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ON THE DETECTION OF ISCHEMIC STROKE AREA BOUNDARY

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Computer tomography (CT) is still the modality of first choice for the investigation of patients with acute stroke. Within the first hours after onset of stroke the detection of ischemic regions on CT images is cumbersome. Ischemic stroke volume is an important topic in the radiology field. Patient status depends on ischemic stroke size, stroke location and place of injury. For scientific medical studies dealing with ischemia it is useful to calculate the volume of an ischemic stroke. Calculating of place and volume of the ischemic stroke manually is very time consuming. Widespread semi-automated methods give only approximate results. Usually the post-processing of several CT images consists of several stages: filtering of CT slices, smoothing and extension of stroke region boundary, filling of stroke space and computing of stroke volume via all slices.

We present development and application of a automatic method for segmentation of normal and abnormal brain tissues from computer tomography images of stroke patients. The method does not require manual drawing of the tissue boundaries. It is therefore faster and more reproducible than the other conventional methods.

A practically applicable magnetic resonance (MR) brain segmentation method presented at [1] is applied to stroke area boundary detection problem. A knowledge-based active shape procedure is designed. It incorporates a priori knowledge about the objects of interest and their specific structural relationships in order to provide robust segmentation and labeling. This model was successfully used to identify neuroanatomic structures in MR brain images. Three additional features characteristic to MR brain images were included in the model: gray-level appearance, border strength and average position.

The searching procedure is based on the model fitting strategy. In order to evaluate the model location hypotheses, a fitness function is needed to assess the agreement between the image data and the particular model instance. Application fitness function in the case of stroke area boundary detection is discussed. The advantage of the method is analyzed using real clinical data.

REFERENCES

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