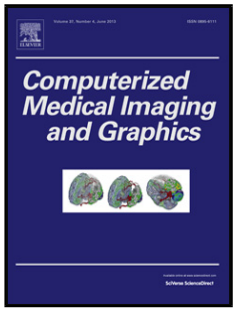

Title: Survey of automated multiple sclerosis lesion segmentation techniques on magnetic resonance imaging

Author: Antonios Danelakis Theoharis Theoharis Dimitrios A. Verganelakis

PII: S0895-6111(18)30322-7
DOI: https://doi.org/doi:10.1016/j.compmedimag.2018.10.002
Reference: CMIG 1598

To appear in: *Computerized Medical Imaging and Graphics*

Received date: 25-5-2018
Revised date: 5-9-2018
Accepted date: 2-10-2018

Please cite this article as: Antonios Danelakis, Theoharis Theoharis, Dimitrios A. Verganelakis, Survey of automated multiple sclerosis lesion segmentation techniques on magnetic resonance imaging, *<![CDATA[Computerized Medical Imaging and Graphics]]>* (2018), https://doi.org/10.1016/j.compmedimag.2018.10.002

Survey of automated multiple sclerosis lesion segmentation techniques on magnetic resonance imaging

Antonios Danelakis[a,*], Theoharis Theoharis[a], Dimitrios A. Verganelakis[b]

[a] *Department of Computer & Information Science, Norwegian University of Science & Technology, Sem Saelands vei 7-9, NO-7491 Trondheim, Norway*
[b] *Nuclear Medicine Department, Oncology Clinic 'ELPIDA', Children's Hospital 'A. Sofia', Goudi Greece.*

Abstract

Multiple Sclerosis (MS) is a chronic disease. It affects the central nervous system and its clinical manifestation can variate. Magnetic Resonance Imaging (MRI) is often used to detect, characterize and quantify MS lesions in the brain, due to the detailed structural information that it can provide. Manual detection and measurement of MS lesions in MRI data is time-consuming, subjective and prone to errors. Therefore, multiple automated methodologies for MRI-based MS lesion segmentation have been proposed. Here, a review of the state-of-the-art of automatic methods available in the literature is presented.

The current survey provides a categorization of the methodologies in existence in terms of their input data handling, their main strategy of segmentation and their type of supervision. The strengths and weaknesses of each category are analyzed and explicitly discussed. The positive and negative aspects of the methods are highlighted, pointing out the future trends and, thus, leading to possible promising directions for future research. In addition, a further clustering of the methods, based on the databases used for their evaluation, is provided. The aforementioned clustering achieves a reliable comparison among methods evaluated on the same databases.

*Corresponding author
Email addresses: antonios.danelakis@ntnu.no (Antonios Danelakis), theotheo@ntnu.no (Theoharis Theoharis), dimitris.verganelakis@gmail.com (Dimitrios A. Verganelakis)