ABSTRACT

Anxiety is a physiological response that can significantly impact an individual's mental and physical health. Objective detection of anxiety using biosignals offers a promising approach in biomedical technology. This research aims to develop an anxiety detection system based on physiological biosignals, namely Electrocardiogram (ECG), Electrodermal Activity (EDA), and Respiration (RSP). The biosignal data were processed through preprocessing, feature extraction, anxiety labeling based on Heart Rate (HR) and Skin Conductance Response (SCR), and classified into three anxiety levels: *low*, *medium*, and *high*.

Five classification models were evaluated in this study: Random Forest, Support Vector Machine (SVM), K-Nearest Neighbors (KNN), Logistic Regression, and XGBoost. The evaluation was conducted on four dataset combinations using HR2 and EDA2 labeling methods. The results showed that the XGBoost model with ECG+EDA+RSP signal combination and HR2 labeling achieved the highest accuracy of 92%, with balanced precision and recall across all classes.

In conclusion, biosignals can be effectively utilized for detecting anxiety levels, with appropriate selection of signal combinations and classification algorithms. This study provides a foundation for the development of accurate and non-invasive anxiety detection systems.

Keywords: anxiety, ECG, EDA, RSP, machine learning, classification, XGBoost