

Energy based Active-Contours Methods for Scientific Image Segmentation

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Segmentation is a process used to identify objects within an image, including their boundary and other properties. Therefore, it serves as a key component in many image processing workflows, including scientific observation purposes. Most traditional methods use gradient information to extract object features and perform segmentation. However, there are drawbacks with such methods as they fail in the presence of noise, when object boundaries cannot be identified with gradients or even present convergence problems and numerical instability.

The talk will present the Chan-Vese Active Contour approach for image segmentation and why it is a great fit for astrophysical image processing. The method is based on level-set functions for contour representation and variational calculus for energy minimization (Euler-Lagrange). Further extensions of the method for multi-phase images and a statistical interpretation will be presented as well.

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