BRAIN TUMOUR DIAGNOSTICS SUPPORT BASED ON MEDICAL IMAGE SEGMENTATION

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High-grade gliomas represent rapidly growing malignant brain tumours. Early diagnostics of this decease and immediately applied treatment entails better life prognosis for the patient. Computed Tomography (CT) is usually the first examination imaging technique used when certain symptoms occur, due to its lower cost in comparison with Magnetic Resonance (MR). The goal of this work is to develop an automated CT image segmentation method in order to support early glioma diagnostics.

The proposed technique involves, subsequently, image preprocessing, feature extraction, and extracted features classification using an artificial neural network. The design of the feature computation procedure follows up on the recent work by Prof. Petrou from the Imperial College, London. For glioma boundaries detection in MR images, Prof. Petrou exploits statistically significant differences between the skewness of the highly-vascular tumour regions and the regions of the surrounding brain tissue.

In our work, we aim to identify features which would allows us to distinguish the healthy brain tissue from the tumour tissue. The task is even more challenging for tumour early stages, since it is not so clearly visible in CT scans as its later stages. We compute the skewness of the Discrete Wavelet Transform (DWT) coefficients as presented in Fig. 1 from selected rectangular regions using three neighboring image slices to increase the number of samples.

The segmentation results are evaluated in cooperation with neurologist Dr. O. Vysata. For all computations and visualizations we use the Matlab environment.

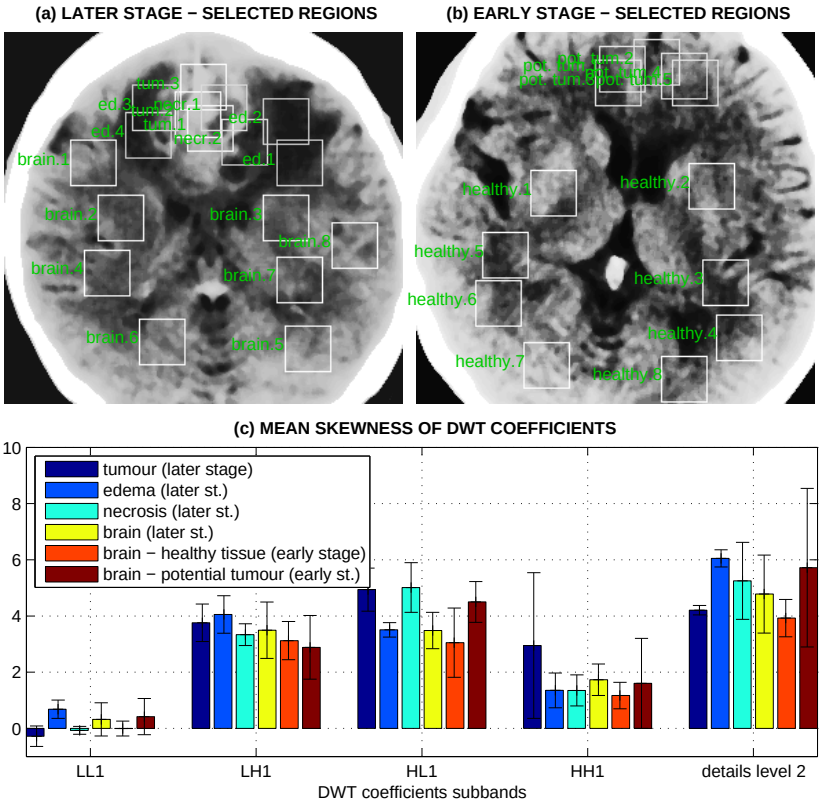

Figure 1: The mean and the standard deviation value of the skewness for selected subbands of the DWT coefficients **(c)** from selected CT image regions in the later **(a)** and in the early tumour stage **(b)**.