ance) that use historical data to generate better forecasts for the future.

6. Assessment

For detecting the condition of vehicle components and infrastructure, it is clear that one challenge of moving applications from research to practice is the low availability of data, especially for existing vehicles. One problem is the high cost of data generation solutions. Another is the lack of IT capacity on existing vehicles. This results in a challenge for broader application, especially for adapting AI approaches that can manage with little data (few-shot learning, for example), and for implementing edge concepts for partially decentralized and, as necessary, energy-optimized data analysis in existing vehicles.

This is also true of AI-supported railway infrastructure maintenance. AI results must be robust, and the approach must be compared with existing ones. This cannot be managed in some places, especially in new applications that have been made possible by AI in the first place. It is important to give AI and other data-driven approaches a chance to make a contribution. Preparation should also be made to make data availability (with sustainable data management, for instance).

For environment motoring in automated driving, computer vision algorithms should be considered. A significant obstacle to high degrees of automation is currently less the availability of sensors and assessment than the monitoring of the unmanned driver's cab and the approval of the relevant systems for safety-relevant applications because of such concerns as various operating scenarios (harbors, industrial parks, shunting yards, etc.).

But the behavior of various actors ([16], for example) indicates efforts toward progress.

The AI methodologies used in the context of railway operations are largely in the testing and trial phase. They are being used primarily for non-safety-critical forecasts and passenger information, such as arrival and departure times, and for train and station capacity usage [14]). Another focus of AI trials is the solution of optimization problems having largely to do with analyzing historical traffic data. It is relatively early going in the implementation and testing of applications in operational conflict avoidance as part of rescheduling after operational disruptions and in strategic and tactical network planning aimed at improving performance. After the assessment of [2], AI methodologies have so far been used only for decision-making and support for dispatchers and planners.

7. Summary

It is clear that AI methods have a great deal to contribute to the solution of relevant problems. Realistic expectation management for AI solutions is important for a productive compromise between the extreme "AI can solve everything" and "AI is unusable" positions. AI tools should therefore not be considered in isolation, but approached as an effective tool that can harmonize with other methodologies. This secures a connection to established procedures and enhances acceptance by stakeholders. It is also clear that there is a need of guidelines and procedures for approving AI algorithms, especially in safety-critical applications. Since the capabilities and reliability of AI methods will continue to grow in the future, it is important to start preparing for their use by initiating suitable approval procedures.

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