

Fast Retinopathy Detection and Classification of Retinas into Healthy and Pathological using the Technique of Spatial Transformation

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Abstract

Diabetic retinopathy (DR) is a diabetic complication that affects the retina of the eye. Due to the accumulation of sugar in the blood, the blood vessels in the retina can bleed. This condition requires proper monitoring and treatment to prevent vision loss. Using the Spatial Transformer Network (STN) method connected to a convolutional neural network (CNN), retinal images are correctly aligned to accurately identify and diagnose lesions associated with this condition. The STN can learn to refocus the images to find the relevant areas that indicate the occurrence of microaneurysms, hemorrhages or exudates. This refocusing is achieved through spatial transformations, and the STN contributes to improved accuracy and efficiency in finding lesions. We used a public dataset which contains samples of fundus images of both the healthy eye and the eye with DR. In this study, we verify which neural architecture is the most performing and efficient, using performance evaluation metrics and execution times. The proposed technique, Trans-NeuroVision Area (TNVA), helps in the prompt detection and categorization of retinas into healthy and problem ones.

Keywords: Diabetic retinopathy; Image processing; Spatial Transformer Network; Interest zones; Convolutional neural network

