

Title: Segmentation of microscopic images using level set methods

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Abstract:

This master thesis presents a new method for segmentation of phase-contrast microscopic images of cells. The goal is to segment the cells from the background.

The algorithm is based on the variational formulation of the level set method, i.e. minimizing of a functional, which describes the level set function. The functional is minimized by a gradient flow described by an evolutionary partial differential equation.

The most significant new ideas are initialization using thresholding and introducing new terms that speed up the convergence and achieve more accurate results. Moreover, we speed up the evaluation of gradient and Laplace operator using new functions written in C language. The new implementation is three times faster than the standard functions in MATLAB.

We compared the results with other algorithms and we achieved better accuracy.

Keywords: Segmentation, level set methods, active contours