

Localization of Myo Armband Electrodes for Stable Classification

Cynthia R. Steinhardt^{1,*}, Joseph Bettthausen², and Nitish Thakor¹

¹Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD 21218 USA

²Department of Electrical and Computer Engineering, Johns Hopkins University, Baltimore, MD 21218 USA

*corresponding author: csteinh2@jhu.edu

Abstract—The Myo Armband is a typical 8-electrode device for externally recording EMG signals from the arm of a typical subject or amputee. One of the most difficult challenges of using a Myo Armband is the need to train and classify movements each time it is worn, due to the shift in positions and electrode location around the arm. The Myo Armband is typically worn within an inch of the elbow of an intact patient of an amputated limb, which allows enough similarity for correct classification by most algorithms. However, the rotation of electrodes around the arm causes entirely new features to be extracted for classification. In this experiment, the Myo Armband was rotated around the upper arm of a patient with an intact limb as she performed six commonly used movements. The mean absolute value of each electrode was calculated and used to characterize response at each electrode site. The root mean-squared error was then used at each site while rotating through all possible rotations of electrodes in single electrode-width intervals (eight positions). Across all motions made, the correct position was identified 93.3% of the time. The ability to classify using the training data for one position (taken as the canonical position) was measured by using the feature vectors of that original training set. Classification error increased by $XX \pm YY\%$.

I. INTRODUCTION

This demo file is intended to serve as a “starter file” for IEEE conference papers produced under L^AT_EX using IEEEtran.cls version 1.8b and later.

II. MATERIALS AND METHODS

A. EMG signal measurement

The subject wore the Myo Armband with the electrode with the logo initially centered at the inner elbow and approximately half an inch up the upper arm. Five gestures that required use of unidirectional hand motion, or a distinct pattern of muscle groups were tested: open, power, pronate, supinate, and tripod grip. The subject was asked to perform each grip twice for a 5 second period. The electrode was rotated by one full electrode position (45 degrees) until it returned to the starting location. At each position, EMG signals were recorded while performing the five grips. Subjects typically performed each grip after a delayed onset. So, only the window of recordings from two seconds in to four seconds after the cue was used for feature extraction.

B. Electrode Displacement Prediction

The raw EMG signal was recorded from each of the eight electrodes on the Myo Armband. The timing and strength of gestures could vary from replication to replication

III. DISCUSSION

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IV. CONCLUSION

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