Fuzzy C-Means Clustering Based on Gaussian Spatial Information for Brain MR Image Segmentation

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Conventional fuzzy c-means (FCM) algorithm is highly vulnerable to noise due to not consider the spatial information in image segmentation. This paper aims to develop a Gaussian spatial FCM (gsFCM) for the segmentation of brain magnetic resonance (MR) images. The proposed algorithm uses fuzzy spatial information to update fuzzy membership with a Gaussian function. Proposed method has less sensitivity to noise specifically in tissue boundaries, angles and borders than spatial FCM (sFCM). Furthermore by the proposed algorithm a pixel which is anatomically a distinct tissue for example a tumor in preliminary stages of its appearance, has more chance to be a unique cluster. The quantitative assessment of presented FCM techniques is evaluated by conventional validity functions. Experimental results show the efficiency of proposed algorithm in segmentation of MR images.