Anomaly Detection Process Using Negative Selection Algorithm in Flight Control Systems

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Abstract:

In this paper, a new method based on the Negative Selection Algorithm (NSA) is proposed for anomaly detection in the event of a possible fault in flight control systems. The Real-Value Negative Selection Algorithm (RNSA) is used. In this algorithm, data from a four-engine executive jet aircraft under lateral motion flight conditions are used. Under these flight conditions, the expected data in the flight control system are determined. To detect the fault, a certain range and number of detectors consisting of random values are generated. At the same time, anomaly data coming into the system as test data are produced in the same quantity as the random flight data. It is shown that in case of any fault in the system, when different data enter the system other than the expected flight data, the anomaly (fault) detection can be performed with the detectors activated in the NSA approach. Results and suggestions are provided in the paper. The obtained results are discussed.

Keywords:

Anomaly detection, detector, flight control systems, Negative Selection Algorithm.