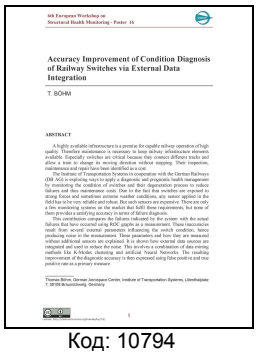

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# Accuracy Improvement of Condition Diagnosis of Railway Switches via External Data Integration

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A highly available infrastructure is a premise for capable railway operation of high quality. Therefore maintenance is necessary to keep railway infrastructure elements available. Especially switches are critical because they connect different tracks and allow a train to change its moving direction without stopping. Their inspection, maintenance and repair have been identified as a cost.

The Institute of Transportation Systems in cooperation with the German Railways (DB AG) is exploring ways to apply a diagnostic and prognostic health management by monitoring the condition of switches and their degeneration process to reduce failures and thus maintenance costs. Due to the fact that switches are exposed to strong forces and sometimes extreme weather conditions, any sensor applied in the field has to be very reliable and robust. But such sensors are expensive. There are only a few monitoring systems on the market that fulfil these requirements, but none of them provides a satisfying accuracy in terms of failure diagnosis.

This contribution compares the failures indicated by the system with the actual failures that have occurred using ROC graphs as a measurement. These inaccuracies result from several external parameters influencing the switch condition, hence producing noise in the measurement. These parameters and how they are measured without additional sensors are explained. It is shown how external data sources are integrated and used to reduce the noise. This involves a combination of data mining methods like K-Modes clustering and artificial Neural Networks. The resulting improvement of the diagnostic accuracy is then expressed using false positive and true positive rate as a primary measure.

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**Ключевые слова:**

## Содержание