

Accepted Manuscript

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Author: Maciej Plocharski, Lasse Riis Østergaard, Alzheimer's Disease Neuroimaging Initiative

PII: S0169-2607(16)30066-9
DOI: <http://dx.doi.org/doi: 10.1016/j.cmpb.2016.05.009>
Reference: COMM 4165

To appear in: *Computer Methods and Programs in Biomedicine*

Received date: 27-1-2016
Revised date: 11-4-2016
Accepted date: 19-5-2016

Please cite this article as: Maciej Plocharski, Lasse Riis Østergaard, Alzheimer's Disease Neuroimaging Initiative, Extraction of sulcal medial surface and classification of Alzheimer's disease using sulcal features, *Computer Methods and Programs in Biomedicine* (2016), <http://dx.doi.org/doi: 10.1016/j.cmpb.2016.05.009>.

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Extraction of sulcal medial surface and classification of Alzheimer's disease using sulcal features

Maciej Plocharski* and Lasse Riis Østergaard

for the Alzheimer's Disease Neuroimaging Initiative**

Dept. of Health Science and Technology

Aalborg University, Aalborg, Denmark

*Corresponding author at Department of Health Science and Technology, Fredrik Bajers Vej 7, Building C, Room C1-217, 9220 Aalborg, Denmark. E-mail address: mpl@hst.aau.dk (M. Plocharski)

**Data used in preparation of this article were obtained from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database (adni.loni.usc.edu). As such, the investigators within the ADNI contributed to the design and implementation of ADNI and/or provided data but did not participate in analysis or writing of this report. A complete listing of ADNI investigators can be found at:

http://adni.loni.usc.edu/wp-content/uploads/how_to_apply/ADNI_Acknowledgement_List.pdf.

Highlights

- An algorithm to compute sulcal medial surfaces for feature extraction was developed.
- Medial surface features of depth, length, curvature, and surface area were computed.
- Classification of Alzheimer's disease and healthy controls was performed.
- High classification results were obtained with ten features from nine cerebral sulci.

Abstract. Background: Recent advancements in medical imaging have resulted in a significant growth in diagnostic possibilities of neurodegenerative disorders. Neuroanatomical abnormalities of the cerebral cortex in Alzheimer's disease (AD), the most frequent type of dementia in the elderly, can be observed in morphology analysis of cortical sulci, and used to distinguish

between cognitively normal (CN) and AD subjects. **Objective:** The purpose of this paper was to extract sulcal features by means of computing a sulcal medial surface for AD/CN classification.

Methods: 24 distinct sulci per subject were extracted from 210 subjects from the ADNI database by the BrainVISA sulcal identification pipeline. Sulcal medial surface features (depth, length, mean and Gaussian curvature, surface area) were computed for AD/CN classification with a support vector machine (SVM). **Results:** The obtained 10-fold cross-validated classification

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