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THE CLASSIFIER ALGORITHM FOR RECOGNITION OF THE SECONDARY DISTRACTING FACTORS WHILE DRIVING A CAR

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Strategic errors, resulting from incorrect decisions made by drivers, are the most common causes of car accidents in Poland. In 2022, 21 322 traffic accidents were recorded in Poland, of which 90.9% were caused by drivers. Strategic errors include driving in difficult conditions, driving a broken vehicle or in an inadequate state of both physiological and mental health, and deliberate distractions such as using a telephone. There are state-of-the-art and non-invasive techniques that allow to detect factors interfering with driving, such as electrooculography (EOG).

The aim of the research was to determine the possibility of classifying disturbances occurring during driving on the basis of signals obtained using JINS MEME_R smart glasses. Signals were acquired during the following scenarios: reference measurement, driving under the influence, driving with glucose administered, driving with a distractor in the form of a phone and driving with a water-drinking. These runs were designed to examine various aspects that affect driver skills and to assess potential distractions if concentration is lacking.

We incorporated basic signal processing techniques to ensure reliable classification results. The pre-processing consisted of data alignment, normalization, standardization and isoline removal. In our implementation, we utilized the Random Forest Classifier for five-class classification problem, which is an ensemble learning method that constructs multiple decision trees during training and outputs the mode of the classes (classification) or the mean prediction (regression) of the individual trees. The classification results obtained from the developed classifier achieved an impressive accuracy of 99%.

Based on the obtained results, it can be concluded that distracting factors significantly affect the driver's concentration while operating the vehicle. The results obtained in our research indicate that using decision trees in conjunction with a thorough analysis of the EOG signal can be used to identify distractions while driving.