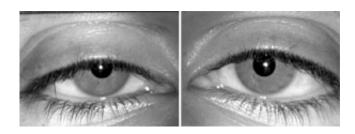# Biometrics expert is helping to ensure an honest election in Somaliland

August 20 2014, by William G. Gilroy

Left and right iris images from one Somaliland trial voter registration record

Mention the name Somaliland, and most people will have images from the movies "Black Hawk Down" and "Captain Phillips" spring to mind. However, those images are more correctly associated with Somalia, not Somaliland, which is an independent state that is internationally recognized as an autonomous region of Somalia.

Somaliland declared itself independent in 1991 and has been transforming itself into a rare, multiparty democracy in the Horn of Africa. University of Notre Dame biometrics expert Kevin Bowyer and his Ph.D. students Estefan Ortiz and Amanda Sgroi are playing a critical role in that process.

"One goal of the Somaliland government is to have honest, respected elections," Bowyer said. "Toward this end, they want to create a fraud-free voter registration list. They have turned to biometrics as a means to

generate such a list."

A biometric is a stable and distinctive physiological feature of a person that can be measured and used to identify them. The fingerprint is probably the most familiar example. But iris recognition is proving to be more powerful than fingerprint in some important applications.

"Fingerprint might seem like an obvious choice for biometric verification of a voting register, but it runs into problems with the percentage of the population for which an acceptable quality image can be obtained," Bowyer said. "Given the state-of-the-art in fingerprint sensors, in a country like Somaliland, a sizeable fraction of the population may have trouble using the sensors reliably. And this weakness can be exploited by people who want to commit voter fraud by registering more than once. In fact, Somaliland conducted a biometric voter registration exercise in 2008-09 using fingerprints and facial recognition, and a good deal of effort was devoted to using biometrics to clean the voting register. However, a report done in 2010 by Electoral Reform International Services for the Somaliland National Electoral Commission concluded that 'this register is known to contain a large number of duplicates, possibly around 30 percent, and the existing biometric systems could not identify these with the data available.' The problems with this voting register motivated the need for a new register."

As an alternative to fingerprinting, the Somaliland government, through its election experts, contacted Bowyer's research group for help in exploring the use of iris recognition. The Bowyer group's publications on iris recognition technology contributed significantly in convincing the National Election Commission that iris recognition, done with the right equipment and procedures and with a focus on data quality, was a viable solution.

The voter registration is by law required to be complete by the end of

2014. Somaliland officials asked Bowyer's group to conduct a trial voter registration project using iris recognition that would be completed before Ramadan started on June 28.

"Data acquisition for the field study was conducted over a five-day period in two registration centers: one in the Somaliland capital, Hargeisa, and one in Baki, a small town about 60 miles from Hargeisa," Bowyer said. "The data was transferred electronically to our research group at Notre Dame, where we performed the iris recognition analysis, and then reported our results back."

The Notre Dame researchers analyzed 1,062 trial voter registration records. The number of duplicate records seeded into the dataset in order to test the power of iris recognition was unknown to the Notre Dame team. Each record contained two iris images, for the left and the right eye. Using automatic matching of the set of 2,124 iris images, the Notre Dame team was able to quickly identify a list of 450 duplicate registrations. A duplicate registration is an instance of two different voter registration numbers that [iris recognition](link) indicates belong to the same person. The Notre Dame team then performed manual inspection of a small number of results that were ambiguous based on the automatic matching, and this identified another seven instances of duplicate registration.

The list of 457 instances of duplicate registration was reported to the Somaliland National Electoral Commission, along with a technical report that describes how the Notre Dame team performed its analysis and makes recommendations for maintaining and improving image quality. Elections specialist Roy Dalle Vedove, working with the Somaliland NEC on the effort for a new and more accurate voting register, replied that "analysis of the results from our data confirm the accuracy of your results. … Overall we are very pleased." Mohamed Ahmed Hirsi Gelleh, the chairman of the NEC, said, "We are very grateful for the great work

you have done for us."

Somaliland will proceed to create a new national voting register to be used in the next elections. Its biometrically validated voting register will be one of the most technically sophisticated voting registers of any country in the world, and a model for others. Researchers hope it will lead to election results that are transparent and believable, and to greater international recognition of the Somaliland government.

Provided by University of Notre Dame

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