A Study on Tumor Detection and Recognition for MRI Imaging

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ABSTRACT

In this thesis, we develop a system to detect and identify tumors for MRI breast images. This system consists of two sub-systems: tumor detection and tumor recognition. To detect tumors, we propose a feature-based scheme composed of preprocessing and feature extraction. In the preprocessing, we coarsely determine tumor candidate regions. To correctly achieve tumor region identification for MRI breast images, some features are extracted based on the intra-slice, texture, and inter-slice analyses. Our intra-slice analysis evaluates the intensity. To find a precise region, a region growing algorithm is proposed based on ellipse fitness. In the texture analysis, some texture features are extracted and combined with a neural network to reduce the false alarms. The inter-slice analysis is based on the continuity characteristic and the size information of tumor candidate to verify the static behavior of tumor regions.

In the thesis, the tumor recognition sub-system is composed of shape analysis and multi-layer neural classifier. For each detected tumor, some features are computed based shape analysis and integrated by using multi-layer neural network. The output of the neural network is used to evaluate the risk of each tumor, i.e., benign and malignant.

The experimental results demonstrate that the proposed scheme can not only well detect tumors but also tumor recognition （i.e., risk evaluation）.

Keywords : tumor detection、fuzzy classifier、medical image

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