

Analysis of flight data using clustering techniques for detecting abnormal operations

L. Li; S. Das; R.J. Hansman; R. Palacios Hielscher; A.N. Srivastava

Abstract-

The airline industry is moving toward proactive risk management, which aims to identify and mitigate risks before accidents occur. However, existing methods for such efforts are limited. They rely on predefined criteria to identify risks, leaving emergent issues undetected. This paper presents a new method, cluster-based anomaly detection to detect abnormal flights, which can support domain experts in detecting anomalies and associated risks from routine airline operations. The new method, enabled by data from the flight data recorder, applies clustering techniques to detect abnormal flights of unique data patterns. Compared with existing methods, the new method no longer requires predefined criteria or domain knowledge. Tests were conducted using two sets of operational data consisting of 365 B777 flights and 25,519 A320 flights. The performance of cluster-based anomaly detection to detect abnormal flights was compared with those of multiple kernel anomaly detection, which is another data-driven anomaly detection algorithm in recent years, as well as with exceedance detection, which is the current method employed by the airline industry. Results showed that both cluster-based anomaly detection to detect abnormal flights and multiple kernel anomaly detection were able to identify operationally significant anomalies, surpassing the capability of exceedance detection. Cluster-based anomaly detection to detect abnormal flights performed better with continuous parameters, whereas multiple kernel anomaly detection was more sensitive toward discrete parameters.

Index Terms-

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If you institution has a electronic subscription to Journal of Aerospace Information Systems, you can download the paper from the journal website:

[Access to the Journal website](#)

Citation:

Li, L.; Das, S.; Hansman, R.J.; Palacios, R.; Srivastava, A.N. "Analysis of flight data using clustering techniques for detecting abnormal operations", Journal of Aerospace

