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Selected aspects on optimization of wavelet based QRS complex detection algorithm

Abstract.

Keywords:

Proposed article concerns the problem of robust and reliable QRS complex detection, which the essential task in the electrocardiography signal analysis. Due to the fact that electrocardiography diagnostic techniques are of a very high importance, they are commonly commented and discussed in the literature. As electrocardiography signal can evolve considerably even for a single subject, not mentioning possible differences occurring for different subjects, the problem becomes quite compound. The computer aided ECG signal analysis process starts with the QRS complex detection. The wavelet analysis is the mathematical tool that is commonly used for this purpose and what is of the foundation meaning it is one of the most effective apparatus in the field. One of the most popular wavelet for the QRS complex localisation is quadratic spline wavelet. Looking closer into the very beginning stage of the ECG signal analysis it turns out that the complexes can be of a huge variety of shapes. They represent different arrhythmia types. One can expect that different shapes of QRS complexes "produce" different values of the wavelet coefficients with different properties. The detection function that is desired to take high values at the presence of QRS complexes in the analysed signal and to take values that are close to zero outside these regions is also expected to be different for various types of QRS complexes. So it can be reasonable to evaluate the independent use of different types of wavelets beside the quadratic spline one. It because of the fact that different types of QRS complexes have different frequency spectrum properties (Fig. 1).
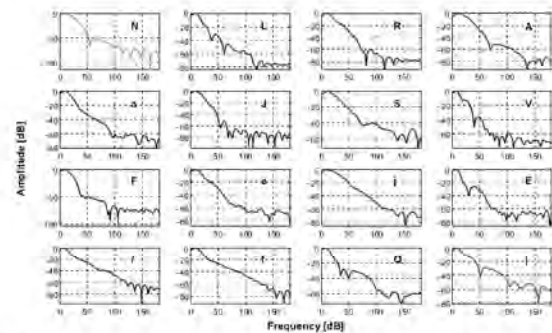

Fig.1. Different types of QRS complexes along with respective frequency spectra

The main goal of the experiments is to find optimal dynamics of the detection function for each particular type of QRS complex. Thus the reliability and robustness of the detection process can be strengthen.

REFERENCES

[1] Jóśko A. „Zastosowanie transformacji falkowej do lokalizacji zespołów QRS w zapisie elektrokardiograficznym" *Przegląd Elektrotechniczny / Electrical Review*, nr 05/2008.

[2] Jóśko A., "Evaluation of the QRS complex wavelet based detection algorithm", *Przegląd Elektrotechniczny / Electrical Review*, nr 05/2011
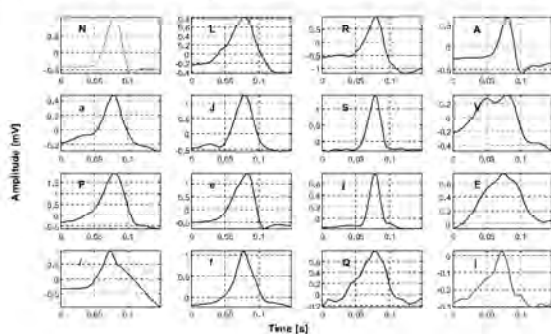
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