Project Title:

The heart failure alarm system with ECG monitor

Background introduction:

In order to detect the real time heart failure ECG signal, the system will need to be able to distinguish the normal ECG signal with the heart failure ECG signal. MIT-BIH Normal sinus Rhythm Database is used as a baseline of the EKG signal of healthy people and the Sudden Cardiac Death Holter Database is used as the baseline of the heart attack. The database contains 15 records, each last about 5 minus. And each record is used as a training sample for the prediction.

For feature extraction:

The QRS complex is the most striking waveform with the ECG signal, it reflects the electrical activity within the heart during the ventricular contraction, times of its occurrence as will as its shape provide much more information about the current state of heart.

The second picture shows the waveform of a section of a ECG signal. And by using a bandpass filter and a differentiator, and doing a squaring process will extract the different wave type of the ECG signal.

1) Segment the each sample signal in about 10 second, and use the QRS algorithm to detect each type of wave. And then calculate the mean as one feature of the ECG signal

2) Use the approximate entropy as another feature

3) Then we will get 15 samples with these features

4) Since we do not know which kind of kernel function to use, then the sample features will be trained from using the linear kernel function then using cross-validation as an evaluation function if the correct rate reach 100 percent the system will stop from doing the second round of training and gives out the function it used to do the prediction.