Functional model of a decision support tool for Air Traffic Control supervisors

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Abstract

The optimization of operator workload in Air Traffic Control systems is of high importance regarding both safety and efficiency of air transportation. The default means of optimizing workload in practice is division of traffic among controllers by splitting the airspace into sectors. Sectors can be created in multiple various ways by combining different elementary sectors and finding the combination that leads to optimal workload for a specific traffic situation requires making a complex decision. Nowadays, this decision is made by a human supervisor who can sometimes encounter difficulties during decision making, especially when facing uncommon traffic situations.

This makes it advisable to create a decision support tool that is designed to automate decision making by suggesting a readymade sector configuration based on traffic complexity to the supervisor who can then decide to approve or reject it. The main modules of this tool are centered on a model of cognitive functions that have to be executed by the supervisor throughout the decision making process. The functions in this model can be listed as follows:

- Traffic prediction - Creating a future traffic situation based on present data of aircraft and the airspace as well as assumptions
- Complexity calculation - Producing values of complexity parameters for the predicted situation
- Sector state calculation - Determining optimal sector states and sector configuration based on complexity
- Self-learning - Updating parameters of the listed functions based on the supervisor's feedback

In this paper, we outline the formal description of the functionality of the tool's modules, focusing on algorithms that should be implemented by each of them as well as the availability and obtaining process of data they require.

Keywords: Air Traffic Control, decision support, neural network

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