Identifying crooks – by their blood vessels

Program can process photos of criminals to make veins more visible

BY FENG ZENGKUN

JUST as fingerprints can help nail a culprit, veins on the body can point the finger at suspects too.

This is according to an assistant professor at Nanyang Technological University (NTU), who has developed a way to identify criminals based on the veins on their bodies.

The computer program takes digital photographs of criminals and reverse-engineers them so the veins, or blood vessels, on the bodies are more visible.

These are then compared to photos of suspects that are also put through the same process.

Dr Adams Kong, 36, who has been given new funding to develop his system, said it could be especially useful in crimes such as child sexual abuse and child pornography.

In such situations, culprits usually post online photos of their misdeeds and with their faces blurred.

"Like fingerprints, they can be another source of evidence for the police," he said of the focus on veins.

In a test of 150 sets of photos, five untrained volunteers were able to match at least 80 per cent of the photos.

A larger test involving 300 people is ongoing.

Dr Kong, who is from Hong Kong, said the project started in 2008 after he was asked to help build a case against a child rapist in the United States.

The rapist was eventually convicted based on photos in which he was identified by a prominent mole.

Dr Kong said: "But not everyone has moles and they can be easily removed so I wanted to focus on something else."

He acknowledged that the method cannot be used in all cases. To be valid as evidence, the photos have to be of a high-enough resolution so the vein patterns are clear.

Dr Kong said the research team at NTU is working with the Singapore Police Force to clarify the requirements of such evidence.

Other factors that may render the method useless are the body parts seen in the photos and the colour of the skin.

Dr Kong said: "Some body parts don't have that many veins, for example, the shoulder. If only the shoulder is exposed in the photo, then it doesn't work."

He said the forearm and leg have the most veins.

He added that people with darker skin might fall through the net since their veins may not show up clearly enough in photos.

The next step in the research is to improve the technology so it can derive more data from the digital photos, he said.

"Digital cameras bounce light off the skin and into the lens. Some of the light penetrates the skin and reveals the body structure underneath, which the cameras also capture," he noted.

"If we can improve the reverse-engineering process, we can provide more data such as the criminal's tissue structure. This would make the identification more accurate."

The team is also working on a computer program that matches the photo sets.

If all goes well, Dr Kong expects the technology to be good enough for use in criminal cases within three years.

The project received $250,000 in funding from the National Research Foundation in its latest round of grants.

Dr Kong said: "Vein patterns remain the same throughout a person's life, just like fingerprints. So once a criminal gets into the computer system, there will always be a record."

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PERMANENT RECORD

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From 'anger control' game to smart windows

TWELVE projects including Dr Adams Kong's vein pattern recognition system, which allows for the identification of criminals based on the veins on their bodies, received up to $250,000 each in the National Research Foundation's latest round of grants.

Seven are from the Nanyang Technological University (NTU), four from the National University of Singapore (NUS) and one from the Institute of Mental Health (IMH).

The grants are awarded twice a year to projects from tertiary institutions and medical centres.

Recipients are chosen by a panel of entrepreneurs, business leaders and venture capitalists.

Since 2008, 63 projects have received grants, including the latest recipients.

Projects awarded this time include:

■ An online game to help children and adolescents with anger problems

Users log on to a virtual world and play games that take them through real-life situations that often provoke young people, such as being stared at or being hit by a stray basketball.

IMH associate professor Daniel Fung, who is the project leader, said this could help anger-prone young people, most of whom do not seek help at clinics.

■ A super-capacitor that stores 100 times more energy than normal batteries

Super-capacitors store electric energy and charges, making them green energy sources. The NUS project may be used to give consumer devices such as iPhones a longer battery life.

Project leader Xie Xianning said they could also power electric vehicles in the future.

■ Windows which can switch between opaque and clear

These are smart windows which can change their opacity and colour at the flick of a switch. The technology can be adapted to block infra-red and ultraviolet rays from the sun as well.

Project leader Alfred Tok from NTU said the technology could also be used for sunglasses, military camouflage and next-generation electronic displays and televisions.

Dr Adams Kong's vein pattern recognition system processes digital photos to make veins on bodies more visible so they can be compared to criminal suspects' photos that are put through the same procedure. PHOTO: NANYANG TECHNOLOGICAL UNIVERSITY