

Initial Dip: An Early Indicator of Neural Activity in Functional Near Infrared Spectroscopy Waveform

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Abstract : Functional near infrared spectroscopy (fNIRS) has a favorable position in non-invasive brain imaging techniques. The concentration change of oxygenated hemoglobin and de-oxygenated hemoglobin during particular cognitive activity is the basis for this neuro-imaging modality. Two wavelengths of near-infrared light can be used with modified Beer-Lambert law to explain the indirect status of neuronal activity inside brain. The temporal resolution of fNIRS is very good for real-time brain computer-interface applications. The portability, low cost and an acceptable temporal resolution of fNIRS put it on a better position in neuro-imaging modalities. In this study, an optimization model for impulse response function has been used to estimate/predict initial dip using fNIRS data. In addition, the activity strength parameter related to motor based cognitive task has been analyzed. We found an initial dip that remains around 200-300 millisecond and better localize neural activity.

Keywords : fNIRS, brain-computer interface, optimization algorithm, adaptive signal processing

Conference Title : ICBES 2018 : International Conference on Biomedical Engineering and Systems

Conference Location : Paris, France

Conference Dates : March 15-16, 2018