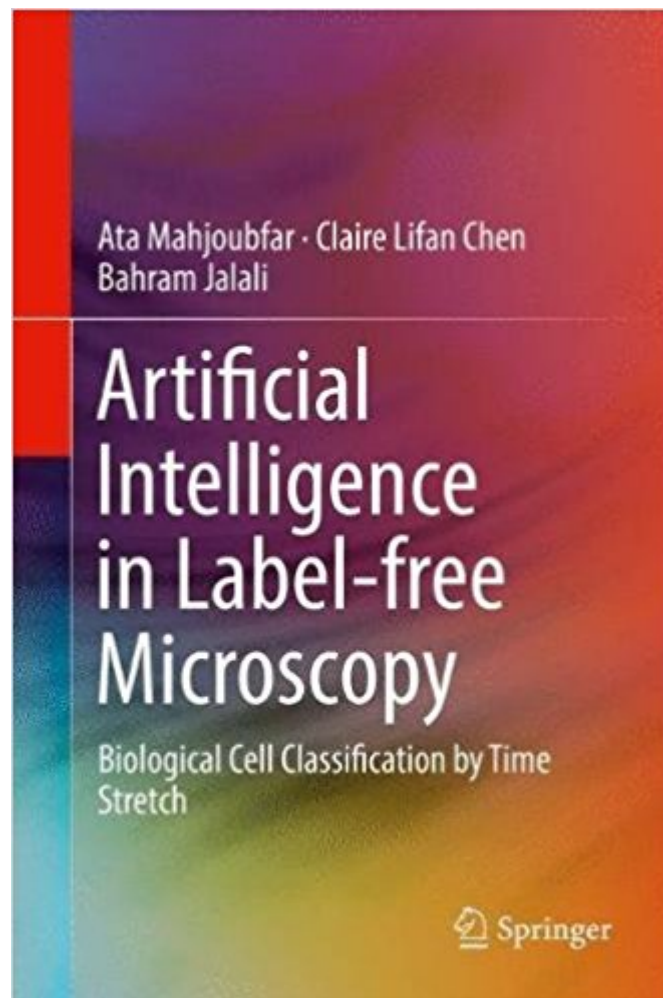




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Artificial Intelligence In Label-free Microscopy: Biological Cell Classification By Time Stretch



Synopsis

This book introduces time-stretch quantitative phase imaging (TS-QPI), a high-throughput label-free imaging flow cytometer developed for big data acquisition and analysis in phenotypic screening. TS-QPI is able to capture quantitative optical phase and intensity images simultaneously, enabling high-content cell analysis, cancer diagnostics, personalized genomics, and drug development. The authors also demonstrate a complete machine learning pipeline that performs optical phase measurement, image processing, feature extraction, and classification, enabling high-throughput quantitative imaging that achieves record high accuracy in label-free cellular phenotypic screening and opens up a new path to data-driven diagnosis.

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used in high-speed microscopy imaging to facilitate medical diagnosis; – Provides a systematic and comprehensive illustration of time stretch technology; – Enables multidisciplinary application, including industrial, biomedical, and artificial intelligence.

Ata Mahjoubfar is a postdoctoral scholar in the Department of Electrical Engineering and California NanoSystems Institute at University of California Los Angeles. He received his Bachelor's and Master's degrees from University of Tehran, Iran in 2006 and 2008, respectively, and his Ph.D. degree from University of California, Los Angeles (UCLA) in 2014. He was the cofounder of OSA/SPIE student chapter at UCLA and its president in 2012. He is the author of more than 35 peer-reviewed publications, and he holds two international patents. His research interests include artificial intelligence, machine vision and learning, imaging and visualization, ultrafast data acquisition and analytics, biomedical technology, and financial engineering.

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Bahram Jalali is the Northrop-Grumman Endowed Chair and Professor of Electrical Engineering at UCLA with joint appointments in Biomedical Engineering, California NanoSystems Institute (CNSI) and Department of Surgery at the UCLA School of Medicine. He is the inventor of the Photonic Time Stretch, a measurement technique that has led to discoveries of new scientific phenomena and to technological inventions. He received his Ph.D. in Applied Physics from Columbia University in 1989 and was with Bell Laboratories in Murray Hill, New Jersey until 2002 before joining UCLA. He is a Fellow of IEEE, the Optical Society of America (OSA), the American Physical Society (APS) and SPIE. He is the recipient of the R.W. Wood Prize from Optical Society of America for the invention and demonstration of the first Silicon Laser, the Aron Kressel Award of the IEEE Photonics Society, the Achievement Medal from IET for his contributions to field of instrumentation for cancer detection, and the Distinguished Engineering Achievement Award from the Engineers Council. He was the founder and CEO of Cognet, a CMOS fiber optics company that was acquired by Intel in 2001. In 2005 he was elected into the Scientific American Top 50, and received the BridgeGate 20 Award in

2001 for his entrepreneurial accomplishments and contributions to Southern California economy.

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