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ABBREVIATIONS

AECG ambulatory Electrocardiogram

ANNs artificial neural networks

AV atrioventricular

CWT Continuous Wavelet Transform

DWT Discrete Wavelet Transform

ECG Electrocardiogram

ICT information and communication technologies

MLP Multilayer Perceptron

PWT Packet Wavelet Transform

PRD percentage root mean-square difference

SA sinoatrial

VLP ventricular late potential

WCT Wilson central terminal

WT Wavelet Transform

Abstract

ECG contains very important clinical information about the cardiac activities of heart. The features of small variations in ECG signal with time varying morphological characteristics needs to be extracted by signal processing method because there are not visible of graphical ECG signal.

In this work, we have developed and evaluated an electrocardiogram (ECG) feature extraction system based on the multi-resolution wavelet transform. The wavelet transform with scaling function more closely similar to the shape of the ECG (Daubechies wavelets (DWT) and Morlet (CWT)) signal achieved better detection. In the first step, the ECG signal was de-noised by removing the corresponding wavelet coefficients at higher scales. Then, QRS complexes are detected and each complex is used to locate the peaks of the individual waves, including onsets and offsets of the P and T waves which are present in one cardiac cycle. We evaluated the algorithm on MIT-BIH Database, the manually annotated database, for validation purposes. The proposed QRS detector achieved sensitivity of $99.18\%^{+}_{-}2.75$and a positive predictivity of $98.00\%^{+}_{-}4.45$over the validation database.

المستخلص

لأهمية المعلومات المعطاة من جهاز رسم تخطيط القلب ،والتي تبين نشاطات عضلة القلب ،والاختلافات الصغيرة في الإشارة الملتقطة من القلب ،والتي على أساسها يتم تشخيص أمراض القلب المختلفة.ولصعوبة اكتشاف الاختلافات من الرسم مباشرة ،مما أدى إلي معالجة الإشارة الملتقطة.وهدا أدى إلي التطور المستمر في عمليات التقاط ومعالجة إشارة القلب.
وفي هدا العمل تم استخدام تقنيات wavelet في تحليل وتشخيص الإشارة.حيث نبدأ بالتقاط الإشارة،والتخلص من التشويش الناتج من حركة الجسم أو العمليات الفسيولوجية داخل الجسم،ثم استخدمت تقنيات المويجات لتحديد PQRST،حيث نستخدم خوارزمية ونطبقها على قاعدة البيانات MIT-BIH Database ، وبمقارنة الإشارة الناتجة مع annotated database ، تم الحصول على النتائج:
(sensitivity of 99.18%$\pm$2.75and a positive predictivity of 98.00%$\pm$4.45over the validation database)