AUTOMATIC DETECTION OF RED LESIONS IN RETINAL FUNDUS IMAGES

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Abstract

DR is one of the important causes of permanent blindness of the eyes [1] caused by long term diabetes. One-third number of diabetic patients come under DR and one-tenth of them face the severity of permanent vision loss. Early detection and timely management could help to preserve vision in individuals with DR. An automated detection system with computerized analysis of retinal fundus images could help diagnosis of DR and follow-up of DR. The first clinically identifiable sign of DR is microaneurysm and its detection at an early stage is very important.

Deep learning techniques achieved better performance in object detection and segmentation. A novel multi-scale feature pyramid network is developed for automatic detection of red lesions from retinal fundus images. The multi-scale features are extracted using the feature pyramid network. Attention augmented feature pyramid network is developed to detect microaneurysms. The network is end-to-end trainable in image level with several scales and works with acceptable performance.

The proposed segmentation architecture uses informative training images and can accurately segment red lesions present in fundus images with a minimum number of false-negative candidates. The false-posive cadidate also reduces to a large extent in this method.The technique used in this work can successfully segment the mico-aneurysms with a small number of false-positive candidates. With the help of this technique, we can detect DR in the early stage and prevent permanent blindness due to DR.In the case of non-proliferative DR, this computer-based diagnosis technique becomes helpful for an opthalmologist making clinical decisions.

Keywords: Deep learning, Diabetic reinopathy, Referable diabetic reinopathy, Retinal fundus image analysis Red lesions, Screening of diabetic reinopathy