Emotion recognition from facial EMG signals using higher order statistics and principal component analysis

Abstract

Higher order statistics (HOS) is an efficient feature extraction method used in diverse applications such as bio signal processing, seismic data processing, image processing, sonar, and radar. In this work, we have investigated the application of HOS to derive a set of features from facial electromyography (fEMG) signals for classifying six emotional states (happy, sad, afraid, surprised, disgusted, and neutral). fEMG signals were collected from different types of subjects in a controlled environment using audio-visual (film clips/video clips) stimuli. Acquired fEMG signals were preprocessed using moving average filter and a set of statistical features were extracted from fEMG signals. Extracted features were mapped into corresponding emotions using k-nearest neighbor classifier. Principal component analysis was utilized to analyze the efficacy of HOS features over conventional statistical features on retaining the emotional information retrieval from fEMG signals. The results of this work indicate an improved mean emotion recognition rate of 69.5% from this proposed methodology to recognize six emotional states.

Keywords