ECG noise reduction technique using antlion optimizer (ALO) for heart rate monitoring devices

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ABSTRACT

The electrocardiogram (ECG) signal is susceptible to noise and artifacts and it is essential to remove the noise in order to support any decision making for specialist and automatic heart disorder diagnosis systems. In this paper, the use of Antlion Optimization (ALO) for optimizing and identifying the cutoff frequency of ECG signal for low-pass filtering is investigated. Generally, the spectrums of the ECG signal are extracted from two classes: arrhythmia and supraventricular. Baseline wander is removed using the moving median filter. A dataset of the extracted features of the ECG spectrums is used to train the ALO. The performance of the ALO with various parameters is investigated. The ALO-identified cutoff frequency is applied to a Finite Impulse Response (FIR) filter and the resulting signal is evaluated against the original clean and conventional filtered ECG signals. The results show that the intelligent ALO-based system successfully denoised the ECG signals more effectively than the conventional method. The percentage of the accuracy increased by 2%.

KEYWORD
Antlion optimization (ALO); electrocardiogram (ECG); finite impulse response (FIR); cutoff frequency
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