

QRS complex detection based on multi wavelet packet decomposition

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Abstract :

We present in this paper a wavelet packet based QRS complex detection algorithm. Our proposed algorithm consists of a particular combination of two vectors obtained by applying a designed routine of QRS detection process using 'haar' and 'db10' wavelet functions respectively. The QRS complex detection routine is based on the histogram approach where our key idea was to search for the node with highest number of histogram coefficients, at center, which we assume that they are related to the iso-electric baseline whereas the remaining least number coefficients reflect the R waves peaks. Following a classical approach based of a calculated fixed threshold, the possible QRS complexes will be determined. The QRS detection complex algorithm has been applied to the whole MIT-BIH arrhythmia Database to assess its robustness. The algorithm reported a global sensitivity of 98.68%, positive predictive value of 97.24% and a percentage error of 04.12%. Eventhough, the obtained global results are not as excellent as expected, we have demonstrate that our designed QRS detection algorithm performs good on a partial selected high percentage of the whole database, e.g., the partial results, obtained when applying the algorithm on 85.01% of the whole MIT-BIH arrhythmia Database, are 99.14% of sensitivity, 98.94% of positive predictive value and 01.92% of percentage error.

Keywords : ECG signal; QRS complex; Wavelet packet transform; Histogram.

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