University of Miami College of Engineering to develop new methods for data analysis

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A new grant from the Office of Naval Research will fund the work of University of Miami (UM) College of Engineering professors and their collaborators from Indiana University and BAE Systems to develop automated methods for analyzing data. Such methods could potentially serve as tools for human analysts and decision makers.

The three-year, $959,059 grant will provide funding to develop computer programs capable of examining and combining both soft and hard evidence. The multidisciplinary project will combine methods from belief theory, data fusion, machine learning, cognitive science, and computational linguistics.

Blending different kinds of data can be very difficult and time consuming, explains Kamal Premaratne, professor in the UM department of Electrical and Computer Engineering and lead principal investigator of this project.

"In many applications, the amount of soft and hard data is enormous, sometimes overwhelming people who must make sense of the information," says Premaratne. "Consequently, there is interest in developing automated methods to extract meaning from the data, and possibly detect hidden patterns and trends."

These methods can be useful in many different contexts, for example, in a medical environment; a physician can analyze both soft evidence, such as text transcriptions of patient statements and text from expert opinions

in journal articles; and hard evidence from various sensor-based data such as blood-pressure readings to render a judgment about a course of treatment.

In a defense/homeland security scenario, an intelligence officer may need to sift through reams of soft information in the form of text transcriptions of witness interviews and expert opinions, and fuse it with hard data generated from various types of sensors in the battlefield, to arrive at a decision.

"Our study will generate ideas and knowledge that will address fundamental problems in extracting meaning from heterogeneous soft and hard data," says Manohar N. Murthi, associate professor in the UM Department of Electrical and Computer Engineering and co-principal investigator of this project. "The methods can be utilized in many different applications and will result in advances in several different fields."

The new project consists of two stages, the first of which will focus on converting natural language text into a format appropriate for data fusion and fundamental combination and fusion methods. During the second stage, researchers will work on inferring evidence reliability and meaning.

"This project supports our research thrust in informatics and risk, one that enables researchers to extrapolate more useful information from datasets that often seem impossible to manage due to their vastness and increasing complexity," says James M. Tien, distinguished professor and dean of the UM College of Engineering. "Congratulations to Drs. Premaratne and Murthi for being awarded this prestigious grant."

Provided by University of Miami