

Further Biometrics - part 2

Welcome back. In this video, we're going to take a deeper look at fingerprint recognition for biometrics. We will also have a look at some of the limitations and concerns more generally around biometrics. As you may already know, fingerprint enrolment involves taking a number of images or scans of your fingerprints. Particularly, it asks you to rotate your finger so that you get partials, as well as full coverage, in a range of different rotations.

And this helps it better recognise when you are trying to authenticate. These images are then analysed in order to determine the different patterns. This is digitised and stored as the template. When authenticating, you then present your fingerprint, scan is taken again, and the same sort of idea with looking at the threshold as to whether it's a sufficiently similar template is executed. There are, of course, limitations with fingerprints.

It is possible that you get cuts, or something like that, which might change your fingerprint. For that reason, it's often recommended you input multiple fingerprints and have templates extracted from those. There is also the issue around wet fingerprints and wet sensors. It can make it a little bit frustrating for the end user if their finger is slightly wet or the sensor is slightly wet, then it won't register that fingerprint.

Fingerprints are also fairly well known for being breakable. In particular, there's a famous piece of research where somebody took gummy bears, melted them down, and was able to create a phony fingerprint, which fooled the sensor. Clearly, the hardware being used is going to impact how effective an attack might be, but it is possible that latent fingerprints from glasses or other surfaces may be lifted without the user's knowledge and they're used to create fake fingers or little plastic bits that go over your finger and you can use.

There is something in biometrics called liveness detection, and this is, effectively, where the sensors try to employ other techniques in order to detect whether it is a live person that is using that particular biometric. It's outwith the scope of what we're doing here, but if it is something you're interested in, there's lots of research out there on it.

Another field of interest within biometrics is behavioural biometrics, and these tend to be

increasing as the research develops. For example, behavioural biometrics might be things such as how you input text into a keyboard, the amount of time that you tend to spend dwelling on one letter compared to another. The time between those, referred to as the flight time, can be sufficiently unique to identify you as a unique individual. As hinted at earlier, there are a range of other considerations when we look at biometric authentication.

Clearly, one of the most prevalent issues is the issue of privacy. As we develop more biometrics for multifactor authentication and for authentication in general, we start to realise that the kind of data that can be stored is becoming more and more valuable. As a result, people are often quite uncomfortable with the idea of these biometrics being taken from us and stored. Another issue with biometrics is around the failure to capture.

This can be either in enrolment or in the verification stage. It's where the biometric is not successfully captured. Clearly, this is a usability issue and can cause issues for the end user. There's also the issue of false accept and false reject should be a low, but trying to balance that against the usability of the system and the cost of the system can be a difficult challenge.

As hinted at earlier, the use of machine learning within authentication, such as biometrics, can introduce concern over the diversity of the training sets being used. If you are interested, as I said, there's some great research from MIT looking at this specifically. That says for this video where we've looked at some of the most common biometric mechanisms.

I hope you've enjoyed the video, and I'll see you next time.

The place of useful learning

The University of Strathclyde is a charitable body, registered in Scotland, number SC015263

