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Title :

Efficient Segmentation of Piecewise Smooth Images

Abstract :

We propose a fast and robust segmentation model for piecewise smooth images. Rather than modeling each region with global statistics, we introduce local statistics in an energy formulation. The shape gradient of this new functional gives a contour evolution controlled by local averaging of image intensities inside and outside the contour. To avoid the computational burden of a direct estimation, we express these terms as the result of convolutions. This makes an efficient implementation via recursive filters possible, and gives a complexity of the same order as methods based on global statistics. This approach leads to results similar to the general Mumford-Shah model but in a faster way, without solving a Poisson partial differential equation at each iteration. We apply it to synthetic and real data, and compare the results with the piecewise smooth and piecewise constant Mumford-Shah models.