Automatic Detection of Driver Fatigue Based on EEG Signals Using a Developed Deep Neural Network

ABSTRACT

In recent years, detecting driver fatigue has been a significant practical necessity and issue. Even though several investigations have been undertaken to examine driver fatigue, there are relatively few standard datasets on identifying driver fatigue. For earlier investigations, conventional methods relying on manual characteristics were utilized to assess driver fatigue. In any case study, such approaches need previous information for feature extraction, which could raise computing complexity. The current work proposes a driver fatigue detection system, which is a fundamental necessity to minimize road accidents. Data from 11 people are gathered for this purpose, resulting in a comprehensive dataset. The dataset is prepared in accordance with previously published criteria. A deep convolutional neural network–long short-time memory (CNN–LSTM) network is conceived and evolved to extract characteristics from raw EEG data corresponding to the six active areas A, B, C, D, E (based on a single channel), and F. The study's findings reveal that the suggested deep CNN–LSTM network could learn features hierarchically from raw EEG data and attain a greater precision rate than previous comparative approaches for two-stage driver fatigue categorization. The suggested approach may be utilized to construct automatic fatigue detection systems because of their precision and high speed.