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learning -- 10.1 Introduction -- 10.2 A deep learning model for Gabor DHM -- 10.3 Experimental results -- 10.4 Discussion -- 10.5 Conclusions -- References -- -- Part III. Intelligent DHM for Biomedical Applications -- 11. Introduction -- References -- 12. Red blood cells phase image segmentation -- 12.1 Introduction -- 12.2 Marker-controlled watershed algorithm -- 12.3 Segmentation based on marker-controlled watershed algorithm -- 12.4 Experimental results -- 12.5 Performance evaluation -- 12.6 Conclusions -- References -- 13. Red blood cells phase image segmentation with deep learning -- 13.1 Introduction -- 13.2 Fully convolutional neural networks -- 13.3 Red blood cells phase image segmentation via deep learning -- 13.4 Experimental results -- 13.5 Conclusions -- References -- 14. Automated phenotypic classification of red blood cells -- 14.1 Introduction -- 14.2 Feature extraction -- 14.3 Pattern recognition neural network -- 14.4 Experimental results and discussion -- 14.5 Conclusions -- References -- 15. Automated analysis of red blood cell storage lesions -- 15.1 Introduction -- 15.2 Quantitative analysis of red blood cell 3D morphological changes -- 15.3 Experimental results and discussion -- 15.4 Conclusions -- References -- 16. Automated red blood cells classification with deep learning -- 16.1 Introduction -- 16.2 Proposed deep learning model -- 16.3 Experimental results -- 16.4 Conclusions -- References -- 17. High-throughput label-free cell counting with deep neural networks -- 17.1 Introduction -- 17.2 Materials and methods -- 17.3 Experimental results -- 17.4 Conclusions -- References -- 18. Automated tracking of temporal displacements of red blood cells -- 18.1 Introduction -- 18.2 Mean-shift tracking algorithm -- 18.3 Kalman filter -- 18.4 Procedure for single RBC tracking -- 18.5 Experimental results -- 18.6 Conclusions -- References -- 19. Automated quantitative analysis of red blood cells dynamics -- 19.1 Introduction -- 19.2 Red blood cell parameters -- 19.3 Quantitative analysis of red blood cell fluctuations -- 19.4 Conclusions -- References -- 20. Quantitative analysis of red blood cells during temperature elevation -- 20.1 Introduction -- 20.2 Red blood cell sample preparations -- 20.3 Experimental results -- 20.4 Conclusions -- References -- 21. Automated measurement of cardiomyocytes dynamics with DHM -- 21.1 Introduction -- 21.2 Cell culture and imaging -- 21.3 Automated analysis of cardiomyocytes dynamics -- 21.4 Conclusions -- References -- 22. Automated analysis of cardiomyocytes with deep learning -- 22.1 Introduction -- 22.2 Region of interest identification with dynamic beating activity analysis -- 22.3 Deep neural network for cardiomyocytes image segmentation -- 22.4 Experimental results -- 22.5 Conclusions -- References -- 23. Automatic quantification of drug-treated cardiomyocytes with DHM -- 23.1 Introduction -- 23.2 Materials and methods -- 23.3 Experimental results and discussion -- 23.4 Conclusions -- References -- 24. Analysis of cardiomyocytes with holographic image-based tracking -- 24.1 Introduction -- 24.2 Materials and methods -- 24.3 Experimental results and discussion -- 24.4 Conclusions -- References -- 25. Conclusion and future work.

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.
