A maximum-flow model for digital elastica shape optimization

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Abstract

The Elastica is a curve regularization model that integrates the squared curvature in addition to the curve length. It has been shown to be useful for contour smoothing and interpolation, for example in the presence of thin elements.
In this article, we propose a graph-cut based model for optimizing the discrete Elastica energy using a fast and efficient graph-cut model. Even though the Elastica energy is neither convex nor sub-modular, we show that the final shape we achieve is often very close to the globally optimal one.
Our model easily adapts to image segmentation tasks. We show that compared to previous works and state-of-the-art algorithms, our proposal is simpler to implement, faster, and yields comparable or better results.

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