Diabetic retinopathy classification using a novel DAG network based on multi-feature of fundus images

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Abstract

Diabetic retinopathy is a kind of ophthalmic disease induced by diabetes, which is a chronic progressive disease affecting vision and even causing blindness. The features of diabetic retinopathy are of great significance to the effective diagnosis and prognosis of ophthalmologists. This paper proposes a novel DAG network model for the classification of diabetic retinopathy based on multi-feature fusion of fundus images. Firstly, under the advice of the doctor, three indicative features of diabetic retinopathy are extracted using different algorithms: retinal hemorrhagic plaque, fundus neovascularization, and retinal varices. Then three features are sent to a classification model based on a novel DAG network for realizing multi-feature fusion and feature learning. Finally, the optimized classification model is used to recognize and classify diabetic retinopathy. DIARETDB1 dataset and real hospital data from Dalian NO.3 People's Hospital are used to evaluate the performance of the proposed method. For the DIARETDB1 dataset and real hospital data, the accuracy can reach 98.7% and 98.5%, respectively. The proposed model has high efficiency and practical application, which can assist doctors in the diagnosis and treatment of diabetic retinopathy.

Merits

Multiple features with DAG (Directed Acyclic Graph) network is used, the accuracy of the model can reach 98.7% and 98.5%.

DIARETDB1 dataset and real hospital data from Dalian NO.3 People's Hospital are used to evaluate the performance of the proposed method.

Contrast limited adaptive histogram equalization is proposed to enhance the local contrast of retinal hemorrhagic plaque.

Demerits

Taking multiple parameters, this method has a high computational complexity and the image resolution must be good to preprocess the data.