

عنوان مقاله:

Negative Emotions Recognition While Driving Using Electroencephalogram Signal

محل انتشار:

نشریه بین المللی مهندسی حمل و نقل، دوره 9، شماره 1 (سال: 1400)

تعداد صفحات اصل مقاله: 28

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خلاصه مقاله:

The role of the human factor has been confirmed as the number one cause of driving crashes and emotions are known as one of the most important factors of driver distraction. Although biological signals have a great potential for detecting emotions, so far few studies have been conducted to use these signals to develop emotion recognition systems while driving. Therefore, in this paper an electroencephalography (EEG) based classification model presents for recognizing low-valence high-arousal (LVHA) emotions (known as negative emotions) of drivers. For this purpose, two driving tests were designed in a driving simulator, one for driving under normal conditions and the other for driving in the negative emotional state. ۱۸ people participated in these tests and the activity of four channels of their brain signals was recorded during the tests. The energies of delta, theta, alpha, beta, and gamma frequency bands, and the total signal energy along with gender were employed as inputs for classification models and emotional state was considered as output. Different models were used for subject-independent classification, among which the neural network classifier with an accuracy of ۹۵% had the best performance. The results of the analysis showed that all channels are effective in increasing the accuracy of classifiers; also, gender has a relative impact on the accuracy of classification models. Assessing the effects of different frequency bands revealed that alpha and gamma bands have a greater effect on the accuracy of models than do other bands. At the end, different combinations of EEG channels were used to recognize negative emotions while driving, and the results indicated that using only two channels can help recognize these emotions with an accuracy of ۸۹%.

کلمات کلیدی:

Emotion Recognition, negative emotions recognition while driving, Advanced Driver Assistant Systems (ADAS), driving simulator study, promoting traffic safety

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