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Software: Mona Lisa was happy

By GREG KLINE
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Published Online December 14, 2005

University of Illinois Professor Thomas Huang has been working for years to get your computer to be more friendly.

Software developed by Huang and his students, coupled with cameras, is supposed to let user and machine interact in ways that are natural for humans, with voice and gestures instead of a keyboard and mouse.

The computer could even read your emotional state from your facial expressions, for example to determine whether the choices it offered from a restaurant database satisfied the criteria you gave it, one project of Huang's lab at the UI's Beckman Institute, where he co-heads the Human-Computer Intelligent Interaction group.

The voice-, face- and emotion-recognition systems being developed by Huang, a pioneer in computerized image handling, and colleagues also have attracted interest for homeland security uses, pointing out suspected terrorists at airport checkpoints, for instance.

But Huang, a UI electrical and computer engineering professor, said he never expected the technology to be applied to an age-old art mystery: What was Mona Lisa thinking?

Many a visitor to the Musee du Louvre in Paris, not to mention art historians and other experts, have contemplated the meaning of the enigmatic, seemingly wry sort of half smile on the face of the woman in the mega-famous painting by Leonardo da Vinci.

The smile of the believed-to-be wife of a wealthy Florence cloth merchant, which Leonardo likely captured between 1503 and 1507, has inspired poetry, movies, songs and even the odd scientific study.

Now comes an examination by Nicu Sebe, a professor and sometimes collaborator of Huang's at the University of Amsterdam in the Netherlands, using the software developed by Huang and his students at the UI. Sebe, during a period working here, helped develop the emotion-recognition component, Huang said.

The software placed the Mona Lisa's face over a kind of virtual mannequin head to render it in three dimensions. That model was then contrasted with a 3-D computer model of a generic Caucasian female face neutral in the emotions it conveys.

In analyzing the differences between the two, the software expressed a high degree of confidence, more than 80 percent, that the woman in the painting was happy, or at least that Leonardo painted her that way.

To a much lesser degree, the analysis also found evidence of disgust, fear and a little bit of anger. The program didn't log any evidence of surprise or sadness, two other emotions it's supposed to assess.

Huang said the Mona Lisa project is mostly for fun. But it does

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help validate the UI-developed software because of the program's selection of happiness as the dominant emotion, a message Leonardo himself apparently intended. Information from the Louvre calls the "notion of happiness the central motif of the portrait."

Pictures, and lately faces and movies, have been a fixture in Huang's career, the last 25 years of it at the UI. He did groundbreaking work, and has been honored frequently for it, on methods for compressing the data in faxes, images and video to send them over phone lines and via computer networks more efficiently.

Last month, he was presented a major award, and a check for \$90,000, from Japan's Okawa Foundation. That Okawa Prize is kind of a lifetime achievement award in the information and telecommunications technology field.

More recently, Huang and his students have been working on ways to automatically catalog and to search the growing number of huge databases containing images, video and other non-textual digital materials.

"Right now the search engines are all based on key words," Huang said. "It's looking at text tags."

That is, when you search, say, Google Images you're really searching words attached to the pictures not the content of the pictures themselves. Currently, those "tags" have to be added by hand, an increasingly hard-to-manage problem.

Huang has a couple ideas for addressing the situation, including software that examines the materials and does the tagging for us. He's also looking at searching without key words at all, for example by choosing an image like what you're looking for and asking the computer for similar images.

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