

Unsupervised systems health estimation using Granger causal connectivity analysis

FOQA (Flight Operations Quality Assurance) data are analyzed in order to compute systems health score using Granger causal connectivity analysis. First G-graph is computed, and then causal density (cd) is computed in interval [0,1]. Numerical value of causal density correspond to systems health score.

In this FOQA data file, the AR model order is estimated to be of order 40. Altitude is causing Flaps and Thrust Rev. Landing Gear is causing Flaps. Flaps and Thrust Rev have strong bi-directional causality. The rest of the 10 parameters are left isolated without any causal links (these 10 parameter values were not produced by the flight simulator). The value of cd is 0.0238. It does not mean that the systems health of this flight is very low. The cd value is very low because of 10 parameter values that are not produced by the flight simulator.

The main script foqa9_g_causality.m reads FOQA data in foqa9.csv, calls cca m-files, and computes G-graph and causal density (cd) as a measure of systems health.

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>>foqa9_g_causality
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