

Acknowledgements

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Abbreviations

SCD	Sudden Cardiac Death
ECG	Electro Cardio Graph
CPR	Cardiopulmonary Resuscitation
SCA	Sudden Cardiac Arrest
FIR	Finite Iimpulse Response
IIR	Infinite Impulse Response
FFT	Fast Fourier Transform
DFT	Discrete Fourier Transform
HRV	Heart Rate Variability
PSD	Power Spectral Density
ESD	Energy Spectral Density
CART	Classification and Regression Tree
ICD	Implantable Cardiac Device
GUI	Graphical User Interface
CSC	cross spectral coherence
SD	Standard Deviation

Abstract

Sudden cardiac death (SCD) is a condition in which the heart suddenly and unexpectedly stops beating. If this happens, blood stops flowing to the brain and other vital organs. SCD usually causes death if it's not treated within minutes.

In the out-hospital patients it is difficult to diagnose the SCD by escorts to revive the patient's, a new home healthcare system for prediction of sudden cardiac death was designed. Matlab simulation environment software was used for signal analysis. As the ECG signals are acquire from PhysioNet website, ECG signals are imported and passes through several processing steps. Noise was removed using bandpass filter, the fast Fourier transform was applied to extract the signal components. Then calculated and determine the power of ECG signals, classification tree was used to assess the ECG and the distinction between normal and risk of sudden cardiac death. The new system was found to be sensitive to predict a sudden death to save patients' lives. Diagnostic sensitivity was determined by gold standard in the system up to 91.3%.

المستخلص

الموت المفاجئ من القلب (SCD) هو الحالة التي يتوقف فيها القلب بصورة مفاجئة عن الخفقان. وعند حدوث ذلك يتوقف تدفق الدم الى الدماغ والأعضاء الحيوية الأخرى. SCD وعادة ما يتسبب بالموت إذا لم يتم علاجه في غضون دقائق. في حالة المرضى المصابين بامراض القلب خارج المستشفى نجد أنه من الصعب تشخيص SCD عن طريق المرافقين، لذلك تم تصميم نظام الرعاية الصحية المنزلية للتنبؤ الوفاة القلبية المفاجئة. تم استخدام برنامج بيئة محاكاة MATLAB لتحليل الاشارات. تم الحصول على إشارات تخطيط القلب من موقع PhysioNet. حيث جلبت إشارات تخطيط القلب ومرت عبر عدة خطوات للمعالجة. تمت إزالة الضوضاء الأولى ، باستخدام مرشح امرار الحزمة. بعد ذلك تم تطبيق تحويل فوريير السريع، لاستخراج مكونات إشارة في مجال التردد. ثم تم احتساب وتحديد طاقة إشارات تخطيط القلب، واستخدمت شجرة القرار لتصنيف وتقييم تخطيط القلب والتمييز بين العادي وخطر الوفاة القلبية المفاجئة. يُمكن نظام التنبؤ بالموت القلبي المفاجئ من اتخاذ تدابير لانعاش القلب وإنقاذ حياة المرضى. تم تحديد حساسية التشخيص من خلال gold standard في النظام التي تصل إلى 91.3 %.