Cluster Analysis of Fuel Flow in Operational Flight Data

Abstract:

With fuel being one of the main cost drivers of airlines, a possibility to measure the reduction of fuel consumption during regular operational based on QAR (Quick Access Recorder) data is assessed. The fuel flow data recorded during regular operation is analyzed by clustering it based on influencing factors such as pressure altitude or Mach number. One fuel flow cluster represents a narrow point of operation for a certain combination of narrow intervals of influencing factors. This paper shows how well the fuel flow in a point of operation can be determined by clustering. With a fixed combination of influencing factors, the effect of the minimum number of data points in one cluster to be considered a full cluster, of the interval width, and the separation between clusters through a single influencing factor are analyzed. Pairs of full clusters are used to calculate the difference in fuel flow between two sets of QAR data based on the mean fuel flow and the H-test developed by Kruskal and Wallis. Real flight data of two Boeing 737-500 aircraft in a certain period of time show significant difference in fuel flow.

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