Special Issue on Multivariate Microscopy Image Analysis
IEEE Transactions on Medical Imaging

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Guest Editors

Analysis of microscopy images of samples has numerous applications in a wide range of areas such as molecular biology, life sciences, pharmacology and medicine. Recently, new protocols based on molecular labeling and imaging automation are spurring a revolution in microscopy techniques since they allow to capture the trans- or co-localization of proteins in multivariate microscopy image (MMI) data. In MMI, each pixel at a location may be associated with more than one intensity value, to an array of multiple intensities. These intensities can encode protein location, co-location or translocation over time, as seen by incident light of multiple wavelengths. In histopathology, for example, diagnosis and grading of cancer and other diseases can be improved by analyzing localization patterns in MMI obtained with multi-staining and/or multi-spectral techniques. As a consequence, there is a rapidly growing interest in the processing and analysis of MMI not only in the classic fields listed above but also in the new and rapidly evolving field of systems biology since the MMI data unfolds the spatial information on the molecular level that cannot be evaluated using the classic "omics" methods. Although there has been great progress in the development and application of image analysis in biomedicine over the recent years, there are a number of significant challenges involving the MMI data. These challenges include acquisition, efficient storage, registration, segmentation, classification, semantic annotation and visualization of the MMI data. Recent advances in other related areas such as image processing, computer vision, pattern recognition, and machine learning as well as the availability of high-performance computing equipment at a relatively affordable cost are seemingly fueling the development of computational methods to deal with these challenges.

This Special Issue will highlight new research directions in Multivariate Microscopy Image Analysis by collecting selected papers in all relevant areas including, but not limited to, the following topics:

- Registration, segmentation, classification, retrieval
- Object detection/classification/quantification
- Computer-aided diagnosis and grading
- Visualization
- System evaluation
- Novel computational architectures
- Other related aspects

The IEEE Transactions on Medical Imaging seeks high-quality original research papers for this Special Issue. Authors should submit their manuscripts electronically, by the deadline below, through the IEEE Manuscript Central Office (http://mc.manuscriptcentral.com/tmi-ieee) following the TMI Instructions for Authors and indicating in the Author Comments to the Editor-in-Chief that the manuscript be considered for the special issue on Multivariate Microscopy Image Analysis. Authors intending to submit articles are encouraged to discuss their submissions with the Guest Editors to determine suitability for this Special Issue.

Schedule:
Submission of manuscripts: November 1, 2009
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Revised manuscripts due: April 2, 2010
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