NIST study advances use of iris images as a long-term form of identification

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A frequent traveler uses an iris recognition camera to speed her travel across the American-Canadian border. NIST researchers evaluated data from millions of images taken over a decade from this iris-based NEXUS program to gauge iris stability. Credit: Canadian Border Services Agency

A new report* by biometric researchers at the National Institute of Standards and Technology (NIST) uses data from thousands of frequent

travelers enrolled in an iris recognition program to determine that no consistent change occurs in the distinguishing texture of their irises for at least a decade. These findings inform identity program administrators on how often iris images need to be recaptured to maintain accuracy.

For decades, researchers seeking biometric identifiers other than fingerprints believed that irises were a strong biometric because their one-of-a-kind texture meets the stability and uniqueness requirements for biometrics. However, recent research has questioned that belief. A study of 217 subjects over a three-year period found that the recognition of the subjects' irises became increasingly difficult, consistent with an aging effect.**

To learn more, NIST biometric researchers used several methods to evaluate iris stability.

Researchers first examined anonymous data from millions of transactions from NEXUS, a joint Canadian and American program used by frequent travelers to move quickly across the Canadian border. As part of NEXUS, members' irises are enrolled into the system with an iris camera and their irises are scanned and matched to system files when they travel across the border. NIST researchers also examined a larger, but less well-controlled set of anonymous statistics collected over a six-year period.

In both large-population studies, NIST researchers found no evidence of a widespread aging effect, said Biometric Testing Project Leader Patrick Grother. A NIST computer model estimates that iris recognition of average people will typically be useable for decades after the initial enrollment.

"In our iris aging study we used a mixed effects regression model, for its ability to capture population-wide aging and individual-specific aging,

and to estimate the aging rate over decades," said Grother. "We hope these methods will be applicable to other biometric aging studies such as face aging because of their ability to represent variation across individuals who appear in a biometric system irregularly."

NIST researchers then reanalyzed the images from the earlier studies of 217 subjects that evaluated the population-wide aspect. Those studies reported an increase in false rejection rates over time—that is, the original, enrolled images taken in the first year of the study did not match those taken later. While the rejection numbers were high, the results did not necessarily demonstrate that the iris texture itself was changing. In fact, a study by another research team identified pupil dilation as the primary cause behind the false rejection rates.*** This prompted the NIST team to consider the issue.

NIST researchers showed that dilation in the original pool of subjects increased in the second year of the test and decreased the next, but was not able to determine why. When they accounted for the dilation effect, researchers did not observe a change in the texture or aging effect. Some iris cameras normalize dilation by using shielding or by varying the illumination.

More information: *The NIST results are reported in IREX VI – Temporal Stability of Iris Recognition Accuracy, NIST Interagency Report 7948, at www.nist.gov/manuscript-public … ch.cfm?pub_id=913900.
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