1 Topological and Metric Properties of Images

Sommario/riassunto

In recent years, Moore's law has fostered the steady growth of the field of digital image processing, though the computational complexity remains a problem for most of the digital image processing applications. In parallel, the research domain of optical image processing has matured, potentially bypassing the problems digital approaches were suffering and bringing new applications. The advancement of technology calls for applications and knowledge at the intersection of both areas but there is a clear knowledge gap between the digital signal processing and the optical processing communities. T