Knobbly kneed ID: Internal body parts and biometrics

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Forget LED thumb-pad identification devices, complex retinal laser scanning, or even computerized iris recognition, the way forward for biometric validation is a quick X-ray snapshot of a person's knees, according to a report published in the *International Journal of Biometrics*.

Lior Shamir of the Laboratory of Genetics, National Institute on Aging, at the National Institutes of Health, and colleagues working with State University of New York at Farmingdale computer engineer Salim Rahimi explain that identification of individuals often requires focusing on unique features such as their face, fingerprints or retina. They explain that a similar identification process with countless applications in building security, at border crossings and elsewhere might equally use the unique nature of person's internal body parts, such as their knobbly knees.

Internal body parts are obviously invisible to the unaided eye but Shamir and colleagues have now demonstrated that knee X-rays can be used for identification purposes. The approach rapidly analyses the X-ray images using the wnd-charm algorithm, which has previously been used to diagnose clinical conditions of the knee joints.

The advantage of using a biometric identification process based on this kind of imaging is that it would be so much more difficult for a fraudster to spoof the knees or other internal body part in the way that they might with artificial fingerprints or contact lenses.

The team points out that the algorithm can correctly identify a given pair of knees and match it to a specific individual in the database even if the original X-ray were taken several years earlier. Identifiable features correspond to specific persons, rather than the present clinical condition of the joint, the researchers say.

The Wnd-charm algorithm, which is publicly available, is a multi-purpose image classification method that looks at a large set of image features, including high-contrast features, textures, and the statistical distribution of pixels in the image.

The team used a dataset of 1700 X-ray images from 425 individuals, representing four knee joint images per person in the dataset. They digitized the X-rays as 8 megapixel scans and characterized a central area of 700 × 500 pixels for the joint detection algorithm to process.

They found that accuracy levels were yet not as high as iris detection or fingerprint identification with the current algorithm but are much better than random results. The algorithm might now be refined to improve accuracy considerably and an alternative imaging process such as terahertz imaging might also offer more precise data.

More information: "Biometric identification using knee X-rays" in Int. J. Biometrics, 2009, 1, 365

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