Movement Identification in EMG Signals Using Machine Learning: A Comparative Study

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Abstract

The analysis of electromyographic (EMG) signals enables the development of important technologies for industry and medical environments, due mainly to the design of EMG-based human-computer interfaces. There exists a wide range of applications encompassing: Wirelesscomputer controlling, rehabilitation, wheelchair guiding, and among others. The semantic interpretation of EMG analysis is typically conducted by machine learning algorithms, and mainly involves stages for signal characterization and classification. This work presents a methodology for comparing a set of state-of-the-art approaches of EMG signal characterization and classification within a movement identification framework. We compare the performance of three classifiers (KNN, Parzendensity-based classifier and ANN) using spectral (Wavelets) and timedomain-based (statistical and morphological descriptors) features. Also, a methodology for movement selection is proposed. Results are comparable with those reported in literature, reaching classification performance of (90.89±1.12)% (KNN), (93.92±0.34)% (ANN) and 91.09±0.93 (Parzen-density-based classifier) with 12 movements.

Keywords: *ANN, EMG signals, Feature extraction, KNN, Parzen*

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