

Title: Bio-inspired Heuristic Optimization-based Cascaded Network for Diabetic Retinopathy Screening(Conference Paper)

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Abstract

Diabetic retinopathy (DR) is a common yet fatal complication of diabetic patients in which high levels of blood sugar damage the blood vessels in the retina, the light-sensitive eye tissue crucial for human vision. Early detection and timely intervention are essential to managing DR and preventing severe vision loss. Traditionally, the examination is performed by ophthalmologists manually examining the retinal fundus images to check for signs of DR. This approach is helpful but subjective, time-consuming and tedious. Artificial intelligence (AI)-guided computer vision has recently become very compelling and practical for image analysis and diagnosis. Existing AI-based methods achieved sufficient accuracy at the cost of high computing resources and large datasets. This paper proposes a cascaded network incorporating deep learning and the traditional machine learning approaches with a bio-inspired heuristic optimization algorithm for DR detection from fundus images. The proposed method achieved sufficient accuracy (97.1%) when trained using limited data and low computing machines. The AI models for the cascaded networks were selected through an exhaustive search in which five popular CNN models were used for extracting features; the Bacterial foraging optimization (BFO) was used to determine optimal features, and seven traditional machine models were used to detect the DR. The ResNet50-BFO-SVC cascaded network was found to be most suitable in this study. The proposed

cascaded network brings efficiency, accuracy, scalability, and robustness to DR screening. © 2024 IEEE.

Author keywords

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