Dedicated to innovation in aerospace

NLR Graduation Project in the field of advanced text processing for improving aviation safety

Background

An important source of information regarding safety occurrences in aviation are so-called occurrence reports. Pilots, air traffic controllers and other aviation staff file these – mandatory or voluntary – reports when something happens that has or could have a negative impact on the safety of the flight operation. These reports usually contain a combination of structured and unstructured data. Of particular interest for safety analyses are the narratives where the reporter describes in his/her words the event. These reports are usually evaluated and classified by safety analysts, who may further classify these reports according to a standardised and/or company specific taxonomy. Based on the analysis of collected occurrence reports, information on safety trends is gathered at national or international level.

Research needs

The aim of this project is to demonstrate and evaluate how advanced text processing techniques and applications (e.g., Natural Language Processing, ElasticSearch) can help in analysing and classifying the occurrence reports.A next step could be to automatically combine the occurrence reports with other sources of information like aircraft flight data (from Radar/ADS-B) and weather data.

With these techniques it may be possible to on one hand automate the process of evaluation and classification of reports, while on the other hand it could reveal relations between precursors, contributing factors and the hazardous event which is information that can be used to further improve safety.

Assignment

The work will address the following activities and questions:

- Literature study on applications and results of text processing inside[1] and outside the aerospace domain;
- Which techniques are available and appropriate to perform the analysis and evaluation of aviation occurrence reports?
- How to deal with aspects like synonyms, different languages, cultural differences, handwriting, etc.?
- How does the “manual” analysis perform compared to the application of text processing/mining applications?
- How can relations between precursors, contributing factors and the hazardous event be presented in an attractive way?

Further details of the project can be discussed with the student and supervisor.

Requirements

The student should have the following competencies:

[1] http://www.sciencedirect.com/science/article/pii/S0166361515300464

- Good understanding of text processing / mining techniques and knowing how to apply these to large sets of data.
- Good computer skills and able to program in e.g., R/Python/Matlab, and preferably experience with applications like Tableau and RapidMiner;
- Very good in English speaking/writing/understanding;
- Enthusiastic about civil aviation;

Knowledge about aerospace and aircraft performance is preferable, but not a prerequisite since NLR staff has abundant knowledge to support the student in the assignment. Knowledge about text processing techniques should primarily be brought in by the student. Supervision on this aspect is expected from the university.

More information

For more information or to discuss possibilities for a graduation project in this field, please contact Mr. Gerben van Baren (vanbaren@nlr.nl / +31885113047).