

Investigation of Different Classifiers for Stress Level Classification using PCA-Based Machine Learning Method

Abstract

Undergraduate students experience several changes and face various problems during their time transitioning from adolescence to adulthood. One of the issues during this time is a mental stress disorder. Stress burdens the students either through mental or physical capabilities. The common method of determining stress includes physical examination and clinical diagnosis. However, the method is subjective and time-consuming as doctors need to make sure that their diagnosis is accurate. Thus, the severity of the stress stages could not be easily determined. A new method using machine learning-based algorithms coupled with EEG devices promises to overcome the issues with the current approaches. This paper presents an investigation using machine learning techniques based on Principal Component Analysis (PCA) which allows for the reduction in the dimensionality of datasets to enhance their interpretability while minimizing information loss. The pre-processed EEG data and PCA-based EEG data were compared and analyzed using three machine learning classifiers such as K-Nearest Network (KNN), Naive Bayes (NB) and Multilayer Perceptron (MLP). The results indicate that KNN demonstrated the highest average classification accuracy of 99%, while the other approaches mentioned above averaged around 50% and 80% for NB and MLP respectively. This investigation shows that the KNN classifier is most suitable for the proposed approach.

Keywords

Dimensionality Reduction; EEG; Machine Learning; Mental Health Disorder; Principal Component Analysis.; Stress