Data Driven Approach to ECG Signal Quality Assessment using Multistep SVM classification

Jakub Kuílek*, Michal Huptych, Václav Chudácek, Jirí Spilka and Lenka Lhotská

Prague, Czech Republic

In response to the PhysioNet/CinC Challenge 2011: Improving the quality of ECGs collected using mobile phones we have develop an algorithm based on arti?cial decision system. It combines couple of simple rules in order to discard recordings of obviously low quality (i.e. high-amplitude noise, detached electrodes) with more sophisticated support vector machine (SVM) classification that deals with more difficult cases where simple rules are inefficient.

SVM classifier is a linear classifier, easily implementable to mobile application. Nevertheless in our case we are using set of quite complex features in order to obtain classifier that is efficient as well as robust and thus speed of the algorithm will not be our priority.

Feature vector used by SVM classifier contains cross-correlation, wavelet entropy, eigen values, number of principal components, statistical characteristics of independent components, number of detected QRS complexes on each lead and heart rate variability. It also contains features calculated on orthogonal leads calculated from 12-lead ECG since it was observed that features from orthogonal leads are sufficient to describe noisy ECG recording thus enabling robust classification.

The initial score obtained on the Challenges test set B in task 1 was 0.701. For the final paper we will focus on identification of the problematic signals by adding ensemble classification and on enhancement of the feature selection algorithm.