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Road surface friction measurement based on intelligent road sensor and machine learning approaches

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Real prediction of friction coefficient on the road surface is essential in order to enhance the resilience of traffic management procedures for the safety of road users. Critical weather conditions could have a significant impact on the road surface, and decrease the reliable friction coefficient in extreme conditions. Weather parameters are involved in the process of traffic management are water film thickness, ice percentage, pavement temperature, ambient temperature, and freezing point. Smart road monitoring of the road surface friction changes over time means the real-time prediction of the friction coefficient changes in the future based on the intelligent weather road-based sensor is crucial to avoid uncontrolled conditions during extreme weather conditions. For this reason, the use of intelligent data analysis such as machine learning approaches is key in order to provide a holistic robust decision-making tool to support road operators or owners for further consideration of the traffic management procedures. In this study, a machine learning approach is applied to train 18 months of data collected from the real case study in Spain, and results show a good agreement between real friction coefficient and predicted friction coefficient. The trained model has been validated with various cross-validation approaches, and the high accuracy of the model is observed.

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