

Preface

This volume contains articles from the BrainLesion Workshop as well as the Brain Tumor Segmentation (BRATS), the Ischemic Stroke Lesion Segmentation (ISLES), and Mild Traumatic Brain Injury Outcome Prediction (mTOP) challenges, which were held jointly at the Medical Image Computing for Computer-Assisted Intervention (MICCAI) Conference on October 17, 2016, in Athens, Greece.

The presented works are aimed at computer scientific and clinical researchers working on glioma, multiple sclerosis (MS), cerebral stroke and brain trauma injuries. This compilation does not claim to provide a comprehensive understanding from all points of view; however, the authors present their latest advances in segmentation, disease prognosis, and other applications to the clinical context.

The volume is divided into four parts: The first part comprises the submissions to the BrainLes Workshop, the second contains a selection of papers regarding methods presented at the BRATS challenge, followed by a selection of papers on methods presented at the ISLES challenge, and finally a selection of papers on methods presented at the mTOP challenge.

The aim of the first part is to provide an overview of new advances in medical image analysis in all of the aforementioned brain pathologies. This section brings together researchers from the medical image analysis domain, neurologists, and radiologists working on at least one of these diseases. The aim is to consider neuroimaging biomarkers used for one disease applied to the other diseases. This session did not have a specific dataset to be used.

The second part focuses on the papers from the BRATS challenge. In order to gauge the current state of the art in automated brain tumor segmentation and compare the different methods, a large dataset of magnetic resonance (MR) images of brain tumors was made available. The participants at the challenge compared the results obtained with their methods against manual segmentations.

The third part contains descriptions of the algorithms participating in ISLES, which aimed to provide a fair and direct comparison of methods for ischemic stroke lesion segmentation from multispectral MR images. A public dataset of diverse ischemic stroke cases and a suitable automatic evaluation procedure was made available for the following two tasks: sub-acute ischemic stroke lesion segmentation and acute stroke outcome/penumbra estimation.

The fourth part comprises approaches for semi-supervised outcome prediction after mild traumatic brain injury, submitted to the mTOP challenge. These aim to use early, multi-modal brain scans to classify subjects as healthy individuals or patients with different outcomes (assessed via the Glasgow outcome scale). The provided dataset included both structural and diffusional MR images.

We heartily hope that this volume will promote further exiting research on brain lesions.

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Alessandro Crimi
Oskar Maier
Bjoern Menze
Mauricio Reyes
Stefan Winzeck
Heinz Handels

Brainlesion: Glioma, Multiple Sclerosis, Stroke and
Traumatic Brain Injuries

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Crimi, A.; Menze, B.; Maier, O.; Reyes, M.; Winzeck, S.;
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