Decision Tree-based Model for Signal Quality Scanning in Wearable ECG

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With the development of wearable electrocardiogram (ECG) monitoring equipment, the ECG signal quality assessment algorithm is becoming critical. At present, there is no unified classification standard for signal quality assessment. Signal quality can be divided into three categories in this work: Class A, ECG waveform (P wave and T wave, QRS complex wave) is visible. Class B, the signal can only reliably detect QRS. Class C, the signal is not suitable for analysis.

Eigthteen features were analyzed. Three models based on the decision tree were trained arcorrding to diagnostic requirements for wearable ECG. In the first model, twelve practical features were used to select Class A and B. The single-lead wearable ECG monitoring device is a convenient means of monitoring arrhythmia, which can be used for disease screening only by RR interval analysis. In the second model, eight practical features are used to screen out Class A signals. Clean ECG waveforms are essential for the diagnosis of the disease. In the third model, seven practical features are used to classify Class A, B, and Class C.

The test results from the first model are as follows: Sp is 97.97%, Se is 99.80%. The results from the second model are 92.12% and 92.19%. The third model report that the Acc of A, B, and C are:90.74 %, 89.72%, and 97.60%. The results showed that models could evaluate the ECG signal quality to meet the need for disease screening and diagnosis.