

RULEX and AI-MATTERS: validation and benchmarking for more transparent and reliable artificial intelligence

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FBK conducted an in-depth analysis of the algorithms and decision intelligence solutions developed by the company to ensure their consistency, reliability, and performance in real-world contexts.

As part of the [AI-MATTERS](#) project, FBK's [Center for Digital Industry \(DI Center\)](#) collaborated with [Rulex](#), an Italian company specializing in end-to-end solutions for data management, decision intelligence, and the automation of decision-making processes across multiple sectors, including manufacturing. FBK provided services in the “*application of formal methods for reliable industrial systems*” and a “*feasibility study and evaluation of AI technology*.”

The goal of the work was to support **Rulex** in the validation and benchmarking of its artificial intelligence algorithms, with particular attention to transparency, robustness, and traceability.

Rulex software uses proprietary algorithms to extract decision rules from data, automate business processes, and optimize industrial planning. As with any AI-based system, it was necessary to verify that automated decisions were consistent, reliable, and understandable. This led Rulex to engage **FBK**, which carried out the activities through two complementary lines of work.

In the first line of activity, formal verification methods were applied to validate the rules generated by the **Rulex** software, defining the conditions under which they were most robust and generalizable. This made it possible to identify anomalies or borderline cases that could have compromised system reliability.

In parallel, the second line of activity involved a quantitative benchmarking analysis of the optimization algorithms developed by **Rulex**. The objective was to objectively assess the effectiveness and efficiency of the proprietary solutions by comparing them with selected open-source solvers and academic reference methods for discrete and continuous optimization problems.

The comparison focused on measurable performance indicators, including the quality of the solutions relative to the best known results, convergence speed, and computational scalability as problem size increased.

This approach made it possible to build a detailed comparative profile of the capabilities of the **Rulex** algorithms, highlighting strengths and areas for potential improvement in real-world application contexts such as maintenance planning and industrial scheduling.

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