Automatic Parameter Estimation for Graph-Cut Chan-Vese for Fluorescence Image Binarization

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Abstract

Motivation The detailed analytical studies of microscopic organisms and such have played a vital role in a host of fields ranging from the simple curiosity of what goes on at the mirco-level to studying the behaviour of cancerous cells. Fluorescence images are generated by the thousands to study these phenomena. The rate at which we're able to gather data outweighs the rate at which we're able to accurate study it. The key to efficient and effective study lies heavily on the ability to bring into focus what is needful and discard everything else. In the study of fluorescence images, it is absolutely critical that the object be segmented accuratetly and quickly. The optical challenges present in fluorescence images make it a very unique class of image data, as such, other segmentation parameters settings cannot be readily applied to it. One must start at the ground level to find the optimal parameters for accurate segmentation; which is tedious and an ineffective use of time. There is also a large variance in the types of images within the set of fluorescence images and hard-coded parameters are quick to hit a brick wall, and once again it is back to the drawing board for searching out the correct parameters for segmentation. **Purpose** The purpose of this study is too investigate the properties of fluorescence images and leverage that understanding to develop a technique that is able to autoatically produce image-specific accurate parameter settings for segmentation of the object of interest. **Proposition** In this paper, we present a novel parameter estimation technique for the graph cut implementation of the Chan-Vese approximation of the Mumford-Shah functional for image segmentation. **Results** The effectiveness of the technique is demonstrated through a set of experiments with real images. These images are chosen such that the set has broad coverage wit the type of images that are commonly obtained in fluorescence imaging. We pit our approach against two other common paramter settings. Our approach proves superior and highly robust for a large range of image types.

Keywords

Image segmentation, graph cuts, fluorescence, active-contours, Chan-Vese.

I. Introduction

Lay the foundation to present the problem. Present the problem. What solution do we seek. Scope of the paper. Other tried approaches. What are their weaknesses? What did they sacrifice to get that scheme or result. What schemes will we be competing with. Organisation.

II. Unsupervised Parametric Graph-Cut Segmentation

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III. Graph-Cut Model for Chan-Vese Segmentation

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IV. Chan-Vese Parameter Estimation for Graph-Cuts

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A. Proposed Technique

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B. Optimisation

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V. Experimental Results

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A. Learning Parameters on Learning Data Set

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B. Testing Parameters on Test Data Set

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VI. Conclusion

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APPENDIX A
PROOF OF THE FIRST ZONKLAR EQUATION

Some text for the appendix.

ACKNOWLEDGMENT

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REFERENCES

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