

Abstract:

This project was intended to prompt the user to load a data file to be analyzed and have the resulting detected events printed out to the terminal. If the user entered a file that was either empty or didn't exist, the program would continue to ask them to enter one until the user successfully identified a file or entered that they wanted to stop trying. The event analysis used is called the AF1 algorithm and was designed to recognize the QRS complex of a sinus rhythm and then calculate pulse from that.

Introduction:

As biomedical students, it's importance to understand the role of signal processing in the field of electrophysiology. In order to study the signal of an ECG for the purposes of the QRS complex, an event detection algorithm must be developed. With the results of the detection algorithm, the average heart rate can then be determined.

Methods:

The AF1 algorithm is a set of three characteristics that must be met. The first is that 3 consecutive points must be above a positive threshold determined as a fraction of the highest derivative value. One three of these points are detected, the program establishes a blanking period in which there must be 2 consecutive points below a negative threshold, also established by a fraction of the highest derivative value. Finally, all of the points within the blanking period must be above a general threshold established by the maximum value of the original data.

Results:

```
Enter the name of the file you would like to load:
sinus.txt
The file you entered does not exist. Would you like to try again? y or n
no
Please enter y or n.
y
Enter the name of the file you would like to load:
sinus1.txt

C:\Users\zacht\OneDrive\Desktop\Work\School\Computer Apps\Labs\Lab_2\Debug\Lab_2.exe (process 3480) exited with code -1.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .
```

Despite the error checks working as intended I was never able to properly load the data for some reason and so am unable to display any results other than the file loading prompts.

Discussion:

Even without being able to visually see the results, it is apparent that the AF1 algorithm would likely have a more difficult time dealing with the cheaper sinus files as there was far more noise and less precision that would lead to false positives and missed events.

The most difficult part of this code was the AF1 function as it relied on so many different indexes and Boolean expressions that all needed to flow perfectly in order to get it to work.