Abstract

In anatomical aspects, magnetic resonance (MR) imaging offers more accurate information for medical examination than other medical images such as X-ray, ultrasonic and CT images. Tumor segmentation from MRI data is an important but time consuming task performed manually by medical experts. Automating this process is challenging due to the high diversity in appearance of tumor tissue, among different patients and, in many cases, similarity between tumor and normal tissue. One of the reasons behind the inferior segmentation efficiency is the presence of artifacts in the MR images. One such artifact is the extracranial tissues (skull). These extracranial tissues often interfere with the normal tissues during segmentation that accounts for the inferior segmentation efficiency. In this paper, an automated segmentation and lesion detection algorithm for high segmentation efficiency is proposed for abnormal MR brain images. The proposed segmentation algorithm consists of three steps. In the first step, extracranial tissues are removed using morphological operations.
In the second step, fuzzy C-means algorithm is used to segment the MR brain images into four groups: white matter, gray matter, cerebrospinal fluid and the abnormal tumor region. Finally, pseudo-colouring operation is performed on the segmented image to detect the abnormal tumor region. The proposed method has been applied to abnormal images from four different types namely metastase, meningima, glioma and astrocytoma. The superior nature of the proposed approach is justified by performing a comparative analysis on skull stripped images and non-skull stripped images. Experimental results suggest that the proposed approach provides an effective and promising method for brain tumor extraction from MR images with high accuracy.

Reference


Index Terms

Computer Science

Segmentation

Key words

MRI

Segmentation

Fuzzy

Extra cranial

Segmentation efficiency