

1. Record Nr.	UNINA9910959060003321
Titolo	Microscope image processing // [edited by] Qiang Wu, Fatima A. Merchant, Kenneth R. Castleman
Pubbl/distr/stampa	Amsterdam ; ; Boston, : Elsevier/Academic Press, c2008
ISBN	1-281-27935-8 9786611279356 0-08-055854-2
Edizione	[1st edition]
Descrizione fisica	1 online resource (585 p.)
Altri autori (Persone)	WuQiang <1958-> MerchantFatima A <1967-> (Fatima Aziz) CastlemanKenneth R
Disciplina	502.82
Soggetti	Microscopy Microscopes
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	Front Cover; Microscope Image Processing; Copyright Page; Contents; Foreword; Reference; Preface; Acknowledgments; Chapter 1: Introduction; 1.1 The Microscope and Image Processing; 1.2 Scope of This Book; 1.3 Our Approach; 1.3.1 The Four Types of Images; 1.3.1.1 Optical Image; 1.3.1.2 Continuous Image; 1.3.1.3 Digital Image; 1.3.1.4 Displayed Image; 1.3.2 The Result; 1.3.2.1 Analytic Functions; 1.3.3 The Sampling Theorem; 1.4 The Challenge; 1.5 Nomenclature; 1.6 Summary of Important Points; References; Chapter 2: Fundamentals of Microscopy; 2.1 Origins of the Microscope; 2.2 Optical Imaging 2.2.1 Image Formation by a Lens2.2.1.1 Imaging a Point Source; 2.2.1.2 Focal Length; 2.2.1.3 Numerical Aperture; 2.2.1.4 Lens Shape; 2.3 Diffraction-Limited Optical Systems; 2.3.1 Linear System Analysis; 2.4 Incoherent Illumination; 2.4.1 The Point Spread Function; 2.4.2 The Optical Transfer Function; 2.5 Coherent Illumination; 2.5.1 The Coherent Point Spread Function; 2.5.2 The Coherent Optical Transfer Function; 2.6 Resolution; 2.6.1 Abbe Distance; 2.6.2 Rayleigh Distance; 2.6.3 Size Calculations; 2.7 Aberration; 2.8 Calibration; 2.8.1 Spatial Calibration; 2.8.2 Photometric Calibration

2.9 Summary of Important PointsReferences; Chapter 3: Image Digitization; 3.1 Introduction; 3.2 Resolution; 3.3 Sampling; 3.3.1 Interpolation; 3.3.2 Aliasing; 3.4 Noise; 3.5 Shading; 3.6 Photometry; 3.7 Geometric Distortion; 3.8 Complete System Design; 3.8.1 Cumulative Resolution; 3.8.2 Design Rules of Thumb; 3.8.2.1 Pixel Spacing; 3.8.2.2 Resolution; 3.8.2.3 Noise; 3.8.2.4 Photometry; 3.8.2.5 Distortion; 3.9 Summary of Important Points; References; Chapter 4: Image Display; 4.1 Introduction; 4.2 Display Characteristics; 4.2.1 Displayed Image Size; 4.2.2 Aspect Ratio 4.2.3 Photometric Resolution4.2.4 Grayscale Linearity; 4.2.5 Low-Frequency Response; 4.2.5.1 Pixel Polarity; 4.2.5.2 Pixel Interaction; 4.2.6 High-Frequency Response; 4.2.7 The Spot-Spacing Compromise; 4.2.8 Noise Considerations; 4.3 Volatile Displays; 4.4 Sampling for Display Purposes; 4.4.1 Oversampling; 4.4.2 Resampling; 4.5 Display Calibration; 4.6 Summary of Important Points; References; Chapter 5: Geometric Transformations; 5.1 Introduction; 5.2 Implementation; 5.3 Gray-Level Interpolation; 5.3.1 Nearest-Neighbor Interpolation; 5.3.2 Bilinear Interpolation; 5.3.3 Bicubic Interpolation 5.3.4 Higher-Order Interpolation5.4 Spatial Transformation; 5.4.1 Control-Grid Mapping; 5.5 Applications; 5.5.1 Distortion Removal; 5.5.2 Image Registration; 5.5.3 Stitching; 5.6 Summary of Important Points; References; Chapter 6: Image Enhancement; 6.1 Introduction; 6.2 Spatial Domain Methods; 6.2.1 Contrast Stretching; 6.2.2 Clipping and Thresholding; 6.2.3 Image Subtraction and Averaging; 6.2.4 Histogram Equalization; 6.2.5 Histogram Specification; 6.2.6 Spatial Filtering; 6.2.7 Directional and Steerable Filtering; 6.2.8 Median Filtering; 6.3 Fourier Transform Methods 6.3.1 Wiener Filtering and Wiener Deconvolution

---

## Sommario/riassunto

Digital image processing, an integral part of microscopy, is increasingly important to the fields of medicine and scientific research. This book provides a unique one-stop reference on the theory, technique, and applications of this technology. Written by leading experts in the field, this book presents a unique practical perspective of state-of-the-art microscope image processing and the development of specialized algorithms. It contains in-depth analysis of methods coupled with the results of specific real-world experiments. Microscope Image Processing covers image digitization and di

---