Abstract

This research explores the impact of physical fatigue on task performance and evaluates the effectiveness of Artificial Neural Network (ANN) and Convolutional Neural Network (CNN) in predicting fatigue levels. Physical fatigue, as a critical factor influencing performance and safety, serves as a signal for the body's need for rest. Utilizing a smartwatch with heart rate sensors, this study applies ANN for subjective fatigue assessments and CNN for time series analysis. With a structured approach encompassing data collection, preprocessing, and model training, a confusion matrix evaluates the model's performance. Results indicate an accuracy of 92.4% for the ANN model with an RMSE of 0.275, while the CNN model achieves an accuracy of 85.46% with an RMSE of 0.381. These findings affirm the effectiveness of both models in predicting fatigue, providing valuable insights for future research and emphasizing the importance of comprehensive data analysis for a nuanced understanding of individual performance (Number of data: 149,796 from 6 subjects).

Keywords: Physical Fatigue; Artificial Neural Network (ANN); Convolutional Neural Network (CNN) ; Time Series; Heart Rate