

Knowledge-Based Approaches to Quantitative Medical Image Analysis and Image-Based Decision Making

Abstract of Keynote Talk

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Widespread use of three-dimensional tomographic imaging scanners and other imaging modalities has revolutionized medical care as we know it today. The ever-increasing sizes of acquired data volumes are making conventional visual analysis of image data and consequent image-based decision making time consuming, tedious, and difficult to perform at the time available in busy clinical practice. The field of quantitative medical imaging, which has considerably matured in the past decade, is increasingly promising to solve many current problems that radiologists, cardiologists, orthopedists, and many other physicians are facing on a daily basis.

Accurate and reliable segmentation and subsequent quantitative description of multi-dimensional and/or multi-modality medical image data is one of the primary pre-requisites to more complex medical image analyses and decision making. The presentation will give a broad overview of the state of the art of medical image analysis and will focus on several inter-disciplinary projects requiring a direct and close collaboration between physicians, computer scientists, biostatisticians, and medical image analysis researchers. In the biomedical research context, spanning from cell images to small and large animals and to humans, a number of knowledge-based medical image analysis methods and approaches will be presented and their utility demonstrated. Examples of research applications as well as commercially available solutions will be presented and discussed.