

Accepted Manuscript

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PII: S0925-2312(17)30253-9
DOI: [10.1016/j.neucom.2016.07.077](https://doi.org/10.1016/j.neucom.2016.07.077)
Reference: NEUCOM 18049



To appear in: *Neurocomputing*

Received date: 25 January 2016
Revised date: 27 June 2016
Accepted date: 16 July 2016

Please cite this article as: Yitian Zhao, Jingliang Zhao, Jian Yang, Yonghuai Liu, Yifan Zhao, Yalin Zheng, Likun Xia, Yongtian Wang, Saliency Driven Vasculature Segmentation with Infinite Perimeter Active Contour Model, *Neurocomputing* (2017), doi: [10.1016/j.neucom.2016.07.077](https://doi.org/10.1016/j.neucom.2016.07.077)

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Saliency Driven Vasculature Segmentation with Infinite Perimeter Active Contour Model

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Abstract

Automated detection of retinal blood vessels plays an important role in advancing the understanding of the mechanism, diagnosis and treatment of cardiovascular disease and many systemic diseases, such as diabetic retinopathy and age-related macular degeneration. Here, we propose a new framework for precisely segmenting retinal vasculatures. The proposed framework consists of three steps. A non-local total variation model is adapted to the Retinex theory, which aims to address challenges presented by intensity inhomogeneities, and the relatively low contrast of thin vessels compared to the background. The image is then divided into superpixels, and a compactness-based saliency detection method is proposed to locate the object of interest. For better general segmentation performance, we then make use of a new infinite active contour model to segment the vessels in each superpixel. The proposed framework has wide applications, and the results show that our model outperforms its competitors.

Keywords: Saliency, Retinex, Active Contour, Vascular Segmentation.

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