

Prediction of each road deterioration considering traffic and the interaction with other surface deteriorations, using automated learning machine technics

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ABSTRACT

For road user, the pavement is a surface that must allow the circulation of mixed traffic, in conditions of safety and comfort, under any climatic condition, for a long time. Once the pavement is put in service, it begins to have deteriorations that can cause that the user modifies their behavior and start driving at a slower speed in order to maintain traffic safety conditions; this circumstance causes travel times increasing and therefore circulation costs increase.

There are different deteriorations to consider, roughness, road surface adherence, rutting, cracking and potholes. Periodic deterioration evaluation and prediction modelling allows that corrective actions can be anticipated, so that road quality does not fall below acceptability limits. To prioritize improvements and routine maintenance, it is necessary to develop adequate tools to predict the deterioration evolution, which can be incorporated into the pavement management systems used to prepare multi-year works and maintenance plans.

Periodic observations of surface deteriorations of sections in service located on routes of Littoral region of Argentina were used in the paper. It was possible to develop predictive models using Support Vector Machine Regression SVR and Random Forest Regression RFR; these are learning machine tools, which can be used to solve estimation problems of multidimensional functions. First a model to predict cracking was developed. When it was optimized, the model to predict rutting was realized. And at the end, the model to predict roughness was adjusted, using cracking and rutting models developed previously. Results indicate that SVR and RFR regression models have the capacity to perform training and prediction that help to develop road surface deterioration models.