

FAST AND ROBUST SEGMENTATION OF HIPPOCAMPUS FROM MAGNETIC RESONANCE IMAGES

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Introduction: Current guidelines support the use of magnetic resonance imaging in diagnostics of Alzheimer's disease. The volume of the hippocampus is a well established measure for diagnostics. Manual hippocampus segmentation is difficult and time consuming, and automated tools are needed in clinical setting.

Aims: Our objective was to develop a clinically useful on-line automatic tool for segmenting the hippocampus. The accuracy should correspond to the agreement between manually delineated results.

Methods: The proposed approach is based on an extension and fast implementation of multi-atlas segmentation [1]. In multi-atlas segmentation, several atlases are registered non-rigidly to patient data and propagated segmentations are fused. Our extension includes: atlas selection, expectation maximization classification and partial-volume correction.

Results: ADNI database was used in our evaluation. Table 1 shows similarity index (0=no overlap, 1=perfect overlap) and correlation coefficient of volumes between manual and automatic segmentations, and manual inter-rater results from two publications. The computation time was 2 minutes using a standard laptop computer.

HIPPOCAMPI FROM MRI	Similarity	Correlation
Our method (N=340)	0.869±0.035	0.96
Morra, NeuroImage, 2008 (N=21)	0.85	0.71
van der Lijn, NeuroImage, 2008 (N=20)	0.86	0.83

[Table

1]

Conclusions: The method proposed allows the segmentation of the hippocampus

with an accuracy corresponding to manual expert segmentations in two minutes, making the use of this method attractive in clinical practise.

References: [1] Lötjönen et al. Fast and robust multi-atlas segmentation of brain magnetic resonance images. *NeuroImage* 49: 2352-2365, 2010.