Cardiac Risk Assessment Based on QTc Speculation and Trending from Past References

Thomas Chee Tat Ho* and Xiang Chen

Singapore, Singapore

A method to construct a predictive time series index based on QTc-intervals is proposed in this paper. The research that surmounted to the formalization and creation of this method is based on previous papers accepted in this conference in 2007, titled Smart Phone-Based Automatic QT Interval Measurement and 2010, titled An Augmentative and Portable QTc-Observer(QTO-Q2) to Facilitate More Purposeful Outpatient Monitoring. Following the latter paper, the monitored ECG is converted into a RMSSD trend-line. In this method, the converted trend-line is used to extrapolate itself. The method extrapolates the next unknown RMSSD using a modified implementation of the Pearsons Correlation. The last (m-1)th amount of RMSSD in the priori is the 1st of the 2 time-series being compared in Pearsons Correlation; the second time-series is a running window of mth number of RMSSD from the 1st RMSSD to the (n-m-1)th RMSSD. The mth RMSSD of the 1st time-series is substituted by the mth RMSSD of the 2nd time-series before the comparison. During each comparison, the correlation computed between the 2 time series is maximized to 1. The last RMSSD of the 1st time series that has the maximum correlation after the comparisons is the predicted RMSSD. The method is reapplied together with the predicted RMSSD to obtain the next RMSSD. QTO-Q2 is then applied to the extrapolate trend-line to obtained a predictive risk outcome. The method was tested against the MIT-Arrhythmia Database. For record in the database, the first 15 minutes is the priori and the last 15 minutes is the ground truth. The task was to re-construct, based on the priori, the last 15 minutes. The re-constructed data is matched against the ground truth using Mahalanobis distance to validate the reconstructions accuracy. Using our method, the average Mahalanobis distance for all the records in the MIT-Arrhythmia Database is 0.1899.