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DETECTION OF MICROSLEEP EVENTS DATA REDUCTION OR DATA FUSION?

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ABSTRACT

The aim of the present study is to examine the detection performance of microsleep events (MSE) during simulated overnight driving. It is investigated if data fusion of different signals reduces detection errors or if data reduction is beneficial. This was realized for nine electroencephalographic and two electrooculographic signals and also for six eyetracking signals. Features which were extracted of all signals were processed during a training process by computational intelligence methods in order to find a discriminant function which separates MSE and Non-MSE. The true detection error of MSE was estimated based on cross-validation. Results indicate that fusion of all signals and all features is most beneficial. Feature reduction is of avail only for Power Spectral Densities and is optimal if a summation in many narrow spectral bands is executed.

KEYWORDS

EEG, EOG, Eyetracking, Driving Simulator, Microsleep, Vigilance Monitoring, Computational Intelligence, Support Vector Machines, Feature Fusion, Feature Reduction, Validation