TEAM: Data Menders

Overview: The main purpose of the "Technical Demos" is to very clearly communicate the extent to which the team has identified key challenges in the project, and has proven solutions to those challenges. Grading is based on how complete/accurate the list of challenges is, and how convincingly and completely the given demos cover the given challenges.

This template is fleshed out by the team, approved by CS mentor, and brought to demo as a grading sheet.

Risky technical challenges

Based on our requirements acquisition work and current understanding of the problem and envisioned solution, the following are the key technical challenges that we will need to overcome in implementing our solution:

C1: Feature Extraction

Need to learn how to extract features from signals that are transformed or not.

C2: Heart Rate Variability Features

Need to learn how to extract HRV features from an ECG signal.

C3: Signal Decomposition Gaussian basis function

Understanding and learning how this function works then making it in matlab.

C4: Learning the BioRadio

The hard part here was cleaning the data from the device. Once it was in a CSV format converting the time domain from the BioRadio to a double took some time to get it right.

C5: Signal transformations

Need to learn to run multiple different signal transformations on ECG signals.

Challenges covered by demos:

In this section, we outline the demonstrations we have prepared, and exactly which of the challenge(s) each one of them proves a solution to.

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Demonstration 1: Feature Extraction
 Challenges addressed: Extracting features from transformed or not signals.

 Flight Plan: Step by step overview of demo
  1. Get a list of features to extract.

2.   Run list of feature extracts on data.

Evaluation:
ü Convincingly demo'd each of listed challenges?

ü Other evaluative comments:
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Demonstration 2: BioRadio
Challenges addressed: Learning the BioRadio
Flight Plan: Step by step overview of demo
1.   To first learn how to use the bio radio was to understand what software was needed to be installed.
2.   After the right software was installed finding a tutorial was the next step, which was not that hard because on same site for the software download; there were instructions for obtaining an ECG signal.
3.   After the ECG signal was obtained, the hard part was getting Matlab to read the data. The BioRadio was able to save the ECG signal as a CSV file, the hard part was converting that CSV file's time domain into data that can be used.

Evaluation:
ü Convincingly demo'd each of listed challenges?

ü Other evaluative comments:
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Demonstration 3: Heart Rate Variability
Challenges addressed: Extracting heart rate variability features.

Flight Plan: Step by step overview of demo
1.   Get several functions already written and work to understand them.
2.   Extract QRS peaks from the ECG signal.
3.   Use QRS peaks to find heart rate.
3.   Extract PQRST peaks from the ECG signal.
4.   Use PQRST peaks to find HRV features.

Evaluation:
ü Convincingly demo'd each of listed challenges?

ü Other evaluative comments:
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Demonstration 4: Gaussian basis function
Challenges addressed: Signal Decomposition Gaussian basis function

Flight Plan: Step by step overview of demo
1.   First I worked with Mohammad to get the Gaussian basis function to work.

2. Then I needed to window the signal and get each PQRST from the ECG signal.
3. Finally I needed to get each PQRST in to the Gaussian basis function to get the final output.

Evaluation:

ü Convincingly demo'd each of listed challenges?

ü Other evaluative comments:

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Demonstration 5: Signal transformations

Challenges addressed: Taking an input signal and transforming it into different domains.

Flight Plan: Step by step overview of demo
1. Accept an ECG signal
2. Run the signal through Fourier, Wavelet, Dual Tree Wavelet, Short Time Fourier, and Taut String

Evaluation:

ü Convincingly demo'd each of listed challenges?

ü Other evaluative comments:

Other challenges recognized by not addressed by demo:

If there were challenges you listed earlier that were *not* covered by a demo, list here. This will hopefully be a short list…but better to be clear about where you are. If you have items here, you could list (if applicable) any pending plans to reduce these risks.