Research Article

# Molecular Image Segmentation Based on Improved Fuzzy Clustering

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## Abstract

Segmentation of molecular images is a difficult task due to the low signal-to-noise ratio of images. A novel two-dimensional fuzzy C-means (2DFCM) algorithm is proposed for the molecular image segmentation. The 2DFCM algorithm is composed of three stages. The first stage is the noise suppression by utilizing a method combining a Gaussian noise filter and anisotropic diffusion techniques. The second stage is the texture energy characterization using a Gabor wavelet method. The third stage is introducing spatial constraints provided by the denoising data and the textural information into the two-dimensional fuzzy clustering. The incorporation of intensity and textural information allows the 2DFCM algorithm to produce satisfactory segmentation results for images corrupted by noise (outliers) and intensity variations. The 2DFCM can achieve $0.96\pm0.03$ segmentation accuracy for synthetic images under different imaging conditions. Experimental results on a real molecular image also show the effectiveness of the proposed algorithm.

Abstract

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