

ECG Quality Rating for Mobile Devices

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For the Physionet Challenge 2011 we propose an algorithm that assesses the quality of a 12-lead ECG record. Since the algorithm is supposed to run on a mobile device with limited memory and processing power only simple mathematical operations are used. To derive the quality of a record the number of beats for each lead is extracted. The beat detection is based on three operations: first a mean filter is applied, segments of sharp changes in the signal are extracted and finally a threshold filter is applied. Parameters such as the filter size were obtained by visual validation. We count the number of beats per lead and calculate their average value and standard deviation. Those two parameters are the core features for quality assessment. Given the provided test data set and the two calculated features, a decision tree based on the statistical C4.5 classifier is generated. A 10-fold cross validation was used for a robust classification. If the number of beats is below or above a certain threshold, the record is classified as bad (no beats and too many beats respectively). If the number of beats is within an acceptable range, the second feature, the standard deviation, is considered. If its value is below a given threshold, the record is classified as good and bad otherwise. Calculating the number of peaks for each lead separately slows down the algorithm on single-core processors, however the overall computational complexity of our algorithm is linear ($O(n)$). We achieve preliminary scores of 0.776 on the training data (Set A) and 0.832 on the provided test data (Set B).