

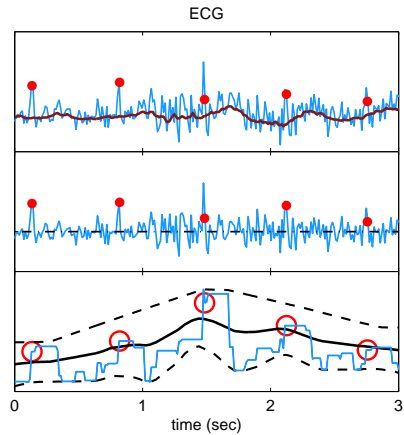
Robust Detection of Heart Beats using Dynamic Thresholds and Moving Windows

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Background: This contribution relates to the *PhysioNet/CinC Challenge 2014* on Robust Detection of Heart Beats in Multimodal Data. The aim is to locate heart beats in continuous long-term data.

Methods: The beat detection system consists of several parts. The preprocessing consists of a non-linear trimmed moving average filter for high pass filtering and standardization. Extrema of a moving window were used to capture the heart beat impulse. A windowed approach led to dynamic thresholds. Valid parts of the channels were determined and the location of beats were extracted. Followed by a dynamic delay correction for other channels than ECG, the beat locations of various channels were compared during the multichannel fusion procedure. Doubtful locations were checked using RR distances.



Exemplary beat extraction process.

Results: The preliminary algorithm was tested on the training data set for this challenge (composed of one hundred 10-minute recordings with various numbers of channels) and on the freely available MIT-BIH arrhythmia

database (forty eight 30-minute excerpts of two-channel ambulatory ECG recordings). The preliminary algorithm scored 93.20 applied to the hidden Phase I dataset of the 2014 PhysioNet challenge.

Performance of the preliminary algorithm

Division	Se	PPV	Overall
Training	99.94%	99.73%	99.84%
MIT-BIH	99.06%	99.68%	99.37%
Phase I	93.44%	93.76%	93.20%

Conclusion: The developed algorithm presents a promising approach to detect heart beats in multivariate records.