

PRESS RELEASE

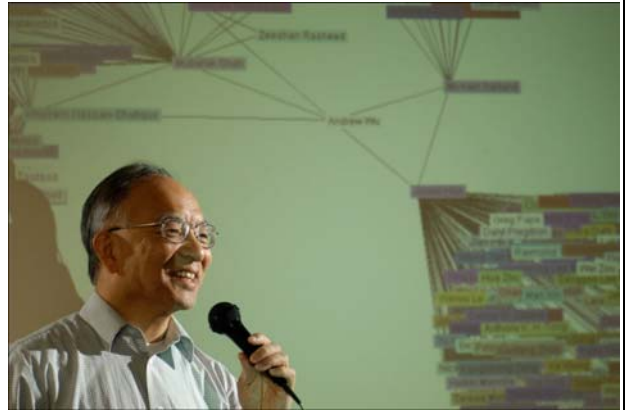
From the University of Illinois Information Trust
Institute and the Department of Computer Science



Researchers Develop Techniques to Analyze Flight Safety Data

Aided by a \$1.1 million grant from NASA, computer science researchers at the University of Illinois are investigating new data mining techniques for analyzing flight safety data. The project aims to find computing methods to better understand anomalous flight events and improve airline safety.

The work focuses on more than three decades of what are called “anomalous aviation events,” or incidents that deviated from normal flight operations. Data relating to more than 150,000 such events are stored in a system known as the Aviation Safety Reporting System (ASRS). The variety of such events – airspace violations, in-flight encounters with birds, and miscommunication between pilots and flight controllers, to name a few – the complexity of the aviation systems involved, the heterogeneity of data sources, and the variety of people who report such events all contribute to the difficulty of discovering trends and correlations in the data.



Professor Jiawei Han, recipient of a new NASA award supporting research in anomalous aviation events.

Computer science professor and Information Trust Institute (ITI) member Jiawei Han, an expert in data mining, data warehousing, spatiotemporal data analysis, and stream data mining, is leading the effort to develop new tools and algorithms to make sense of this jumble of information. The research team also includes Illinois CS professor Cheng Zhai, an expert in information retrieval, natural language processing, machine learning, and text mining, and researchers from UT-Dallas and Boeing Corporation.

“Since the root causes of such events can be complicated and the reporters’ opinions may vary or are inconsistent, we believe that an effective way to help analysts is to provide a software environment that can be used to interactively mine the reports to obtain interesting patterns,” says Han. “We want to create a system that enables users to flexibly navigate through the event and pattern space to understand the linkages among different events and patterns.”

Ultimately, says Han, the team wants to enable analysts to go beyond the raw text information in the reports to interact more directly with the knowledge buried in the reports. To reach this goal, the team will employ data mining and contextual text mining techniques, among others, to classify, cluster, and build links between data elements.

Researchers hope that their system enables another crucial task beyond the detection of anomalous events: the prevention of similar incidents in the future.

“Our intent is to develop a system that will lead to the discovery of patterns, correlations, trends, and causality in the data so that flight safety analysts can have a better understanding of incidents and the

contextual factors that may have influenced their occurrences,” says Han.

The new collaboration emerged in part out of a project Han leads in ITI’s Boeing Trusted Software Center, addressing online mining of anomalous moving objects for security protection. Boeing researchers were excited about that work and interested in pursuing additional research with him. For the new project, they are contributing the expertise of one Boeing researcher.

About the Department of Computer Science

The Department of Computer Science at the University of Illinois is recognized throughout the world as a leader in computer science education and research, consistently ranked among the top 5 programs in the nation. The department and its graduates have long been at the forefront of modern computing beginning with ILLIAC in 1952, continuing through the most recent Internet era with YouTube and PayPal. For more information, visit www.cs.uiuc.edu.

About the Information Trust Institute (ITI)

The Information Trust Institute is a multidisciplinary cross-campus research unit housed in the College of Engineering at the University of Illinois at Urbana-Champaign. It is an international leader combining research and education with industrial outreach in trustworthy and secure information systems. ITI brings together over 90 faculty, many senior and graduate student researchers, and industry partners to conduct foundational and applied research to enable the creation of critical applications and cyber infrastructures. In doing so, ITI is creating computer systems, software, and networks that society can depend on to be trustworthy, that is, secure, dependable (reliable and available), correct, safe, private, and survivable. Instead of concentrating on narrow and focused technical solutions, ITI aims to create a new paradigm for designing trustworthy systems from the ground up and validating systems that are intended to be trustworthy. www.iti.uiuc.edu

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