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CERTIFICATE of PRESENTATION

This is to certify that
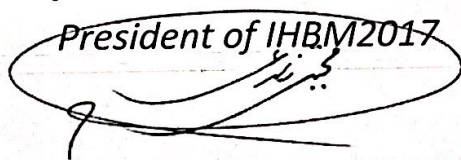
Zahra Sheikholeslami

presented a poster entitled:

A New Automated Method for Segmentation of Brain Magnetic Resonance Images

at the 4th Iranian Human Brain Mapping Congress

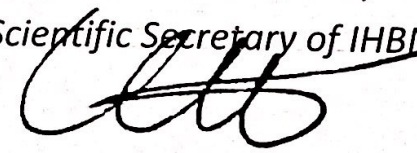held in Shahid Beheshti University, Tehran, I.R. Iran

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A New Automated Method for Segmentation of Brain Magnetic Resonance Images

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Introduction

Region classification is an essential process in the visualization of Brain tissues of MRI. Brain image is basically classified into three main regions which includes gray matter (GM), white matter (WM) and CSF (Ahirwar, 2013). Other regions can be bone, soft tissue (ST) and air (see Fig. 1). There are some methods for brain regions segmentation such as (Prajapati et al., 2015) which represented an unsupervised method for MR images segmentation based on Self Organizing Maps. The most well-known approach which is used in SPM toolbox was proposed by Ashburner and Friston (2011). The aim of this work is to register a patient's image with a standard Tissue Probability Maps (TPM) atlas which is divided into three main regions and also bone, soft tissue and by doing this, the patient's image being divided into six regions. This method is sensitive to morphological changes

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of brain. It means that this method may fail for some brain images with neurodegenerative diseases such as Parkinson disease (PAD). The main reason of this problem is a large shape difference between the patient's image and the atlas.

Methods

In current paper, we proposed a new method to solve the problem of SPM method. So, we propose an energy function consisting of sum of three terms. The first term is mean squared difference between grey levels of corresponding pixels in both the patient's image and the ICBM152 atlas (Fonov et al., 2011 & 2012). The second term is a regulator which preserve continuity and differentiability in smoothed areas. The third term is segmentation term which is divided images into six regions with aligning image with TPM atlas (Ashburner & Friston., 2005).

Results

In Fig. 2, three slices of three MR brain scans with PAD (dataset was obtained from [7]) was illustrated. As you can see in Fig. 3, our approach could segment these images but Ashburner's method is failed.

Conclusion

In current paper, we proposed a new method to segment the MR images of brain into main six regions and tackle difficulties of Ashburner's method for some images by

representing a new energy function. Experimental results show that suggested method has better performance compare of Ashburner's method.

