Automatic heart diseases detection techniques using musical approaches

ABSTRACT

In this study, a musical approach to provide an automatic heart disease detection system is proposed. Heart sounds are recorded with audio format. Audio files are converted to semistructured music files that can be represented textually. Samples were captured from different heart diseases and were stored in a database. Two different approaches which are information retrieval based on n-gram and longest common subsequence are used to retrieve the similarity of a given sample with existing heart diseases in the database. Since the frequency of heart sound is relative to age and physical characteristics of a patient, an important feature of using n-gram in this study is to retrieve diseases without respect to the different heart sounds frequencies. The effects of window sizes for n-gram approach on the accuracy of the information retrieval were tested and a proper window size was extracted. The results of the performed experiments showed that window size of 5 notes revealed a high performance in comparison with other window sizes. Hence, the proposed technique can detect and recognize a heart disease with a reliable accuracy. Average of precision values for around 85% in information retrieval and 55% in longest common subsequence technique were obtained for the retrieval of heart sound categories. Moreover, the results of string matching technique demonstrated that threshold level of 65% could appropriately detect heart disease.

Keyword: Heart disease; Heart sound; Multimedia; Music information retrieval; Signal preprocessing