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Paper Title:	Detection of Chronic Stress Based on Electroencephalography Responses Induced by the Stroop Color Word Test
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Abstract

Stress significantly affects the learning, academic performance, and health of university students. Traditional detection methods often rely on subjective self-reports, that can be stigmatized. In this study, we developed an EEG-based system to offer a more objective approach to chronic stress assessment. Fourteen participants (aged 24-35) were evaluated using the Perceived Stress Scale (PSS) and the Trier Inventory for Chronic Stress (TICS), with electroencephalography (EEG) data collected during resting and cognitive tasks (i.e., the Stroop color word test). The study aimed to identify the most effective brain regions and EEG features for chronic stress detection. Data analysis involved feature extraction, normalization, classification, and regression to build and assess detection models. The results indicated no significant differences among resting state, cognitive task, and perturbation signals in the classification of chronic stress levels. Resting-state signals were more effective, with logistic regression, support vector machine classifier (i.e., SVC), and random forest classifiers achieving accuracies of 93.35%, 93.26%, and 94.69%, respectively. Furthermore, the EEG-based regression models estimated PSS and TICS scores with high accuracy, with adjusted R^2 values exceeding 0.90, particularly for PSS. Contributive EEG features for chronic stress detection included gamma in the frontal, central, and parietal regions, as well as beta in the frontal and parietal regions. Notably, effective chronic stress detection was possible using only frontal electrodes, simplifying the setup for larger studies. Limitations related to the sample size and circadian rhythm control were acknowledged, suggesting the need for future research with larger samples and varied recording schedules.