A Tool to Measure Efficiency and Trust Towards eXplainable Artificial Intelligence in Conflict Detection Tasks

Authors : Raphael Tuor, Denis Lalanne

Abstract : The ATM research community is missing suitable tools to design, test, and validate new UI prototypes. Important stakes underline the implementation of both DSS and XAI methods into current systems. ML-based DSS are gaining in relevance as ATFM becomes increasingly complex. However, these systems only prove useful if a human can understand them, and thus new XAI methods are needed. The human-machine dyad should work as a team and should understand each other. We present xSky, a configurable benchmark tool that allows us to compare different versions of an ATC interface in conflict detection tasks. Our main contributions to the ATC research community are (1) a conflict detection task simulator (xSky) that allows to test the applicability of visual prototypes on scenarios of varying difficulty and outputting relevant operational metrics (2) a theoretical approach to the explanations of AI-driven trajectory predictions. xSky addresses several issues that were identified within available research tools. Researchers can configure the dimensions affecting scenario difficulty with a simple CSV file. Both the content and appearance of the XAI elements can be customized in a few steps. As a proof-of-concept, we implemented an XAI prototype inspired by the maritime field.

Keywords : air traffic control, air traffic simulation, conflict detection, explainable artificial intelligence, explainability, human-automation collaboration, human factors, information visualization, interpretability, trajectory prediction

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