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Novel statistical approach for segmentation of brain magnetic resonance imaging using an improved expectation maximization algorithm

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Keywords

expectation maximization, maximum likelihood, magnetic resonance imaging (MRI), fuzzy C-means (FCM)

Abstract

In this paper, an improved expectation maximization (EM) algorithm called statistical histogram based expectation maximization (SHEM) algorithm is presented. The algorithm is put forward to overcome the drawback of standard EM algorithm, which is extremely computationally expensive for calculating the maximum likelihood (ML) parameters in the statistical segmentation. Combining the SHEM algorithm and the connected threshold region-growing algorithm that is used to provide *a priori* knowledge, a novel statistical approach for segmentation of brain magnetic resonance (MR) image data is thus proposed. The performance of our SHEM based method is compared with those of the EM based method and the commonly applied fuzzy C-means (FCM) segmentation. Experimental results show the proposed approach to be effective, robust and significantly faster than the conventional EM based method.

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