Parallel Segmentation of Large Images via Level Sets

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In several applications like remote sensing or medical imaging, a fast and accurate segmentation of large two or three dimensional images into a a priori unknown number of classes (i.e. segments) is wanted. The aim is to find homogeneous regions Ω^i and their boundaries Γ inside a given, possibly noisy two or three dimensional image $g : \Omega \to [0, 1]$ and a piecewise constant approximation u to g which is constant inside of the segments Ω^i but may jump across the boundary Γ. We present a parallel adaptive finite element algorithm for segmentation of large images with automatic adjustment of the maximal number of possible classes, which scales close to optimal. It is based on a level set formulation of the Minimal Partition approach proposed by Chan and Vese and suitable also for two and three dimensional multichannel data.

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