

Real-Time Aircraft Data Analytic and Visualization Framework using JavaFX

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Abstract

The AI revolution in real-time aviation data handling is essentially a marvel that opens up various new avenues for safety, predictive maintenance, and monitoring by deeply interfacing with sensor streams. Furthermore, visualization is playing a major role in the speeding up of anomaly detection and prevention. We are presenting "Real-time Aircraft Data Analysis Using JavaFX," which is a live flight data streaming visualization system for enhanced situational clarity and crisis management, thereby reducing data overload that comes from metrics like altitude, airspeed, temperature, fuel, and engine performance—going far beyond the mere delayed post-flight analysis. This Java-based program uses JavaFX for the interactive user interface and OpenSky API for ADS-B data. It keeps up with the latest changes continuously and after filtering and computing the data, it displays the statistics in charts, maps, gauges, and notifications. Rule-based AI systems monitor for conditions leading to a fuel shortage, overheating situation, or even loss of communication and, in such cases, they initiate the first warning and actions. The agile model allows the monitoring of several aircraft at the same time with easy-to-understand graphics and strong data handling, which contributes to the implementation of safer operations by means of trustworthy AI-assisted air traffic management.

Keywords

Real-Time Data Analysis, JavaFX, ADSB, OpenSky API, Flight Data Visualization, Anomaly Detection, Aviation Safety, Predictive Analysis.