Twins are intriguing research subjects for Notre Dame biometircs researchers

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Each year in August, the aptly named town of Twinsburg, Ohio, is the site of the largest official gathering of twins in the world. Open to all multiples -- identical and fraternal twins, triplets and quads from newborns to octogenarians -- the weekend's events include food, live entertainment, a golf tournament, and a twins' parade.

The event also has become an important site for field research by Kevin Bowyer and Patrick Flynn of the University of Notre Dame's Department of Computer Science and Engineering. Flynn has a twin sister, making this research especially relevant to him.

Flynn and Bowyer have been developing and assessing image-based biometrics and multi-biometrics technologies since 2001, including first-of-kind comparisons of face photographs, face thermograms, 3-D face images, iris images, video of human gait, and even ear and hand shapes.

A biometric is a stable and distinctive physiological feature of a person that can be measured and used to identify that person; the fingerprint is the most familiar example.

In the wake of the terrorist attacks of Sept. 11, 2001, federal agencies have become increasingly interested in the feasibility of facial and iris recognition technologies.

Bowyer and Flynn have received two grants from the Federal Bureau of Investigation for research into the discrimination of identical twins. Even

identical twins have unique irises. They are examining how iris biometrics performs in twins to confirm prior claims that biometrics is capable of differentiating between twins and to explore if human observers can make distinctions that current iris biometrics technologies cannot.

At the Twinsburg event, Bowyer and Flynn recruited volunteers to capture biometrical samples of identical twins. The volunteers sat at the center of a half-circle arc surrounded by five cameras which took high resolution color photographs from different angles. Volunteers also posed for iris and 3-D face imaging cameras.

After acquisition and assembly of these field-collected data, the researchers then presented unlabeled twin and non-twin image pairs in equal numbers to another group of human volunteers on campus. These volunteers were told to record their opinion of whether the image pairs came from a pair of twins or from unrelated individuals.

Bowyer's and Flynn's research indicates that the participants can correctly classify pairs of twins with 80 percent accuracy using only the appearance of the iris, a level that rules out the possibility of random guessing.

Their research suggests that iris images may be able to be used for purposes beyond those that are currently envisioned by the biometrics research community. The researchers plan on continuing to analyze data from the Twinsburg event to look closer at the feasibility of new types of automated iris image analysis. Initial results of their work appear in the Computer Vision and Pattern Recognition Biometrics Workshop and the International Carnahan Conference on Security Technology.

Provided by University of Notre Dame