

Threshold dynamics for the piecewise constant Mumford–Shah functional of image segmentation

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Abstract

Image segmentation is a fundamental procedure of computer vision. It forms a crucial preliminary step in extracting useful information from digital images. Given an image, its goal is to determine the regions that contain different objects. One of the most successful mathematical models for segmentation is the variational model of Mumford and Shah. We propose an efficient algorithm for minimizing the piecewise constant version of the Mumford–Shah functional. It is based on the threshold dynamics of Merriman, Bence, and Osher for evolving an interface by its mean curvature. We show that a very fast minimization can be achieved by alternating the solution of a linear parabolic partial differential equation and simple thresholding. This is joint work with Richard Tsai.