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Spatio-temporal Image Analysis for Longitudinal and Time-Series Image Data

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Preface

The second International Workshop on Spatiotemporal Image Analysis for Longitudinal and Time-Series Image Data (STIA 2012) was held in Nice, France on October 1st, 2012 in conjunction with the International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI). This workshop was a follow-up of the first international workshop on Spatiotemporal Image Analysis for Longitudinal and Time-Series Image Data (STIA 2010) held in conjunction with MICCAI 2010 in Beijing, which followed a previous tutorial on "Detection and Quantification of Evolving Processes in Medical Images", organized by Nicholas Ayache at MICCAI 2004.

For STIA 2012, we received 22 submissions of which 13 were accepted yielding an acceptance rate of 59%. Each submission was reviewed by two to three expert reviewers. Submissions that were not championed by any of the reviewers were rejected.

The analysis of spatio-temporal time-series and longitudinal data is becoming increasingly more important as clinical imaging increasingly makes use of longitudinal image studies to examine subject-specific changes due to pathology, intervention, therapy, neurodevelopment, or neurodegeneration. Moreover, dynamic organ changes as seen in cardiac imaging or functional changes as measured in perfusion imaging, just to name a few, by definition result in time-series image data presenting volumetric image data over time.

The detection and characterization of changes from baseline due to disease, trauma, or treatment require novel image processing and visualization tools for qualitative and quantitative assessment of change trajectories. Whereas longitudinal analysis of scalar data is well known in the statistics community, its extension to high-dimensional image data, shapes or functional changes poses significant challenges. Cross-sectional analysis of longitudinal data does not provide a model of growth or change that considers the inherent correlation of repeated images of individuals, nor does it tell us how an individual patient changes relative to a change over time of a comparable healthy or disease-specific population, an aspect which is highly relevant to decision making and therapy planning.

The goal of this workshop was to comprehensively discuss approaches and new advances for the spatio-temporal analysis of time-series and longitudinal image data. It also aimed at starting a dialog to define the generic nature of algorithms, methods, modeling approaches, and statistical analysis for optimal analysis of such data, in particular in the context of challenging applications. The main body of submissions to the workshop was concerned with neuroimaging applications. However, the workshop also touched on spatio-temporal analysis in biology.

We are tremendously grateful to our program committee members, who carefully reviewed all submissions. We would also like to thank all participants of the workshop and in particular our two keynote speakers for stimulating posters, presentations, and discussions.

July 2012   Stanley Durrleman
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Organization

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