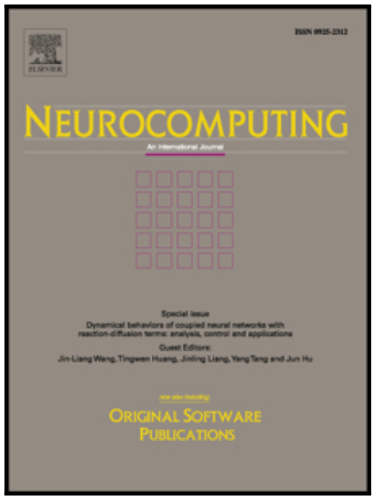
Communicated by Dr Bo Du

Accepted Manuscript



Exudate-based Diabetic Macular Edema Recognition in Retinal Images using Cascaded Deep Residual Networks

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PII: S0925-2312(18)30170-X
DOI: 10.1016/j.neucom.2018.02.035
Reference: NEUCOM 19325

To appear in: *Neurocomputing*

Received date: 12 August 2017
Revised date: 15 December 2017
Accepted date: 8 February 2018

Please cite this article as: Juan Mo, Lei Zhang, Yangqin Feng, Exudate-based Diabetic Macular Edema Recognition in Retinal Images using Cascaded Deep Residual Networks, *Neurocomputing* (2018), doi: 10.1016/j.neucom.2018.02.035

Exudate-based Diabetic Macular Edema Recognition in Retinal Images using Cascaded Deep Residual Networks

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Abstract

Diabetic macular edema (DME), one of the leading causes of visual impairment and blindness, is usually diagnosed by the presence of exudates. However, exudate detection is challenging due to the large intraclass variation and high interclass similarity. To overcome these challenges, we propose the cascaded deep residual networks to recognize DME. Specifically, we first design a fully convolutional residual network that fuses multi-level hierarchical information to segment exudates accurately with a fast speed. Compared with previous methods, our approach avoids a wide range of preprocessing or postprocessing steps, reducing the impact of subjective factors. Then based on the segmentation results, the region centered on the pixel with the maximum probability is cropped and fed into the other deep residual network (for classification) to distinguish DME from its hard mimics. This makes the classification network to extract more representative features based on the segmentation results instead of the original images, further reducing the influence of complicated background. We evaluate the proposed method on two publicly available databases, the HEI-MED and e-ophtha EX databases. Extensive experiments demonstrate that our approach achieves better performance than the state-of-the-art methods with a fast processing speed, making it suitable for real-world clinical applications.

Keywords: diabetic macular edema recognition, fully convolutional network, residual learning, retinal image, exudate segmentation

1. Introduction

Diabetic retinopathy (DR) is one of the leading causes of blindness in the working-age population of the developed world. The World Diabetes Foundation estimates that there will be 438 million people worldwide suffering from

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