

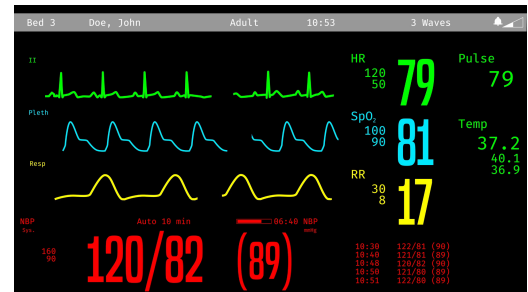
Waveform visualization tool for Critical Care Medicine

Subject areas: data visualization, clinical informatics, precision medicine, critical care

Background

Health informatics is currently one of the fastest growing fields in both medicine and computer science. Small startups and established companies alike are seeking talented individuals who have computing skills, or a background in medical science. People who combine both these attributes will be in high demand.

The Intensive Care unit of the Kingston Health Sciences Centre (KHSC) is a 33-bed unit caring for critically ill patients with severe infections, massive strokes, trauma, and other life-threatening conditions. Physiologic signals from bedside monitors are continuously recorded at 240 Hz, including arterial and venous pressures, cardiac electrical activity, and blood oxygen saturation. All of this generates a tremendous amount of data, the correct, real-time interpretation of which is vital to ensuring the best possible outcomes for the sickest patients in the hospital.



As part of a multi-year project, a large amount of high frequency physiological data is collected on critically ill patients admitted to the intensive care unit at KHSC. At the moment this dataset exceeds 20 TB and is growing by approximately 16 GB per day. This dataset is being mined for novel physiological signatures which have the potential to better predict the evolution or development of disease states as well as measure and predict response to therapy.

Deliverable

The goal of this project is to develop a suite of visualization tools which will allow for exploration of the physiological waveforms. The project group will work with a team of clinician scientists, fellows and graduate students to implement new algorithms into an exploratory data analysis tool for physiologic data. There may be potential to continue development of a real-time clinical monitoring tool for multiple critical care units.

Requirements

1. The tool should be sufficiently flexible to accept multiple data sources (eg. the KHSC data mentioned above as well as data from the [MIMIC database](#) and other [Physionet](#) resources).
2. The tool should be cross-platform, ideally web-based such that it can be used from secured computers at KHSC

3. The tool should allow for overview of an entire record with the ability to zoom in on regions of interest
4. The tool should support animation of historical signals leading up to marked events of interest
5. The tool should support automated flagging/feature detection of interesting events and signals. The algorithms for this will be supplied by the research team but the developers should be able to build a visualization platform that is sufficiently flexible to accommodate multiple detection algorithms and filters as they are developed over the course of the project
6. The user interface should allow for the selection of various channels for display as well as the selection of different filters and processing algorithms

Architecture:

Development would preferably be in Python in order to integrate with other applications in use and in development by the lab.

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