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Driver drowsiness detection using different classification algorithms

(Conference Paper)   (Open Access)

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Abstract   ⌄ View references (22)

Capability of electrocardiogram (ECG) signal in contributing to the daily application keeps developing days by days. As technology advances, ECG marks the possibility as a potential mechanism towards the drowsiness detection system. Driver drowsiness is a state between sleeping and being awake due to body fatigue while driving. This condition has become a common issue that leads to road accidents and death. It is proven in previous studies that biological signals are closely related to a person's reaction. Electrocardiogram (ECG) is an electrical indicator of the heart, provides such criteria as it reflects the heart activity that can detect changes in human response which relates to our emotions and reactions. Thus, this study proposed a non-intrusive detector to detect driver drowsiness by using the ECG. This study obtained ECG data from the ULg multimodality drowsiness database to simulate the different stages of sleep, which are PVT1 as early sleep while PVT2 as deep sleep. The signals are later processed in MATLAB using Savitzky-Golay filter to remove artifacts in the signal. Then, QRS complexes are extracted from the acquired ECG signal. The process was followed by classifying the ECG signal using Machine Learning (ML) tools. The classification techniques that include Multilayer Perceptron (MLP), k-Nearest Neighbour (IBk) and Bayes Network (BN) algorithms proved to support the argument made in both PVT1 and PVT2 to measure the accuracy of the data acquired. As a result, PVT1 and PVT2 are correctly classified as the result shown with higher percentage accuracy on each PVTs. Hence, this paper present and prove the reliability of ECG signal for drowsiness detection in classifying high accuracy ECG data using different classification algorithms. © 2020 IOP Publishing Ltd. All rights reserved.

SciVal Topic Prominence ⓘ

Topic: Sleepiness | Mental Fatigue | Electrooculogram

Prominence percentile: 98.214   ⓘ

Indexed keywords

Engineering controlled terms:
Barium compounds   Bayesian networks   Classification (of information)   Electrocardiography   MATLAB   Nearest neighbor search   Sleep research

Engineering uncontrolled terms:
Classification algorithm   Classification technique   Drowsiness detection   Electrocardiogram signal   K-nearest neighbours   Multi layer perceptron   Potential mechanism   Savitzky-Golay filter

Engineering main heading:
Biomedical signal processing

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