



Qian Tao

If it were up to Qian Tao, having to remember yet another PIN code for your mobile phone or PDA will soon become a thing of the past, as they will be equipped with face recognition. An advantage of using face recognition on a PDA is that you look at the display frequently, enhancing recognition every time. But the tricky part is minimizing the amount of computation required.

Look your handheld in the eye!

'The first mobile phones with face recognition are already available, as is the software and accompanying camera for PCs and laptops. But the capabilities of these products are still limited. The algorithms we have developed are smarter and result in even better recognition. After all, you not only want to minimise the risk of an impostor gaining access to your system, you also want the highest probability of gaining access yourself.'

'Recognition has to be quick; you don't want to be kept waiting until you have access. At the same time, we want to keep costs low. You can't equip a mobile device with a sophisticated camera and lenses – the simple built-in camera should be more than enough. Memory use and battery power consumption should be minimal. We believe we will be able to develop algorithms that take



all these limitations into account and that are as simple as possible. You don't need special hardware for recognition.'

It is quite an extraordinary feat, Qian realizes, considering that people have learned how to recognize faces from a very early age and under widely varying circumstances. Computers first have to find out the exact location of the face in the camera's image. The system should not be too rigid to only allow access with a specific facial expression or from a certain angle. 'We look for feature points such as eyes, nose and ears, or the corners of your mouth. This enables us to find the face and align the image. Upon first use, a short film is made of the user to store different camera angles.'

The extremely high quality of human recognition is proven again when considering different types of lighting. People have no problem with it, but computers see completely different images. 'We have found a way to filter out light information and process pixels locally. We are, in fact, looking at the texture of the face. This extremely rapid process is a real breakthrough in "normalization".'

Face detection and normalization are followed by discrimination. Is the system capable of distinguishing an

impostor from the actual user? 'The drawback of having to type in a PIN code is clear: a person stealing your mobile while you're still logged in can use your phone until you have asked your provider to disconnect it. But an impostor will not gain access to your phone by looking at it. The system does not have a database of faces, as is the case with face identification, for example at airports. It compares the face with the characteristics of the actual user. This verification is subject to strict requirements. The advantage is that a lot of information about the user's face is available. Recognition improves the more frequently the device is used. A statistical comparison in a multidimensional space yields a 'cloud'. The farther away from the centre of the cloud, the greater the chance that the person being recognized is an impostor.'

'The initial results are promising. Real-time recognition is already possible on PCs, while a PDA takes a few seconds. We still have to fine-tune the algorithm. Our method is also suitable for sophisticated face recognition such as for airport security. The embedded algorithms can be adjusted to the application and, for instance, the false acceptance rate lowered even further.'

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