References

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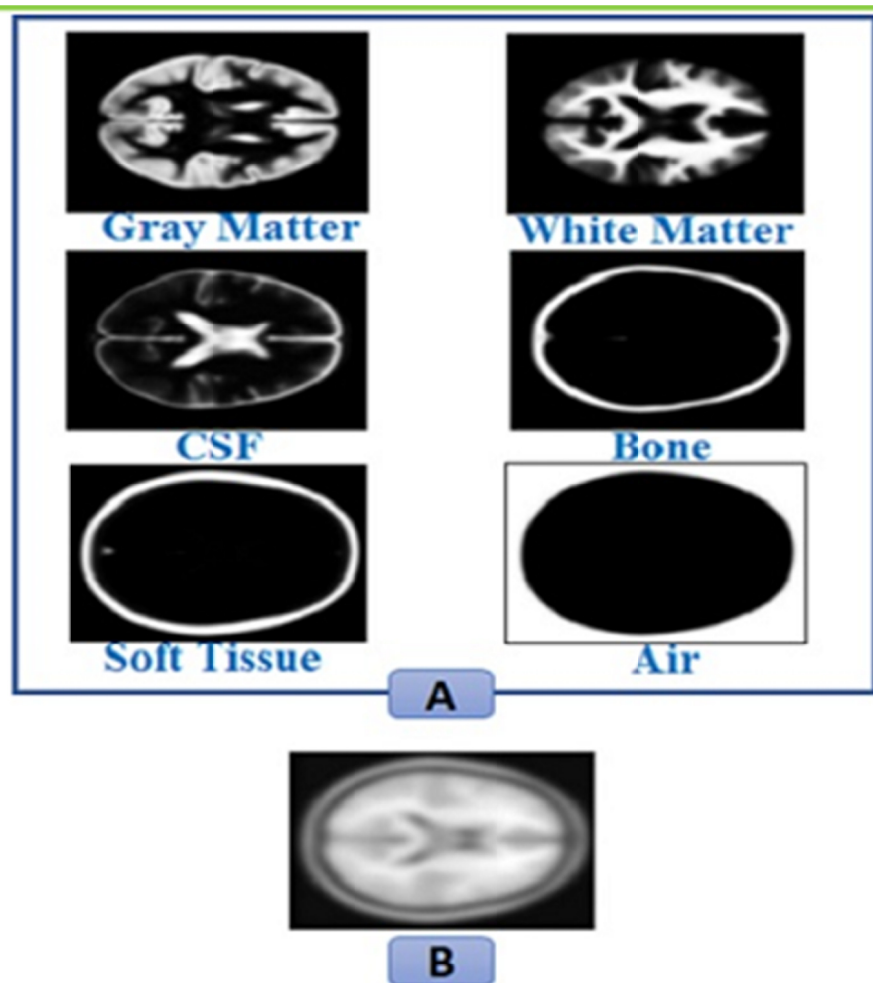[7] Available ONLINE: 'https://ida.loni.usc.edu'

Fig. 1. **A**: TPM atlas which is divided into 6 regions (GM, WM, CSF, bone, ST and air) and is obtained from SPM toolbox. **B**: ICBM152 atlas which is obtained from 152 T1-MRI scans.
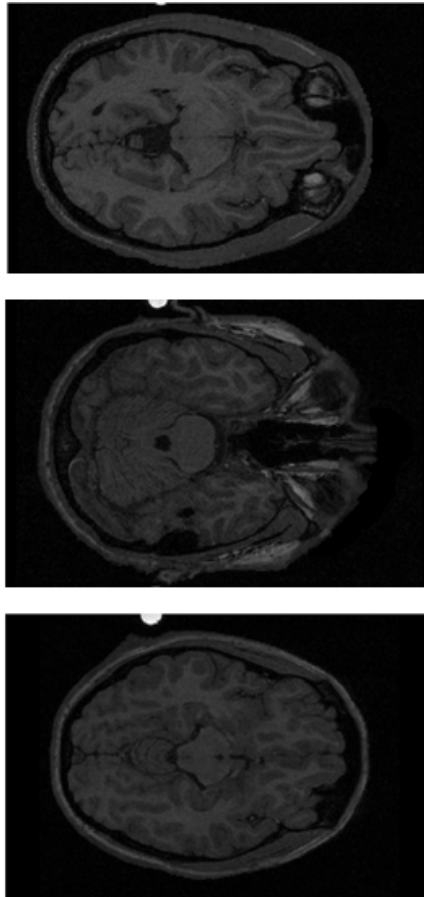
Fig. 2. sample slices of three brain T1-
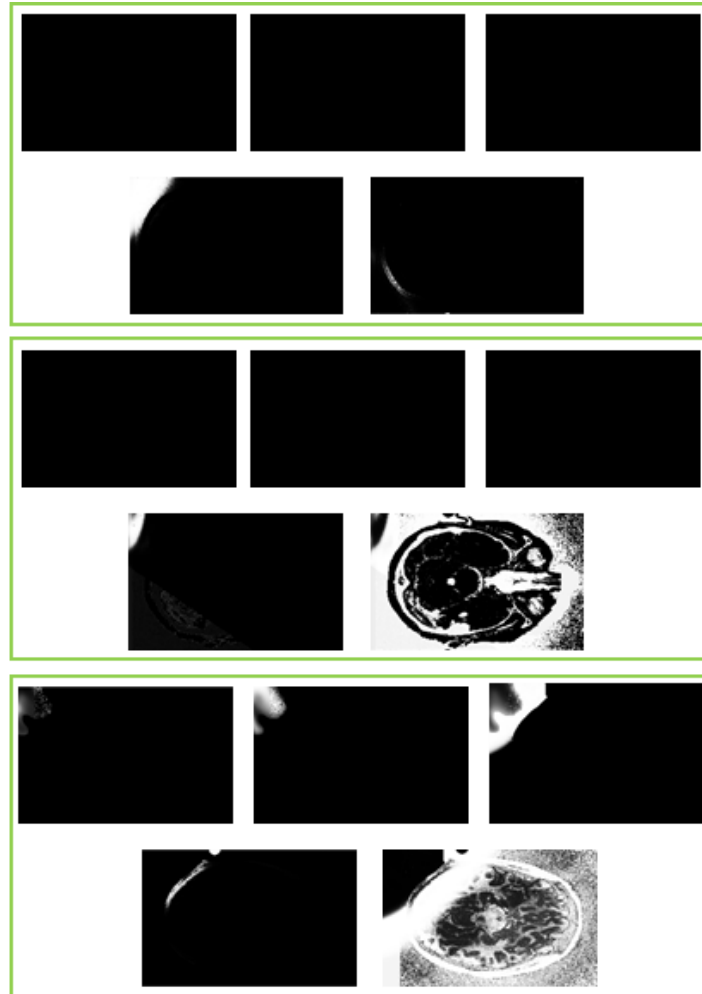weighted MR images of Parkinson patients.

