EYESIGHT AI: A REVIEW OF DEEP LEARNING BASED IMAGE CLASSIFICATION METHODS FOR RETINAL DISEASE DETECTION USING FUNDUS IMAGES

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Abstract:

Retinal diseases are a major cause of vision impairment worldwide, and early diagnosis is essential for effective treatment and prevention of vision loss. With the rapid advancement of deep learning, automated retinal image analysis using fundus and optical coherence tomography (OCT) images has become an important research area. In recent years, many researchers have proposed deep learning based image classification models for retinal disease detection using convolutional neural networks, transfer learning frameworks, and ensemble learning strategies. However, differences in model architectures, preprocessing pipelines, datasets, and evaluation methods lead to varying performance and practical limitations.

This review paper presents a structured survey and comparative analysis of recent deep learning approaches for automated retinal disease classification reported in the last few years. The study examines existing methods with respect to network architectures, transfer learning backbones, data preprocessing techniques, training strategies, and performance metrics. Reported advantages and limitations of different approaches are analyzed to identify current research trends and gaps. Based on insights from the reviewed literature, an implementation-oriented framework, referred to as EyeSight AI, is outlined to demonstrate how transfer learning and ensemble-based prediction techniques can be integrated into a practical retinal screening support system. This review aims to provide a consolidated understanding of current computational intelligence techniques and highlight future directions in automated retinal diagnostics.

Keywords:

Deep Learning, Retinal Disease Detection, CNN, Transfer Learning, Fundus Image Analysis.