

Title:

Trustworthy AI for Safe Autonomy of Smart Railways: Directions and Lessons Learnt from Other Sectors

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Abstract:

In this paper, we present some of the results achieved during the ongoing RAILS (Roadmaps for Artificial Intelligence Integration in the Rail Sector) research project, funded by the European Union Shift2Rail Joint Undertaking, and specifically in Work Package 2, addressing AI for autonomous and cooperative driving in future smart railways. We will provide a brief state-of-the-art and opportunities for future research, focusing on the trustworthiness of intelligent train control, also based on the analysis of related transportation sectors. As for other safety-critical sectors, the use of AI for autonomous driving in railways represents a challenge. This happens when an appropriate "safety envelope" cannot be guaranteed, such as when the Automatic Train Protection (ATP) is missing or not working properly (e.g., in limited supervision operating modes), or in cases when it is specifically used to improve safety (e.g., when employed for on-track obstacle detection). In many situations, however, AI can be advantageously adopted to optimize several parameters when supporting Automatic Train Operation (ATO), while the ATP supervises safety. Furthermore, in limited or no supervision by the ATP, AI can be effectively used to support train drivers in respecting signals and keeping safe headways, i.e., as an advanced driving assistance system, in analogy with the latest developments in the automotive sector.

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