

Robust Heart Sounds Segmentation Based on the Variation of the Phonocardiogram Curve Length

Authors : Mecheri Zeid Belmecheri, Maamar Ahfir, Izzet Kale

Abstract : Automatic cardiac auscultation is still a subject of research in order to establish an objective diagnosis. Recorded heart sounds as Phonocardiogram signals (PCG) can be used for automatic segmentation into components that have clinical meanings. These are the first sound, S1, the second sound, S2, and the systolic and diastolic components, respectively. In this paper, an automatic method is proposed for the robust segmentation of heart sounds. This method is based on calculating an intermediate sawtooth-shaped signal from the length variation of the recorded Phonocardiogram (PCG) signal in the time domain and, using its positive derivative function that is a binary signal in training a Recurrent Neural Network (RNN). Results obtained in the context of a large database of recorded PCGs with their simultaneously recorded ElectroCardioGrams (ECGs) from different patients in clinical settings, including normal and abnormal subjects, show a segmentation testing performance average of 76 % sensitivity and 94 % specificity.

Keywords : heart sounds, PCG segmentation, event detection, recurrent neural networks, PCG curve length

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