RESEARCH BRIEF

OASYS: OPINION ANALYSIS SYSTEM

The need

In a world where conflicts increasingly are not between two standing national armies but between governments and opposing ideological, factional, terrorist, and insurgent groups, computer tools that could help predict the future plans and attacks of such groups could play an important role in military strategy.

A new tool

Predictive computer models are still in their infancy and can provide only hints of possible outcomes during the often chaotic conditions in combat zones. Still, the U.S. Department of Defense has expressed considerable interest in the development of these kinds of tools. The hope is to integrate the cultural, behavioral, and economic aspects of adversaries into combat strategies.

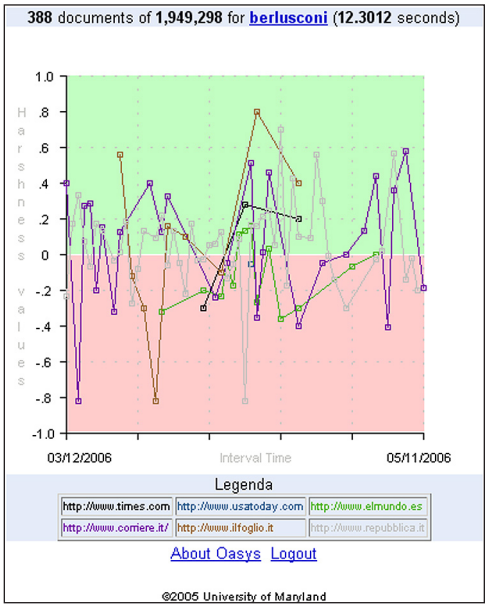
Institute for Advanced Computer Studies (UMIACS) Director and ISR-affiliated Professor V.S. Subrahmanian (CS/UMIACS) and his colleagues in the Laboratory for Computational Cultural Dynamics and at the University of Napoli in Naples, Italy, are devloping such a tool. OASYS (Opinion Analysis System) is a software package that can automatically and quickly extract specific information about violent incidents from thousands of news reports. The information can be used to develop rules about adversarial behavior and offer a probability estimate that a particular action might happen.

The research

The Internet contains current opinion on nearly any topic of interest. OASYS is a tool that "crawls" through Internet news sites and accurately and quickly analyzes opinion intensity on specific topics. OASYS returns quantitative and qualitative ratings and shows how the level of opinion intensity changes over time and geographic location.

The current OASYS system can look at a collection of documents and assign an "intensity" of opinion of a given document on a given topic. The intensity of opinion of document *d* with regard to topic *t* depends not only on the terms used in the document, but also on the perceptions of the reader.

When humans read a document, they consider not only its opinionated statements but also its overall tone. OASYS reflects the impression writing leaves on the reader rather than just the relevant written words—a tricky task, since any two readers can have different perceptions of the author's intent.



An OASYS graph generated for the topic "Berlusconi" on May 12, 2006. The user can click on each point to get a list of, or retrieve, all the associated documents. Six different news sources are represented.

OASYS uses linguistic, statistical, database, cognitive, and engineering approaches to generate the average human evaluation of opinion intensity. The research team calibrated its statistical algorithms against human panels to create the intensity scoring model. A sample group of human-evaluated documents trained the system to associate certain quantitative automatic analyses of opinion intensity with a set of human descriptions. From this set of descriptions, an average human rating was generated so that the program scores opinions at about the median that human panels do.

In its current version, the OASYS background crawler retrieves documents in English, Italian and Spanish from 38 different American, Spanish, Italian and Pakistani news sources. It monitors news feeds and extracts information about topics on which opinions are expressed in the news story. OASYS

scans the feeds for words in its dictionary of adjectives, which are coded as positive or negative. The adjectives are also weighted so that, for example, "fabulous" is seen as more positive than "good." Adverbs are also weighted so that "bad" can be distinguished from, say, "very bad." Each day OASYS visits about 10,000 documents.

A user can enter a topic of interest and see color-coded graphs illustrating the intensity of opinion over some specified time period, by language or country.

Examples of OASYS analysis

The team has looked at reports of suicide attacks by the Hezbollah group, based in Lebanon. Preliminary results suggest that when the group is engaged in education and propaganda activities in a major way, there's a 46-47 percent probability it will carry out suicide attacks. When it is not engaged in such activities, the probability of an attack rises to about 80 percent.

"This is a very coarse finding, not the last word by any means," cautions Subrahmanian. More data and analysis would be needed to refine that rule as well as come up with other, increasingly useful ones.

OASYS also was used for an automated analysis of 1,555 stories in the Afghan media to assess the perceived strength or weakness of Afghan President Hamid Karzai. The analysis searched for phrases containing both opinions and statements of fact that can influence opinions. Karzai's overall rating was mildly positive for most sources.

Intensity of opinions can influence how a group might act during times of stress and conflict, Subrahmanian says. Behavioral scientists would like to find ways to accurately predict how a group might respond, and do so in a matter of hours or days rather than weeks or months.

A variety of uses

The need for accurate opinion analysis is not limited to military operations. Politicians may find it useful to analyze the popularity of new proposals or the overall public reaction to certain events. Companies could be interested in consumer attitudes towards a product. Historians and social anthropologists may want to track how views of an issue have changed over time or have varied from region to region. The OASYS tool can be useful in each of these scenarios.

Research team

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Awards

OASYS won *ComputerWorld's* 2006 Horizon Award for cutting-edge technology: *www.computerworld.com/action/article.do?command=viewArticleTOC&specialReportId=9000103&articleId=9002569*.

Web links

Dr. Subrahmanian's home page: *www.isr.umd.edu/faculty/gateways/subrahmanian.htm*.

OASYS website: *oasys.umiacs.umd.edu/oasys/index.html*.

The software has been written about in the journal *Science*: *www.sciencemag.org/cgi/content/full/316/5824/534*.

The software was featured at a seminar on Capitol Hill organized by the American Association for the Advancement of Science: *www.aaas.org/news/releases/2007/0625insurgents.shtml*.