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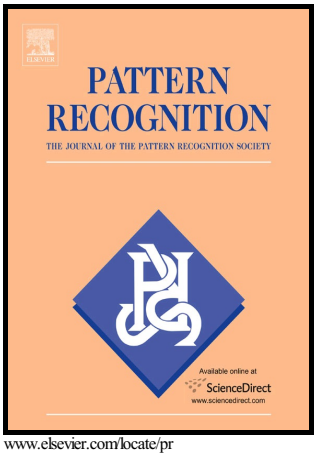

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Optic Disc Segmentation based on Variational Model with Multiple Energies

Baisheng Dai[a], Xiangqian Wu[a,*], Wei Bu[b]

[a]*School of Computer Science and Technology, Harbin Institute of Technology, Harbin 150001, China*
[b]*Department of New Media Technologies and Arts, Harbin Institute of Technology, Harbin 150001, China*

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Abstract

Accurate and reliable optic disc (OD) segmentation is important for retinal image analysis and retinal disease screening. This paper presents a novel method to automatically segment OD in fundus images based on variational model with multiple energies. Firstly, a sparse coding based technique is designed to localize the OD center, based on which an initial boundary curve is then estimated by a circular Hough transform. Next, OD segmentation is regarded as an energy minimization problem, and a variational model integrating three energy terms is proposed to evolve the curve to the OD boundary. In the proposed model, the first term, named phase-based boundary energy, is designed to attract the evolution curve to the OD boundary, even the one with low contrast; the second term, named PCA-based shape energy, constraints the evolution curve to a common OD shape, which can suppress the negative effect of bright interferences, e.g., the bright lesions and myelinated nerve fibers, in OD segmentation; the last one is the region energy, which

*Corresponding author.
Email address: xqwu@hit.edu.cn (Xiangqian Wu)

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