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Impact of hybrid neural network on the early diagnosis of diabetic retinopathy disease from video-oculography signals

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Highlights

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This study constitutes a new attempt to introduce two hybrid artificial neural network models with particle swarm optimization algorithm for early diagnosis of diabetic retinopathy based on the Video-Oculography (VOG) signals.

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Discrete wavelet transform and Hilbert–Huang transform methods were utilized through Video-Oculography signal decomposition for feature extraction.

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The proposed hybrid models suggest a clear advantage for the detection of diabetic retinopathy disease levels, which is crucial for the patients with diabetes.

Abstract

In this study, we introduce two hybrid artificial neural network models with particle swarm optimization algorithm to diagnose diabetic retinopathy based on the Video-Oculography signals. The hybrid models use Discrete Wavelet Transform and Hilbert-Huang Transform separately to extract features from the signals. The classification performance of both models is analyzed comparatively. We show that the model based on Hilbert–Huang Transform exhibits better classification performance than the model based on the Discrete Wavelet Transform.

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Keywords

Video-oculography

Diabetic retinopathy

Wavelet transform

Hilbert–Huang transform

Artificial neural network

Particle swarm optimization