Abstract

In this paper we present a hybrid approach based on combining fuzzy clustering, seed region growing, and Jaccard similarity coefficient algorithms to measure gray (GM) and white matter tissue (WM) volumes from magnetic resonance images (MRIs). The proposed algorithm incorporates intensity and anatomic information for segmenting of MRIs into different tissue classes, especially GM and WM. It starts by partitioning the image into different regions using fuzzy clustering. These regions are fed to seed region growing (SRG) method to isolate the suitable closed region. The seeds of SRG are selected as the output centers of the fuzzy clustering method. To compare the performance of various outputs of seed region technique Jaccard similarity coefficient is used to merge the similar regions in one segment. The proposed algorithm is applied to challenging applications: gray matter/white matter segmentation in magnetic resonance image (MRI) datasets. The experimental results show that the proposed technique produces accurate and stable results.

References

Determination of Gray Matter (GM) and White Matter (WM) Volume in Brain Magnetic Resonance Images (MRI)

Determination of Gray Matter (GM) and White Matter (WM) Volume in Brain Magnetic Resonance Images (MRI)

- Zijdenbos A. P., MRI segmentation and the quantification of white matter lesions PhD thesis, Vanderbilt University, Electrical Engineering Department, Nashville, Tennessee; December 1994
- Brain Web, "Simulated Brain Database." McConnell Brain Imaging Centre, Montreal Neurological Institute, McGill.
- Del-Fresno M., Vénere M., and A. Clausse, A combined region growing and
deformable model method for extraction of closed surfaces in 3D CT and MRI scans, Computerized Medical Imaging and Graphics, 33, 369–376, 2009

Index Terms

Computer Science       Image Processing

Keywords
Fuzzy Clustering   Seed Region Growing   Performance Measure   MRI Brain Database