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Nota di contenuto	Part I. Digital Holographic Microscopy (DHM) -- 1. Introduction -- References -- 2. Coherent optical imaging -- 2.1 Monochromatic fields and irradiance -- 2.2 Analytic expression for Fresnel diffraction -- 2.3 Transmittance function of lens -- 2.4 Geometrical imaging concepts -- 2.5 Coherent imaging theory -- References -- 3. Lateral and depth resolutions -- 3.1 Lateral resolution -- 3.2 Depth (or axial) resolution -- References -- 4. Phase unwrapping -- 4.1 Branch cuts -- 4.2 Quality-guided path-following algorithms -- References -- 5. Off-axis digital holographic microscopy -- 5.1 Off-axisdigital holographic microscopy designs -- 5.2 Digital hologram reconstruction -- References -- 6. Gabor digital holographic microscopy -- 6.1 Introduction -- 6.2 Methodology -- References -- -- Part II. Deep Learning in DHM Systems -- 7. Introduction -- References -- 8. No-search focus prediction in DHM with deep learning -- 8.1 Introduction -- 8.2 Materials and methods -- 8.3 Experimental results -- 8.4 Conclusions -- References -- 9. Automated phase unwrapping in DHM with deep learning -- 9.1 Introduction -- 9.2 Deep learning model -- 9.3 Unwrapping with deep learning model -- 9.4 Conclusions -- References -- 10. Noise-free phase imaging in Gabor DHM with deep

Sommario/riassunto

Artificial Intelligence in Digital Holographic Imaging Technical Basis and Biomedical Applications An eye-opening discussion of 3D optical sensing, imaging, analysis, and pattern recognition Artificial intelligence (AI) has made great progress in recent years. Digital holographic imaging has recently emerged as a powerful new technique well suited to explore cell structure and dynamics with a nanometric axial sensitivity and the ability to identify new cellular biomarkers. By combining digital holography with AI technology, including recent deep learning approaches, this system can achieve a record-high accuracy in

non-invasive, label-free cellular phenotypic screening. It opens up a new path to data-driven diagnosis. Artificial Intelligence in Digital Holographic Imaging introduces key concepts and algorithms of AI to show how to build intelligent holographic imaging systems drawing on techniques from artificial neural networks, convolutional neural networks, and generative adversarial network. Readers will be able to gain an understanding of the basics for implementing AI in holographic imaging system designs and connecting practical biomedical questions that arise from the use of digital holography with various AI algorithms in intelligence models. What's Inside Introductory background on digital holography Key concepts of digital holographic imaging Deep-learning techniques for holographic imaging AI techniques in holographic image analysis Holographic image-classification models Automated phenotypic analysis of live cells For readers with various backgrounds, this book provides a detailed discussion of the use of intelligent holographic imaging system in biomedical fields with great potential for biomedical application.