July 3 (Wednesday), 09:00-16:30, Room 1203 (12F)

Full-day Workshop

Organizers - Tuan D. Pham, Xiaoyi Jiang, Kazuhisa Ichikawa

Title - Current Challenging Image Analysis and Information Processing in Life Sciences

Abstract

Rapid advances in imaging devices and biotechnology have greatly helped life-science researchers gain insights into studying complex disease process and progress. However, in order to enable the computerized analysis of novel high-content and high-throughput data, advanced image and signal analysis techniques for handling such state-of-the-art information are needed. For example, a new type of cancer research is to observe cancer-cell characteristics exhibited on its intracellular space captured by the advanced microscopy imaging technology to study how cell regulates its intracellular features to optimize their signaling pathways. Such advancement in microscopy imaging of the structure of cell organelles enables biomedical researchers to study cell morphology in great detail to discover the pathogeneses of diseases by information obtained at molecular level. Therefore, automated segmentation/extraction of all organelles in a single cell for cancer modeling and simulation is a current challenge in computational systems biology. Another example is the challenge in the accurate 3D-image reconstruction of computed tomography (CT) scans of the abdominal aorta for computational modeling of fluid dynamics and the dynamic interaction of blood flow and the arterial wall which are important biomedical factors contributing to the pathogenesis of abdominal aortic aneurysms. In computational neuroscience, as another example, the same neuropathological burden that may cause different degrees of cognitive impairment with one person developing dementia such as Alzheimer's disease, while the next retains normal cognitive ability. Because brain structure is highly variable between individuals; therefore the quantification of brain structural complexity on magnetic resonance imaging (MRI) of individuals who were characterized as non-demented, mild to moderate Alzheimer's disease and non-demented is important for discovering imaging biomarkers for the early diagnosis and prediction of dementia. Such brain-MRI complexity analysis is a current trend in computational neuroscience. The proposed workshop will particularly calls for contributions from researchers working on biological imaging, medical imaging, biometric imaging, and health. Springer Communications in Computer and Information Science (CCIS) Series (http://www.springer.com/series/7899) has agreed to publish the proceedings of the proposed workshop.

Talks

Joint Registration of PET/MRI Data for Motion Correction of PET Data - M. Fieseler, F. Gigengack, X. Jiang, K. Schäfers

Deformable Part Models for Object Detection in Medical Images - K. Toennies

Semi-Automatic Segmentation and Classification of Pap Smear Cells - P.-C. Huang, K.-C. Lin, J.-Y. Lin, L.-E. Wang, Y.-F. Chen, J.Y. Chiang

An Automatic Segmentation and Classification Framework of Anti-nuclear Antibody Images - C.-C. Cheng; J.-S. Taur; T.-Y. Hsieh; Y.-F. Chen


Signal Transduction in Real Intracellular Space - D. Ohshima, H. Sagara, T.D. Pham, K. Ichikawa

Mass Type-Specific Sparse Representation for Mass Classification in Computer-Aided Detection on Mammograms - S. H. Lee, D. H. Kim, Y. M. Ro

3D Motion Image Reconstruction for Clinical Inspection of Tricuspid of Heart from 2D MRI Motion Images - R. Oka, K. Ota, S. Maeba

Lineage Data Analysis for the Inference of Regulatory Network for C.Elegans Embryonic Cell Cycle - X. Huang, H. Lim, L. Chen, L.L.H. Chan, Z. Zhao, H. Yan

A Brain MRI-based Hidden Markov Model for Dementia Recognition - Y. Chen, T.D. Pham

Segmentation of Endoplasmic Reticulum in Intracellular Space - N. Nguyen-Thanh, T.D. Pham, H. Sagara, K. Ichikawa