Fig. 3. Results of applying Ashburner's method on patient's images. In each image group, the images are GM,WM,CSF, bone and ST respectively.
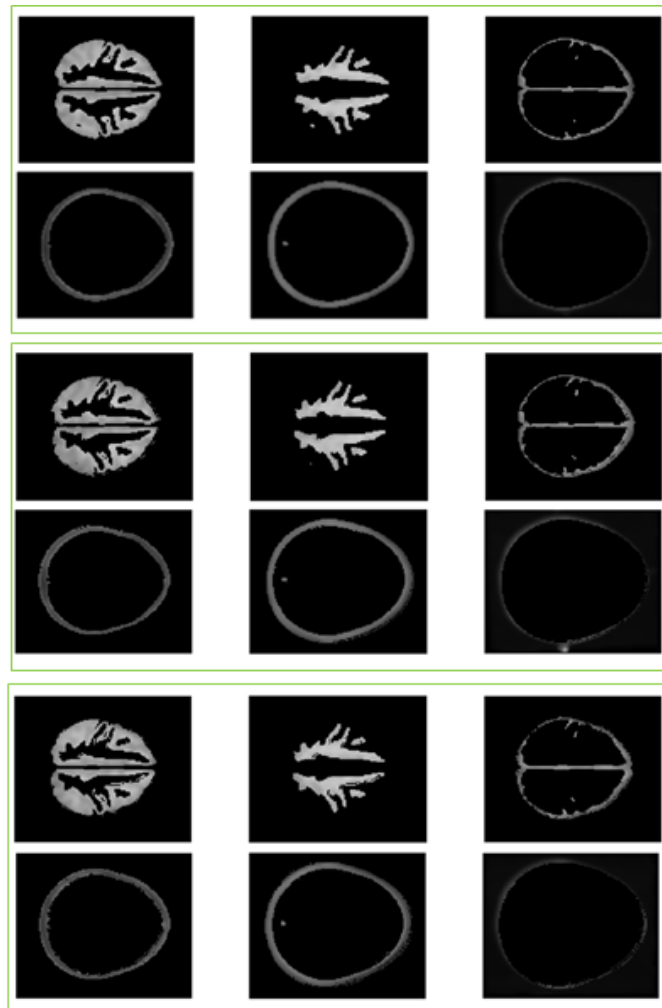
Fig. 4. Results of proposed method. In each images group, main regions are shown.