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Automatic technique of cardiac arrhythmia detection

Using neural network

by

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Abstract

The Electrocardiogram (ECG) is the most clinically used biological signal and it is the detecting several cardiac diseases and abnormalities. Among various abnormalities related with functioning of the human heart .this study proposed method 3 for ECG classification ,It consist of three distinct stages .in the first stage a preprocessing different Steps is done to remove the baseline wander, power line interference and to enhance morphological properties.

secondly wavelet transform implemented to extract features of each peak in ECG signal in the final stage Neural Networks are applied to identify the diseases. Back-Propagation algorithm is used to train the network.

In our implementation, the MITBIH Arrhythmia Database, which is the most popular standard database and the most widely used in ECG classification, was used the performance of the proposed method has been evaluated in terms of accuracy and specific accuracy. The experimental result have shown that the proposed system achieves validity as competitive result of ECG signal classification were 95.0%.

Keyword: electrocardiogram(ECG), wavelet transform, neural networks, MITBIH Arrhythmia Database.

الملخص :

جهاز رسم القلب مهم جدا يستخدم اشاره حيويه ويتم استخدامه في تحديد العديد من امراض القلب والمشاكل الغير طبيعيه فيه والتي تؤثر علي وظائف قلب الانسان.

هذه الدراسه تقترح طريقه لتصنيف اشاره القلب وهي تحتوي علي ثلاثه مراحل:

المرحله الاولى هي ماقبل المعالجه والتي يتم فيها ازاله الضجيج وتحسين الخواص التشكليه للاشاره , المرحله الثانيه يتم تنفيذ خاصيه تحويل المويجات لاستخراج خصائص كل أي قمة في كل اشاره قلب اما المرحله الاخير ه تم تطبيق الشبكه العصبية لتصنيف الامراض وتم استخدام نوع معين منها .

لتنفيذ هذه الدراسه ومن ثم تصنيف اشاره القلب تم استخدام اشهر قاعده بيانات وأكثرها استخداما وكانت نتيجته هذه التجربه تم الحصول علي دقه قدرها 95.0%.



1-1 Introduction:

An ECG is a graphic representation of the electrical activity of the heart muscle. ECG is the main diagnostic approach for cardiac rhythm evaluation. Cardiac arrhythmia is the disturbance in the regular rhythmic activity of the heart [2]. Different characteristics such as shapes, interval and amplitudes of ECG reflect different arrhythmias [3]. Arrhythmia may be caused by irregular firing patterns from the sinoatrial (SA node) or due to abnormal activity from other parts of the heart and indicates a serious problem that may lead to stroke or sudden cardiac death [4]. The vital and weight bearing types of arrhythmia are ventricular tachycardia, ventricular fibrillation, premature ventricular contraction (PVC), right bundle branch block (R or RBBB) and left bundle branch block (L or LBBB) [5]. In the past few years, a lot of research has been carried out on the automatic classification of ECG. These attempted to characterize arrhythmia using various features, a set of wavelet transform coefficients, which contain the maximum information about the arrhythmia, is selected from the wavelet decomposition. These coefficients are fed to the back-propagation neural network which classifies the arrhythmias, presents the classification of cardiac arrhythmia based on the signal variation characteristic of each beat type [6].

1-2 Statement of the problem

ECG signal is complicated and sensitive to noise and the signal morphology is varying from one to other dependent on the age of patient and heart disease, so the chosen of digital filters parameters is difficult on (preprocessing) another reason we need very accuracy ways for feature extraction, that to lead to the best classification For ECG signal. the global advantage is make the heart disease diagnosis easiest.

1-3Objective

the objective of this study to developing automatic and fast arrhythmia diagnosis tools based classification by propose a novel method for ECG feature extraction (using discrete wavelet transform) and use accuracy way for classification (using neural network) ,Before that two steps we must apply preprocessing to remove or reduce the noise .

1-4Layout

This research containing six chapter

Chapter One general introduction , objective ,statement problem and this layout.

Chapter Two The oretical background of heart anatomy ,Electrocardiogram wavelet transform ,computer aided design , neural network and Arrhythmias inECG

Chapter Three literature reviews reviewing a number of previous trial classification of ECG signal .

Chapter Four methodology

Chapter Five result and discussion

Chapter Six conclusions and recommendations