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Robust fuzzy c-means clustering algorithmusing non-parametric Bayesian estimation in wavelet transform domain for noisy MR brain image segmentation

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Abstract: The major drawback of the fuzzy c-means (FCM) algorithm is its sensitivity to noise. The authors propose a new extended FCM algorithm based a non-parametric Bayesian estimation in the wavelet transform domain for segmenting noisy MR brain images. They use the Bayesian estimator to process the noisy wavelet coefficients. Before segmentation based on FCM algorithm, they use an a priori statistical model adapted to the modelisation of the wavelet coefficients of a noisy image.The main objective of this wavelet-based Bayesian statistical estimation is to recover a good quality image, from a noisy imageof poor quality. Experimental results on simulated and real magnetic resonance imaging brain images show that their proposed method solves the problem of sensitivity to noise and offers a very good performance that out performs some FCM-based algorithms.

Keywords : fuzzy C-means algorithm, Non-Parametric Bayesian Estimation, Wavelet transform, image segmentation, MR Brain Images