



Braunschweiger Verkehrskolloquium

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„Lenkradbewegungsbasierte Müdigkeitserkennung“

Abstract

This paper describes a fatigue monitoring instrument based on steering wheel movements. The advantages of steering behavior based approaches for detecting fatigue are that these instruments measure continuously, cheaply, non-intrusively, and robustly even under extreme demanding environmental conditions. The expected fatigue induced changes refer to driving pattern of slow drifting and fast corrective counter steering. Using advanced signal processing procedures for feature extraction, we computed 3 feature set in the time, frequency and state space domain (a total number of 1251 features) to capture fatigue impaired steering patterns. Each feature set was separately fed into 5 machine learning methods (e.g. Support Vector Machine, K-Nearest Neighbor). The outputs of each single classifier were combined to an ensemble classification value. Finally we combined the ensemble values of 3 feature subsets to a of meta-ensemble classification value. To validate the steering behavior analysis driving samples are gained from a car simulator based sleep deprivation study (N=12). We yielded a recognition rate of 86.1% in classifying slight from strong fatigue.