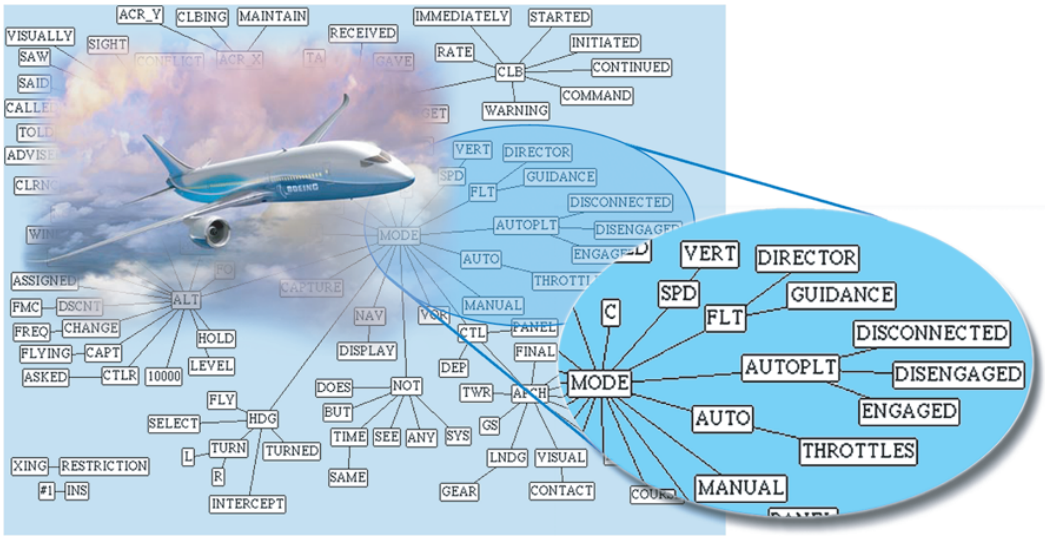
Human Factors

research and technology division

Contextual Mining of Incident Narratives and Other Text

Objective

Increase safety and performance in aerospace operations through development of methods that enhance understanding of large collections of incidents and their relationships to accidents.



Approach

Develop contextual methods of situational analysis, modeling, relevance ranking, database search, and text mining based on exploitation of contextual structure in seemingly unstructured text. Develop the underlying linguistic theory, explore its implications, and publish the results. Implement the theory-based methods in software; apply them to collections of incident narratives, accident reports, and other text; and evaluate the results. Work closely with airlines and the Aviation Safety Reporting System (ASRS) to support their operational requirements. Obtain patents, commercialize the technology, and support technology transfer.

Impact

Since early 2002, the resulting technology has been applied and enhanced at the ASRS and the Aviation Safety Action Partnership (ASAP) office of a major airline. In one case, the technology revealed a formerly unrecognized relationship between landings without clearance and unstablized approaches. Application by a second major airline is planned. Three U.S. patents have been awarded and one is pending. Numerous commercial licenses have been granted since 2001. A paper on the underlying theory has been accepted for publication by a prominent linguistics journal. The currently distributed version of the software includes keyword-in-context search, flexible phrase search, search by example, phrase generation, and phrase extraction. These methods apply to any text in any domain. When applied to aviation safety text, incidents can be retrieved and ranked according to the extent that they share situational factors with accidents or other incidents, or according to their relevance to any topic or combination of topics.

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