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Review

Analysis on diagnosing diabetic retinopathy by segmenting blood vessels, optic disc and retinal abnormalities

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Abstract

The main intention of mass screening programmes for Diabetic Retinopathy (DR) is to detect and diagnose the disorder earlier than it leads to vision loss. Automated analysis of retinal images has the likelihood to improve the

efficacy of screening programmes when compared over the manual image analysis. This article plans to develop a framework for the detection of DR from the retinal fundus images using three evaluations based on optic disc, blood vessels and retinal abnormalities. Initially, the pre-processing steps like green channel conversion and Contrast Limited Adaptive Histogram Equalisation is done. Further, the segmentation procedure starts with optic disc segmentation by open-close watershed transform, blood vessel segmentation by grey level thresholding and abnormality segmentation (hard exudates, haemorrhages, Microaneurysm and soft exudates) by top hat transform and Gabor filtering mechanisms. From the three segmented images, the feature like local binary pattern, texture energy measurement, Shanon's and Kapur's entropy are extracted, which is subjected to optimal feature selection process using the new hybrid optimisation algorithm termed as Trial-based Bypass Improved Dragonfly Algorithm (TB – DA). These features are given to hybrid machine learning algorithm with the combination of NN and DBN. As a modification, the same hybrid TB – DA is used to enhance the training of hybrid classifier, which outputs the categorisation as normal, mild, moderate or severe images based on three components.

Keywords: Diabetic retinopathy detection, optic disc, blood vessels, retinal abnormalities, trial-Based Bypass Improved Dragonfly Algorithm

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Additional information

Disclosure statement

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