Multiscale Quality Control of Telemedicine ECG Signal Acquisition

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The Quality of electrocardiogram (ECG) recordings is critical to ensure the diagnosis of cardiovascular ailments. However, for telemedicine ECG recordings, especially those gathered by people with minimal training, it is difficult to control the ECG signal quality due to human errors, noises, artifacts and other extraneous factors. Few, if any, previous investigations have developed the mobile phone based algorithms for assessing the diagnostic quality of telemedicine ECG signals. This paper is aimed at designing classification algorithms to predict and estimate the quality of ECG signals in the Android smart phone based telemedicine system. We have developed a procedure based on multiscale ECG signal analysis and ensemble classification models. We used wavelet approaches to characterize the quality of ECG signals in various frequency bands. The proposed ensemble classification models implement a majority voting mechanism among base classifiers for quality decision making. In addition, we have also considered the balance between model performance and computational complexity in the Android smart phone based telemedicine system.