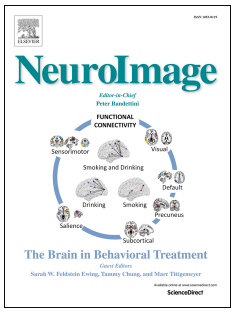
Accepted Manuscript



Fully convolutional network ensembles for white matter hyperintensities segmentation in MR images

Hongwei Li, Gongfa Jiang, Ruixuan Wang, Jianguo Zhang, Zhaolei Wang, Wei-Shi Zheng, Bjoern Menze

PII: S1053-8119(18)30597-4

DOI: 10.1016/j.neuroimage.2018.07.005

Reference: YNIMG 15096

To appear in: *NeuroImage*

Received Date: 25 December 2017

Revised Date: 30 June 2018

Accepted Date: 2 July 2018

Please cite this article as: Li, H., Jiang, G., Wang, R., Zhang, J., Wang, Z., Zheng, W.-S., Menze, B., Fully convolutional network ensembles for white matter hyperintensities segmentation in MR images, *NeuroImage* (2018), doi: 10.1016/j.neuroimage.2018.07.005.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Fully Convolutional Network Ensembles for White Matter Hyperintensities Segmentation in MR Images

Hongwei Li[1,2,3], Gongfa Jiang[1], Ruixuan Wang[1], Jianguo Zhang[2], Zhaolei Wang[1], Wei-Shi Zheng[1] and Bjoern Menze[3]

1. School of Data and Computer Science, Sun Yat-sen University, China.
2. Computing, School of Science and Engineering, University of Dundee, UK.
3. Department of Computer Science, Technical University of Munich, Germany.

Abstract

White matter hyperintensities (WMH) are commonly found in the brains of healthy elderly individuals and have been associated with various neurological and geriatric disorders. In this paper, we present a study using deep fully convolutional network and ensemble models to automatically detect such WMH using fluid attenuation inversion recovery (FLAIR) and T1 magnetic resonance (MR) scans. The algorithm was evaluated and ranked 1^{st} in the WMH Segmentation Challenge at MICCAI 2017. In the evaluation stage, the implementation of the algorithm was submitted to the challenge organizers, who then independently tested it on a hidden set of 110 cases from 5 scanners. Averaged dice score, precision and robust Hausdorff distance obtained on held-out test datasets were 80%, 84% and 6.30mm respectively. These were the highest achieved in the challenge, suggesting the proposed method is the state-of-the-art. Detailed descriptions and quantitative analysis on key components of the system were provided. Furthermore, a study of cross-scanner evaluation is presented to discuss how the combination of modalities affect the generalization capability of the system. The adaptability of the system to different scanners and protocols is also investigated. A quantitative study is further presented to show the effect of ensemble size and the effectiveness of the ensemble model. Additionally, software and models of our method are made publicly available. The effectiveness and generalization capability of the proposed system show its potential for real-world clinical practice.

Keywords: White matter hyperintensities, Brain lesion segmentation,

Download English Version:

https://daneshyari.com/en/article/9990847

Download Persian Version:

https://daneshyari.com/article/9990847

Daneshyari.com