

BLOCK DIAGRAM/METHOD*

This work is produced by OpenStax-CNXX and licensed under the Creative Commons Attribution License 2.0[†]

Abstract

Abstract

The project group began by obtaining MATLAB data on these five types of ECG signals. The signals obtained might be thought of as the ideal; that is they were completely free of noise, perfectly smooth, textbook examples of what each type of signal might look like. A random noise signal was then generated by use of a random number generator. The level of noise could be varied by adjusting the amplitude of this noise signal. The noise signal was then added to the ideal signals to create a simulation of the type of measurement that might be found in the real world. The group then applied filters and identification algorithms to see if the original signal could be correctly identified.

Our identification method worked as follows. To reduce noise we convolved the unknown signal with a sinc function of width seven. Seven was chosen because smaller values did not have adequate noise reduction and larger values had the adverse effect of essentially “smoothing out” the signal to too great a degree. We then took an inner product of the filtered signal with all of the idealized signals. Whichever inner product was the greatest we took to correspond with the correct signal. That is to say that if the inner product of the unknown signal and the sinus rhythm was greater than the inner product of the unknown signal with any other of our ideal signals we take the unknown rhythm to be a sinus rhythm. For flatline we simply stated that if the maximum value of the signal does not exceed some threshold our cardiac rhythm is flatline.

Image not finished

Figure 1

Analysis of pulse rates were done exclusively in the time domain. We low pass filtered the signal just as we did when we were trying to identify the type of rhythm. We then found the maximum value for the given cardiac complex and set a threshold at 80% of that. We can then count the number of times we exceed that value in a minute.

*Version 1.4: Dec 14, 2005 12:06 am -0600

[†]<http://creativecommons.org/licenses/by/2.0/>