Biometrics Based on Fingertip Sweat

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Hyperspectral Imaging of Fingertip Sweat to Build Spoof-Proof Biometric Profiles

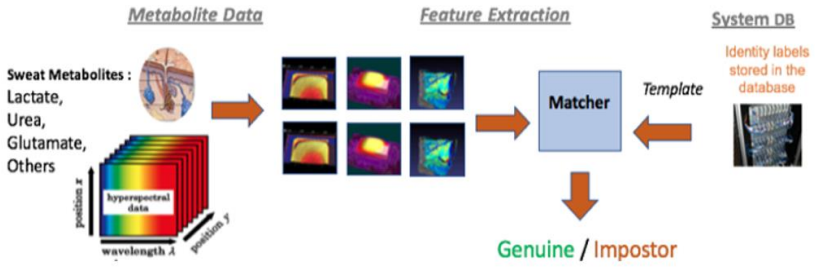
Researchers at Mason have invented a new biometric identification system which adds **two new dimensions to biometric profiles**: (1) **the chemical composition of an individual's unique sweat** and (2) **the spatial distribution of the fingertip sweat** revealing the unique distribution of sweat-glands inside the fingertip skin. The biometric identification system acquires hyperspectral images of a subject's fingertips. These images enable the building of deep biometric profiles significantly less vulnerable to spoofing attacks and racial bias.

Biometrics vulnerability to spoofing attacks: despite the increasing adoption of biometrics, many of the existing technologies (e.g., fingerprinting, face recognition) are susceptible to various forms of spoofing attacks. For example, 3D printers have been used to create inexpensive fake fingerprints which can be used to bypass authentication.

Racial Bias: Matching algorithms designed to compare primary identifiers (i.e., face and fingerprint) yield lower genuine scores for some racial and ethnic minorities. This results not only in a less accurate output for minorities but also makes them more vulnerable.

The biometric identification system uses a hyperspectral camera to acquire spectral-hypercubes from a fingertip. The spectral-hypercube includes both spectral and spatial information about the fingertip. The spectral-hypercube includes a spectral series of images (e.g., 256 images at wavelengths from 250nm to 2000nm) of the fingertip. Each of the images of the spectral series corresponds to a certain wavelength-band. The fingertip has a plurality of pixels disposed in an array (e.g., 100 x 200 pixels). For each of the pixels, the hypercube includes a reflectivity spectrum of the pixel. A spectrum associated with an imaged pixel provides information about the pixel volume chemical composition. This hypercube now provides information both about the spatial distribution and the chemical composition of the sweat.

The spatial distribution and chemical composition of sweat on fingertips provide new identifying biometric parameters of an individual, thereby enabling the formation of deeper biometric profiles which are resilient to spoofing and racial bias.



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