A Semi-Automated QT Interval Measurement; A Novel Approach Based on Energy Analysis

In this paper, a new mathematical-based algorithm is presented in order to detect the QT interval using continuous wavelet transform (CWT). The Haar mother wavelet due to its advantage in preserving the morphology of ECG signals is used. The method is approved by rescaled wavelet coefficients. According to the previous works, the relation between the duration of ECG waves and their wavelet transforms are analytically derived. The proposed relations are used to determine QRS complex vicinity and to denoise ECG signal based on detected vicinity of QRS-complex. To determine T-wave domain, a simple mathematical sinusoid model for T wave is considered. Then, at each location between two successive QRS complexes which the variance of ECG signals and modeled T-wave becomes minimum, denotes T-wave vicinity. The concept of Rescaled Maximum Energy Density (RMED) of signals is used to determine onset and offset of QT-interval. RMED curve represents a region in the transform domain with the highest concentration of signal’s energy. This is slightly different from wavelet ridges which determine regions with a high concentration of energy. The special points in the RMED curve which RMED curve rises are called ‘rising points’. These points are used to determine the onset and offset of QT-interval. We evaluate the algorithm on the PTB database. The proposed multiscale approach is achieved about 7.35 ms of RMS error. The preliminary results are sent to PhysioNet/Computers in Cardiology Challenge 2004. The algorithm is semi-automated because at the first step the dominant scale is calculated by human.

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این صفحه به معنای تاییدیه نمایه سازی مقاله در پایگاه استنادی سیویلیکا می‌باشد. در هر لحظه به منطوق تایید اصلی این گواهی می‌توانید وضعیت تایید مقاله را از طریق لینک فوق به صورت آنلاین کنترل نمایید.