

Establishing a Gold Standard for Drivers Microsleep Detection

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Abstract. A comprehensive database of electrophysiological recordings is required for establishing a gold standard of microsleep detection in order to evaluate commercial alertness monitor technologies. We present an adaptive biosignal analysis system which was applied to electroencephalogram and electrooculogram recordings of 23 young volunteers while performing monotonic overnight driving in our real car driving simulation laboratory. The electroencephalogram (7 channels) and electrooculogram (2 channels) during clear observable microsleep and non-microsleep events was processed to extract discriminative features and to train a classifier. In addition to well established methods of Power Spectral Density estimation we utilized the recently introduced method of Delay Vector Variance for feature extraction. Subsequently, the obtained data set was processed by advanced methods of Soft Computing, such as Learning Vector Quantization networks, Genetic Algorithms and Support Vector Machines. Fusion of all recorded signals and of both types of features led to multiple cross validated test errors down to 9.3 %.