PERFORMANCE COMPARISON OF ARTIFICIAL NEURAL NETWORK AND GAUSSIAN MIXTURE MODEL IN CLASSIFYING HAND MOTIONS BY USING sEMG SIGNALS

Ulvi Baspinar, Huseyin Selcuk Varol, Volkan Yusuf Senyurek

Technical Education Faculty, Electronics & Computer Education Department, Marmara University, Istanbul, Turkey

Abstract

In this study, a home-made four channel sEMG amplifier circuit was designed for measuring of sEMG signals. The measured sEMG signals were recorded on to a computer with help of a DAQ board. The recorded sEMG signals were filtered first with a high-pass filter and afterwards a wavelet based filtering was applied to remove unwanted noises. Before applying of the wavelet based filtering, it was first determined which wavelet type, threshold selection rule and threshold would be suitable for the denoising process. As a second step, the recorded and denoised signals' features were extracted. For classification of motions 8 time domain and 2 frequency domain features were used individually and in combinations. Lastly, seven different motions were classified and their classification performances were compared. In this study, classification rates of ANN and GMM classifiers were compared as regards features.

Keywords: hand motion classification, artificial neural network, gaussian mixture model