知繁业茂 | Yintrust

Machine-Learning-Based Denoising Of Doppler Ultrasound Blood Flow And Intracranial Pressure Signal

Published date: Aug. 28, 2019

Technology description

Summary
UCLA researchers in the Department of Neurosurgery have developed a novel framework to constrain noises in the measurements of vital physiological signals from neurosurgical patients.

Background

Cerebral blood flow velocity (CBFV) and intracranial pressure (ICP) remain the pivotal physiological signals for managing neurosurgical patients in both acute states, such as brain injury, and in chronic states such as hydrocephalus. Despite this importance, signal processing capabilities in existing commercial CBFV and ICP monitoring devices remain poor, providing clinicians with a limited amount of information. One of the major challenges in accurate continuous monitoring of these signals is the interference from various types of noises. It has been known that ICP is intrinsically related with CBFV, which might provide some important information for the denoising problem. However, this complex relationship has only been partially explored, and not been applied to constraining the noises.

Innovation

UCLA researchers have learned that the changes in the CBFV and ICP waveforms exhibit temporal trends. They have developed a framework, based on machine learning, which learns the temporal relationship between CBFV and ICP, and then used the data to denoise/reconstruct the signal. This framework significantly reduces the amount of noise and artifacts presented in the signal.

Application area

▶ This framework can be implemented into a Transcranial Doppler (TCD) acquisition device or a bedside monitor for real-time denoising of CBFV and ICP signals

Advantages

▶ Significantly reduces the amount of noises and artifacts presented in the signal without losing pertinent morphological features

▶ Once trained the system can be used on individual inputs only (or any combination of them): CBFV, ICP waveforms, and/or ICP level

Institution

University of California, Los Angeles

Inventors

Fabien Scalzo
Assistant Professor in Residence
NEURO