GUEST EDITORIAL

Special Section on Model-based Medical Image Processing and Analysis

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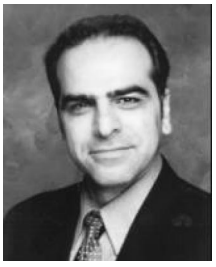
Medical imaging modalities routinely provide a variety of information—ranging from highly detailed, three-dimensional pictures of structural anatomy to maps of functional activity within the body—that has become indispensable in investigating the health of an individual. Recent developments in biomedical imaging are enabling us to accurately image anatomical and physiological processes from macro to micro levels. In addition to its well-established clinical role in facilitating diagnosis and in monitoring response to treatment, imaging has gained an equally important function in advancing basic research in many areas of the biomedical sciences. A central factor in the success and increasingly widespread application of imaging-based approaches in medicine has been the emergence of sophisticated computational methods that utilize external knowledge in the form of geometric, statistical, and/or domain/modality-specific models for extracting clinically significant and scientifically important information from image data. Development of quantitative and automatic image analysis strategies is becoming increasingly crucial as the size of imaging datasets continues to expand. In addition, detection and classification of early biological and physiological changes demand more objective and reproducible procedures that cannot be achieved through human examination of clinical and experimental images. The papers in this special section, although not intended to be comprehensive in scope, collectively highlight new research directions in model-based methods for processing and analysis of medical images.

James C. Gee is an assistant professor of radiologic science in the Department of Radiology at the University of Pennsylvania School of Medicine. He holds BS degrees in computer science and electrical engineering and an MS in electrical engineering, all from the University of Washington, and PhD in computer and information science from the Universtiy of Pennsylvania. His research interests include biomedical imaging, probabilistic and geometric modeling, pattern analysis, and scientific computing. Best known for the contributions to nonrigid image registration, his group has pioneered the application of Bayesian modeling and inference to problems in registration and morphometry as well as the use of finite element techniques for efficient implementation of the solutions.



Mostafa Analoui is the senior director and global head of the Image Analysis and Visualization group at Pfizer Global Research and Development in Connecticut. He is also adjunct professor of oral pathology, medicine, and radiology at Indiana University (IU), and electrical and computer engineering and biomedical engineering at Purdue University. Dr. Analoui is actively involved in developing imaging solutions for biomedical research and clinical diagnosis. His research focus includes quantitative multi-modality imaging, automatic image segmentation and modeling, multi- and hyperspectral imaging for tissue characterization, and application of imaging modalities in clinical trails. Dr. Analoui was previously the Director of Oral and Maxillofacial Imaging Research at IU. In addition to lecturing graduate courses on biomedical imaging, he also lectures nationally and internationally. Dr. Analoui has authored over 100 publications, including journal articles, book chapters, and technical reports. He is an active member of IEEE, SPIE, IS&T, RSNA, IADR, AAOMR, and IADMFR.