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Adaptive neuro fuzzy classifier for heart sounds

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Adaptive Neuro Fuzzy Classifier for Heart Sounds

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Keywords

Phonocardiogram (PCG), envelopgram, neural network, fuzzy, hybrid system, ANFIS

Abstract

Classification of heart sounds for correct medical diagnosis without any human intervention is the most vital aspect of automatic heart auscultations. Various classifier designs based on statistical, artificial Neural Networks, Hidden Markov and other methods have been proposed earlier however performance of these classifiers is erratic under different circumstances. Highly nonstationary nature of heart sound signals demand intelligent systems that combine knowledge, techniques and methodologies to distinguish heart sounds of patients with different pathologies in a manner similar to a physician. This paper proposes an aboriginal approach for the classification of heart sounds using neuro-fuzzy techniques. The basic aim of research has been on design of complementary hybrid intelligent system able to possess humanlike expertise which is able to adapt itself and perform better in changing environment. Classifier design is based on neuro-fuzzy principles for their ability to incorporate human knowledge by using variety of computing techniques synergistically. From the envelogram of the phonocardiogram different distinguishing features are extracted which are used as input to the classifier. Network is then trained with about sixty percent of the total data available while the remaining data is used in testing and validation. Classifier output is very encouraging with high rate of correct identification of S1s, S2s, S3s, murmurs and stenosis. Results are far better than conventional classifiers under different circumstances.

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