

A comparative study of wavelet families for classification of wrist motions

Abstract

The selection of most suitable mother wavelet function is still an open research problem in various signal and image processing applications. This paper presents a comparative study of different wavelet families (Daubechies, Symlets, Coiflets, and Biorthogonal) for analysis of wrist motions from electromyography (EMG) signals. EMG signals are decomposed into three levels using discrete wavelet packet transform. From the decomposed EMG signals, root mean square (RMS) value, autoregressive (AR) model coefficients (4th order) and waveform length (WL) are extracted. Two data projection methods such as principal component analysis (PCA) and linear discriminant analysis (LDA) are used to reduce the dimensionality of the extracted features. Probabilistic neural network (PNN) and general regression neural network (GRNN) are employed to classify the different types of wrist motions, which gives a promising accuracy of above 99%. From the analysis, we inferred that 'Biorthogonal' and 'Coiflets' wavelet families are more suitable for accurate classification of EMG signals of different wrist motions.