The Classification of Hallucination: The Identification of Significant Time-Domain EEG Signals

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ABSTRACT

Electroencephalogram (EEG) has now become one of the means in the medical sector to detect hallucination. The main objective of this study is to classify the onset of hallucination via time-domain based EEG signals. In this study, significant time-domain features were identified to determine the best features that could yield high classification accuracy (CA) on different classifiers. Emotiv Insight, a 5 channels headset, was used to record the EEG signal of 5 subjects aged between 23 and 27 years old when they are in a hallucination state. Eight statistical-based features, i.e., mean, standard deviation, variance, median, minimum, maximum, kurtosis, skewness and standard error mean from each channel. The identification of the significant features is obtained via Extremely Randomised Trees. The classification performance of all features, as well as selected features, are evaluated through, i.e. Random Forest (RF), k-Nearest Neighbours (k-NN), Naïve Bayes (NB), Support Vector Machine (SVM), Artificial Neural Network (ANN) and Logistic Regression (LR). The dataset was separated into the ratio of 70:30 for training and testing data. It was shown from the study, that the LR classifier is able to provide excellent CA on both the train and test dataset by considering the identified significant features. The identification of such features is non-trivial towards classifying the onset of hallucination in real-time as the computational expense could be significantly reduced.

KEYWORDS

Classification; EEG; Hallucination; Machine learning

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