INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Epsilon-Tube Filtering for Artifact Reduction in Impedance and Other Physiologic Signal Monitoring

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OVERVIEW

A novel approach to reduce motion artifact (MA) in portable monitoring devices

- Better detection of useful physiologic signals measured by mobile devices
- Adaptable for current physiologic signal monitors and wearable devices

BACKGROUND

The provision of mobile healthcare is becoming more common, though its usefulness depends upon the quality of portable monitoring devices. One challenge facing the use of these devices is the need to reduce motion artifact (MA) during the acquisition and processing of physiologic signals. MA vary with time and can have a larger signal amplitude than do the signals of interest. Existing approaches for MA reduction include instrumentation manipulation, multichannel recording to optimize independent and principle component analysis, and the use of adaptive filters to estimate MA. Each of these approaches are limited in their usefulness, so the further expansion of mobile healthcare requires a more successful approach toward reducing MA.

INNOVATION

Researchers have developed a novel approach to estimate MA by combining epsilon-tube loss function and an autoregressive exogenous model while leaving the periodic component of the signal intact. Additionally, the software utilizes a regularization method to find the best filter co-efficient that maximizes the regularity of the output signal. This technology therefore better separates the useful signals from MA and aids detection of those signals as they very over time.

The software is adaptable for current physiologic signal monitors as well as wearable sensor monitoring. As such, it can be useful for a variety of biosignal processing such as monitoring respirations, blood pressure, arterial pressures, and electrogram tracings.