

Selection of spectrogram's best window size in EMG signal during core lifting task

ABSTRACT

Electromyography (EMG) is one of the most commonly used tools to study human muscle condition. Past researchers have introduced various techniques from time distribution (TD), frequency distribution (FD) and time-frequency distribution (TFD) to extract information from this EMG signal. However, due to the complex characteristics of the EMG signal itself, TFD such as spectrogram has been widely used as it can provide both temporal and spectral information. However, since spectrogram has a fix window size, there exists a dilemma of resolution, where the too narrow window will result in a poor frequency resolution, and a too wide window will cause poor time resolution. Thus, this study aims to select the best window size to be used with spectrogram to monitor human muscle electrical activity during core lifting task. Four electrodes were placed over different types of muscles, which are the right and left biceps brachii (BB), and right and left erector spinae (ES). In this study, six window sizes (64, 128, 256, 512, 1024, and 2048) were used. The test has been done using two evaluating criteria, namely frequency resolution (Fr) and time resolution (Tr). The result shows that both window size of 512 and 1024 are acceptable, but the best window for this application is window size 512.

Keyword: Best window size; Electromyography; Instantaneous RMS voltage; Lifting task spectrogram; Time-frequency representation