

Preface

The Third International Workshop on Spatiotemporal Image Analysis for Longitudinal and Time-Series Image Data (STIA 2014) was held in Boston, USA on September 18, 2014 in conjunction with the International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI). This workshop is a follow-up of the first two workshops on Spatiotemporal Image Analysis (STIA 2010/2012) for Longitudinal and Time-Series Image Data held in conjunction with MICCAI 2010 in Beijing, China and MICCAI 2012 in Nice, France, respectively. The STIA workshop series followed a previous tutorial on “Detection and Quantification of Evolving Processes in Medical Images” organized by Nicholas Ayache at MICCAI 2004.

For STIA 2014, we received 15 submissions of which 7 were accepted yielding an acceptance rate of 47%. 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 makes more and more 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 submissions were largely concered with neuroimaging applications.

In contrast to previous STIA workshops we supplemented the program with mini-tutorials on topics related to longitudinal and time-series image analysis for STIA 2014. We have received very positive feedback on such a combination of invited talks and tutorials, and based on multiple requests have made all tutorial slides available to the public.

We are tremendously grateful to our Program Committee which carefully reviewed all submissions. We would also like to thank all participants of the workshop and, in particular, our keynote speaker Yicong Wu from NIMH for stimulating presentations and discussions.

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