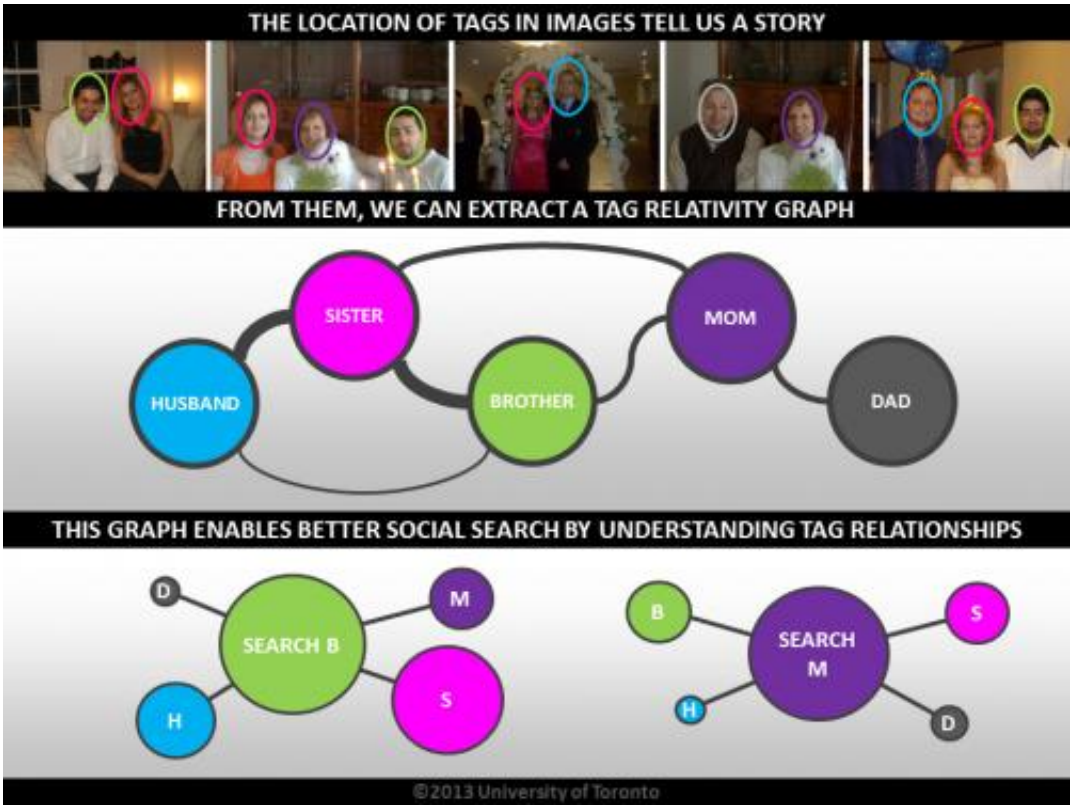
New algorithm finds you, even in untagged photos

December 2 2013



The location of tags in a images tells us a story. From them, we can extract a tag relativity graph. The graph enables social search by understanding tag relationships. Credit: University of Toronto

A new algorithm designed at the University of Toronto has the power to profoundly change the way we find photos among the billions on social media sites such as Facebook and Flickr. This month, the United States

Patent and Trademark Office will issue a patent on this technology.

Developed by Parham Aarabi, a professor in The Edward S. Rogers Sr. Department of Electrical & Computer Engineering, and his former Master's student Ron Appel, the search tool uses tag locations to quantify relationships between individuals, even those not tagged in any given photo.

Imagine you and your mother are pictured together, building a sandcastle at the beach. You're both tagged in the photo quite close together. In the next photo, you and your father are eating watermelon. You're both tagged. Because of your close 'tagging' relationship with both your mother in the first picture and your father in the second, the algorithm can determine that a relationship exists between those two and quantify how strong it may be.

In a third photo, you fly a kite with both parents, but only your mother is tagged. Given the strength of your 'tagging' relationship with your parents, when you search for photos of your father the algorithm can return the untagged photo because of the very high likelihood he's pictured.

"Two things are happening: we understand relationships, and we can search images better," says Professor Aarabi.

The nimble algorithm, called relational social image search, achieves high reliability without using computationally intensive object- or facial-recognition software.

"If you want to search a trillion photos, normally that takes at least a trillion operations. It's based on the number of photos you have," says Aarabi. "Facebook has almost half a trillion photos, but a billion users—it's almost a 500 order of magnitude difference. Our algorithm is

simply based on the number of tags, not on the number of photos, which makes it more efficient to search than standard approaches."

Work on this project began in 2005 in Professor Aarabi's Mobile Applications Lab, Canada's first lab space for mobile application development.

Currently the algorithm's interface is primarily for research, but Aarabi aims to see it incorporated on the back-end of large image databases or social networks. "I envision the interface would be exactly like you use Facebook search—for users, nothing would change. They would just get better results," says Aarabi.

While testing the algorithm, Aarabi and Appel discovered an unforeseen application: a new way to generate maps. They tagged a few photographs of buildings around the University of Toronto and ran them through the system with a bunch of untagged campus photos. "The result we got was of almost a pseudo-map of the campus from all these photos we had taken, which was very interesting," says Aarabi.

More information: This work will be presented at the IEEE International Symposium on Multimedia Dec. 10, 2013.

Provided by University of Toronto