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Flux Maximizing Geometric Flows

A number of geometric active contour and surface models have been proposed for shape segmentation in computer vision. The essential idea is to evolve a curve (in 2D) or a surface (in 3D) so that it clings to the features of interest in an intensity image. However, in practice these models often fail on images of low contrast or narrow structures. To address this problem we maximize the rate of increase of flux of an auxiliary vector field through a closed curve (2D) or closed surface (3D). This leads to an interpretation as a gradient flow, which is essentially parameter free. We illustrate its potential with level-set based segmentations of blood vessels in magnetic resonance angiography (MRA) and computed rotational angiography (CRA) data.