

EEG-based recognition of positive and negative emotions using for pleasant vs. unpleasant images

Abstract

Emotions play an important role in our daily life. Antonio Damasio famously stated: "We are not thinking machines that feel; rather we are feeling machines that think". Human emotions can be recognized through facial expression, speech and gesture. The use of electroencephalograms (EEGs) to understand and recognize human emotion has been widely studied, where those recognition techniques greatly benefit in human-computer interaction (HCI). In this investigation, we study the use of EEGs to recognize emotions. Pleasant and unpleasant images are used as stimuli to elicit human pleasant and unpleasant emotions. The brainwaves are recorded using a 9-electrode medical grade wireless EEG headset from Advance Brain Monitoring (ABM), the B-alert X10. The features comprising alpha, beta, gamma, theta, and delta bands are then extracted from the recorded brainwaves using time-frequency analysis. Different channels and rhythms are used in support vector machine (SVM) and K-nearest neighbors (KNN) classifiers to train and classify pleasant vs. unpleasant mind states. The best accuracy obtained was 70.43% using SVM with alpha and beta rhythms from channel F3 and Fz, and also with gamma rhythms from channel POz.