Real-Time Drowsy Driving Detection based on EEG data

FORUM8 11th CPWC FIVE

Overview

- According to research data , drowsy driving is one of the significant factors in road traffic accidents. Long hours of driving, lack of sleep, and work pressure can lead to driver fatigue.
- By collecting the driver's EEG data, conducting drowsy driving detection, and issuing warnings, it can promptly remind the driver and greatly reduce the occurrence of traffic accidents.

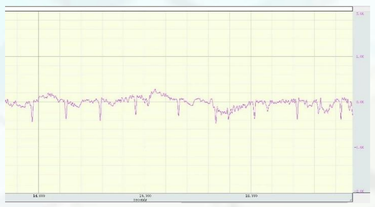
02. Process of Project

Acquire

Using the Biopac MP150 to collect driver EEG data.
Export the data to CSV format, output every 5s, and overwrite the previous file.

Process

Using SVM classification results to determine whether the driver is in a fatigued state.



Output

Display the warning sign right in the middle of screen if the driver is recognized as drowsy.

03. Feature of Project

Feature One

Accuracy

EEG data detection

EEG data is the most direct indicator of brain fatigue compared to other physiological signals and detection methods. Theoretically, EEG-based driver fatigue detection and warning methods are more reliable in preventing traffic accidents.

Feature Two

Safety

Fatigue Driving Warning

Using the support vector machine (SVM) algorithm, the EEG data is classified based on the four types of EEG wave features. If the data is identified as fatigue driving, an alarm is triggered.

Feature Two

Real-time

Real-time monitoring of driver's state

Using the BIOPACAPI, different types of EEG wave data are output every five seconds to monitor the driver's state in real-time.

04. Future Work

Algorithm Optimization:

According to relevant literature, the accuracy of SVM algorithm in predictive classification is approximately 75%. To enhance accuracy, more robust and accurate algorithms will be introduced in the future.

Multidimensional data fusion:

In the future, it is possible to integrate other physiological data to comprehensively understand the driver's physiological state and more accurately detect fatigue driving.

Enhanced Warning Effect:

Currently, fatigue driving warnings are only presented in textual form. In order to effectively remind drivers, future considerations will include adding voice prompt functionality.

Providing Fatigue Driving Analysis Results:

Future research can provide analysis results on fatigue driving and remind drivers of the periods when fatigue may occur during the driving process.