Image Segmentation and Three Dimensional Reconstruction of MR Brain Tumor Images

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ABSTRACT

Brain Tumor is one of the most common diseases in the central nervous system. Though physicians are able to locate the tumor from the 2D Magnetic Resonance (MR) images, the 3D visualized presentation will provide a more accurate and direct tool for clinical applications. In this research, we developed a Computer Aided Diagnostic (CAD) system to segment and to reconstruct the brain and the tumor for MR brain images for 3D reconstruction and visualization. We apply Active Contours Without Edges (i.e. Active Contours Using Level Sets, ACLS) algorithm to segment the brain from the simulated MR brain images. Bias Corrected Fuzzy C-Mean (BCFCM), Expectation Maximum (EM), and Adaptive EM-based Pulse Coupled Neural Network (Adaptive EM-based PCNN, AEBP) algorithms are applied to compare the performance with the ACLS. The results showed that ACLS, BCFCM, EM and AEBP are not significantly different in terms of segmentation quality. For the computational time, ACLS is significant better than BCFCM, EM and AEBP. The ACLS is applied to segment the brain tumor in a real case of MR Brain Imaging. Both the brain and the tumor are segmented and reconstructed to provide visualized information of the location of brain tumor.

Keywords : Brain Tumor ; MRI ; Image Segmentation ; Active Contour ; Level Set ; 3D Reconstruction

Table of Contents

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