

Brain Tumor Segmentation Using a Generative Model with an RBM Prior on Tumor Shape - DTU Orbit (09/11/2017)

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In this paper, we present a fully automated generative method for brain tumor segmentation in multi-modal magnetic resonance images. The method is based on the type of generative model often used for segmenting healthy brain tissues, where tissues are modeled by Gaussian mixture models combined with a spatial atlas-based tissue prior. We extend this basic model with a tumor prior, which uses convolutional restricted Boltzmann machines (cRBMs) to model the shape of both tumor core and complete tumor, which includes edema and core. The cRBMs are trained on expert segmentations of training images, without the use of the intensity information in the training images. Experiments on public benchmark data of patients suffering from low- and high-grade gliomas show that the method performs well compared to current state-of-the-art methods, while not being tied to any specific imaging protocol.

General information

State: Published

Organisations: Department of Applied Mathematics and Computer Science , Image Analysis & Computer Graphics, Copenhagen University Hospital

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Pages: 168-180

Publication date: 2016

Host publication information

Title of host publication: 1st International Workshop on Brainlesion: Glioma, Multiple Sclerosis, Stroke and Traumatic Brain Injuries (Brainles 2015) : Revised Selected Papers

Publisher: Springer

ISBN (Print): 978-3-319-30857-9

ISBN (Electronic): 978-3-319-30858-6

Series: Lecture Notes in Computer Science

Volume: 9556

ISSN: 0302-9743

Main Research Area: Technical/natural sciences

Workshop: 1st International Workshop on Brainlesion: Glioma, Multiple Sclerosis, Stroke and Traumatic Brain Injuries (Brainles 2015), Munich, Germany, 05/10/2015 - 05/10/2015

DOIs:

10.1007/978-3-319-30858-6_15

Publication: Research - peer-review › Article in proceedings – Annual report year: 2016