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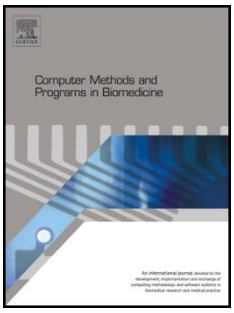

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Enhancement of Lung Sounds Based on Empirical Mode Decomposition and Fourier Transform Algorithm

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Highlights

- A new lung sound enhancement technique is proposed based on EMD framework and prediction algorithm.
- Heart sound locations in the lung sound signal are detected using Hilbert Heron Algorithm (HHA).
- The missing values of lung sound signal are estimated using Fast Fourier Transform (FFT) based prediction algorithm.
- The proposed method gives a superior performance than the baseline method.

Abstract

Background and Objective: There is always heart sound (HS) signal interfering during the recording of lung sound (LS) signals. This obscures the features of LS signals and creates confusion on pathological states, if any, of the lungs. In this work, a new method is proposed for reduction of heart sound interference which is based on empirical mode decomposition (EMD) technique and prediction algorithm. **Method:** In this approach, first the mixed signal is split into several components in terms of intrinsic mode functions (IMFs). Thereafter, HS-included segments are localized and removed from them. The missing values of the gap thus produced, is predicted by a new Fast Fourier Transform (FFT) based prediction algorithm and the time domain LS signal is reconstructed by taking an inverse FFT of the estimated missing values. **Results:** The experiments have been conducted on simulated and recorded HS corrupted LS signals at three different flow rates and various SNR levels. The performance of the proposed method is evaluated by qualitative and quantitative analysis of the results. **Conclusions:** It is found that the proposed method is superior to the baseline method in terms of quantitative and