

Track Data Smoothing for Air Traffic Simulation

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Abstract: The air traffic in Europe is subject of detailed research for reorganization. For a relevant research accurate simulation of different traffic categories is required. The conventional simulation techniques comprise mature models of aircraft behavior but do not include interactions between traffic objects. With trajectories corresponding to a highly complete and widespread air situation, this gap can be closed. The idea behind this way of scenario construction is to use well founded data mining techniques instead of more arbitrary constructive methods. The achieved high accuracy allows associating the complete air route topology to the trajectories. The focus of the paper is on the robust and accurate method to derive smoothed trajectories from air surveillance sensor data. The German Improved Air Defense System with up to 150 connected radars and a coverage area of 16 Million km² is used as the data source. The smoothing method presented comprises multiple evaluation paths including multi sensor tracking, sensor alignment, Kalman Smoothing, removal of outliers, fitting of Bézier type splines, subsequent segmentation-, and adaptation- cycles. The accuracy of the method described in this paper has been evaluated with a GPS recorded calibration flight with the result of a mean deviation of 80m.