

# **Comparative analysis of electroencephalogram-based classification of user responses to statically vs. dynamically presented visual stimuli**

## **Abstract**

Emotion is an important part of human and it plays important role in human communication. Nowadays, as the use of machine getting more common, the human computer interaction (HCI) has become important. The understanding of user could bring across a better aiding machine. The exploration of using EEG in understanding human is widely studied for benefit in several fields such as neuromarketing and HCI. In this study, we compare the use of 2 different stimuli (3D shapes with motion vs. 2D emotional images that are static) in attempting to classify positive versus negative feelings. A medical-grade 9-electrode Advance Brain Monitoring (ABM) B-alert X10 is used as the brain-computer interface (BCI) acquisition device to obtain the EEG signals. 4 subjects are involved in recording brain signals during viewing 2 types of stimuli. Feature extraction is then applied to the acquired EEG signals to obtain the alpha, beta, gamma, theta and delta rhythms as features using time frequency analysis. Support vector machine (SVM) and K-nearest neighbors (KNN) classifiers are used to train and classify positive and negative feelings for both stimuli using different channels and rhythms. The average accuracy of 3D motion shapes are better than the average accuracy of the 2D static emotional images for both SVM and KNN with 69.88% and 56.35% using SVM for 3D motion shapes and emotional images respectively, and also 65.31% and 55.45% using KNN for 3D motion shapes and emotional images respectively. This study shows that the parietal lobe are more informative in the classification of 3D motion shapes while the Fz channel of the frontal lobe is more informative in classification of 2D static emotional images.