ATC Operations Analysis via Automatic Recognition of Clearances

Mosaic ATM, Inc.

Technical Abstract

Recent advances in airport surface surveillance have motivated the creation of new tools for analysis of Air Traffic Control (ATC) operations, such as the Surface Operations Data Analysis and Adaptation (SODAA) tool, which is being used by NASA to conduct airport ATC operations analysis. What is missing from ATC operations analysis, however, is accessible and reliable data regarding the clearances issued by the controller and other communication conducted with the pilot that influences the behavior seen in the surveillance data. The reliance on voice communication in ATC operations presents challenges to the researcher who is trying to obtain data and conduct detailed analyses of ATC operations. During the Phase I effort, we designed and developed a prototype system to perform automatic speech recognition (ASR) of ATC clearances. We demonstrated the feasibility of recognizing ATC clearances from speech audio data and associating the clearance data with the flight that is the subject of the clearance. In the Phase II effort, we will create a complete prototype of the ATC speech recognition, processing and analysis capability in SODAA. In addition, we will integrate ATC speech recognition capabilities into a real-time application in the Surface Management System (SMS).

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Estimation and Prediction of Unmanned Aerial Vehicle Trajectories

Numerica Corporation

Technical Abstract

There is serious concern about the introduction of Unmanned Aerial Vehicles (UAV) in the National Air Space (NAS) because of their potential to increase the risk of collision between aircraft. At present, many UAV platforms lack a Sense and Avoid (SAA) capability to mitigate collision risk, and this has prevented both the government and private contractors from using these platforms in critically needed reconnaissance, surveillance, and security enforcement missions. To demonstrate a SAA capability that is applicable to a wide range of UAV platforms, advanced trajectory estimation and prediction algorithms are developed and used to exploit a small collision avoidance radar currently under development for UAV operation. Collision prediction algorithms will assess potential risk in probabilistic terms using adaptive techniques that permit accurate predictions across long time horizons. Techniques to ensure these predictions are robust to modeling uncertainty increase the utility the developed SAA capability for realistic scenarios.

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