

Time-frequency analysis of EEG signals for human emotion detection

Abstract

This paper proposes an emotion recognition system from EEG (Electroencephalogram) signals. The main objective of this work is to compare the efficacy of classifying human emotions using two discrete wavelet transform (DWT) based feature extraction with three statistical features. An audio-visual induction based protocol has been designed to acquire the EEG signals using 63 biosensors. Totally, 6 healthy subjects with an age group of 21–27 years old have been used in this emotion recognition experiment. In this work, we have used three statistical features (energy, Recoursing Energy Efficiency (REE) and Root Mean Square (RMS)) from the EEG signals for classifying four emotions (happy, disgust, surprise and fear). An unsupervised clustering called Fuzzy C-Means (FCM) clustering is used for distinguishing emotions. Results confirm the possibility of using “db4” wavelet transform based feature extraction with proposed statistical feature for assessing the human emotions from EEG signal.

Keywords — EEG, human emotions, wavelet transform, Fuzzy C-Means clustering (FCM)