

'Big data' reveals human interests, behavior

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(Phys.org) —Information technology advances are leading to ever-growing accumulations of "big data," making it feasible to quantify more things long thought immeasurable.

Arizona State University professor Ying-Cheng Lai and his research partners are combining expertise in computer science, engineering, mathematics, statistics and physics in analyzing [big data](#) to explore human-interest dynamics. They want to see if it's possible to identify patterns in what motivates people to become interested in particular things, what makes them maintain certain interests and what causes them to lose interest.

"Big data now provides a platform for exploring the dynamics of why people change their minds about certain things," Lai says. "Are there intrinsic rules that govern when something interests people, and what influences us to become interested?"

Learning what attracts and holds peoples' interests is a door to better understanding and predicting human behavior – providing knowledge that can be valuable to business, economics, social sciences, health care, even national defense, Lai says.

Lai is a professor in the School of Electrical, Computer and Energy Engineering, one of ASU's Ira A. Fulton Schools of Engineering. He is working on the human-interest dynamics project with ASU electrical engineering research scientist Zi-Gang Huang and graduate student Zhi-Dan Zhao. Huang is also a researcher with the Institute of Computational

Physics and Complex Systems at Lanzhou University in China. Zhao is also with the Web Sciences Center at the University of Electronic Science and Technology of China.

Other team members are Zimo Yang, Tao Zhou and Zike Zhang, all with the Web Sciences Center in China. Zhang is also with the Institute for Information Economy at Hangzhou Normal University in China.

The team is working with large data sets being provided by three large companies in China: two e-commerce companies and a mobile communications business. Those data sets are big enough to eventually give researchers a credible indication of about how much of peoples' decision-making follows patterns, or if it's mostly random and chaotic, Lai says. By examining and analyzing how millions of people are making decisions online or on mobile phones about using the companies' services, researchers expect to understand how a wide variety of factors attracts, or fails to attract, individuals' interest.

Lai, who brings a physics perspective to solving engineering challenges, is providing a key aspect to the project: the application of a statistical physics approach to the study of big data. As he explains, trying to analyze a large amount of data to seek trends and patterns is similar to what physicists do when examining millions of particles of matter, and trying to understand the nature of all the interactions of the particles and the affects of those interactions.

"It is difficult to pin down the exact relationships between all the particles and how all the variables are changing, particularly when changes in the microscopic particles are having an impact on a large macroscopic system," says Lai. However, it is possible to deduce from microscopic interactions how macroscopic variables depend upon each other – the so-called "scaling relations," he adds.

Having information on the massive scale provided by big data can enable researchers to get a clearer picture despite the variables and randomness in peoples' decision-making. "We should be able to develop some predictive capability," Lai says. Such predictive findings about human-interest dynamics could aid psychiatrists in better diagnosing patients' conditions, and prescribing more effective mental health therapies.

Using knowledge of what drives interest to predict [human behavior](#) could also be valuable in devising national security and defense strategies, and in guiding the engineering and design of transportation systems and similar high-interaction environments. By providing a deeper understanding of what shapes and changes consumer interests and behavior, the research promises to offer advertising, marketing and product-development industries a more solid basis for long-term business planning and strategy.

Lai says the project is the first thoroughly systematic attempt to probe the intricacies of the dynamics at work when people develop – or lose – interest in various things. "We expect our findings to have applications in many more areas."

More information: The complete paper is available online:
[www.nature.com/srep/2013/13121 ... /full/srep03472.html](http://www.nature.com/srep/2013/13121.../full/srep03472.html)

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