Detection of muscle fatigue, from statistical methods to software applications

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Abstract
Background: Muscle fatigue has become increasingly present in our daily lives. This is related to lifestyle difficulties. Several methods were proposed in order to detect the muscle fatigue. This report proposes a short review of statistical methods and processing tools extracted from MATLAB software dedicated to detection of fatigue.
Methods: The first part in this study is an application of a useful electronic card named "arduino" for acquiring the electromyography signal (EMG). This latter is the perfect signal to describe fatigue in muscles. The acquisition of data is done in two steps; the first is a simple acquisition representing rest (the subject is relaxed). Then, in the next step, the subject does a series of physical exercises representing moving continuously a handlebar (in order to simulate the work of the tram's conductor). After obtaining raw data from the acquired signals, we apply statistical methods and some processing tools in order to detect fatigue.
Results: For the statistical method, we apply the spectral density, which is a mathematical tool that represents the various spectral components of a signal and to perform the harmonic analysis. We deduct that 80 microvolt's is the intensity of getting fatigue (exercise of moving the handlebar). Using processing tools (FFT and STFT techniques), we obtain essential information on the fatigue's beginning time.
Conclusion: A brief survey of statistical and processing tools to extract fatigue information from an EMG signal was done. A typical example of the importance of detecting fatigue was also illustrated (tram conductor). We aimed for a lot of results from this study, especially because we want to compare techniques. After studying, the STFT technique seem the best.

Keywords: Muscle fatigue, Spectral density, Processing techniques.

1. **Declaration of conflicts**

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2. **Authors' biography**

No Biography

3. References

No reference