

Chapter 3

FACIAL IMAGE RECOGNITION

Personal identity verification is a very human activity. On one level it is essential for interpersonal relationships. Even animals have developed specialized skills for distinguishing between friend and enemy. Animals rely mainly on smell (dogs remain unmoved by images other dogs). Humans, when possible, prefer sight.

On a different level, personal identification has been in use since ancient times to confirm transactions (include image of the ‘signature’ of the Zulu king, Dingane, dating from the previous century). Our modern technological society relies heavily on personal identity verification, be it to gain access to bank accounts or secure areas, or just to login to a computer. Automated identity verification is a complex problem and many different options have been pursued. Some old favorites including,

- Handwritten signatures
- Passwords
- Identity documents, etc

are particularly easy to copy and lead to widespread fraud. The problem is that these systems do not contain any personal information about the individual. Even handwritten signatures exist as little more than a ‘abstract’ pattern that is not particularly hard to duplicate by the forger, especially for the untrained eye. Passwords

are of course totally divorced from the individual using it—it is impossible to verify that the person offering the password is in fact authorized to use it. It is not surprising that fraudulent transactions based on the misuse of identification systems have become a serious problem.

In recent years much effort has done into the development of automated personal identification/verification systems based on the characteristics unique to each individual, the so-called Biometric Personal Identification Systems. Ideally these system are based on personal characteristics that even the individual is not able to alter (disguise). Doling provides the following table of the different systems that are either commercially available or or in advance stages of development.

Biometric	Reliability	Acceptance	Cost
Fingerprint	4	3	3
Hand geometry	3	4	2
Eye retina	5	2	4
Iris	5	2	3
Face	3	4	2
Voice	3	5	2
Handwriting	2	4	1
Keystroke	1	4	1
Signature	3	5	1

Table 3.0.1. A comparison of different biometrics.

In this table the score is out of 5. Thus a score of 5 indicates a high level of reliability and acceptance, and a high cost. Thus we note that facial recognition is fairly reliable, quite acceptable at a reasonable cost. It is without doubt the most natural way for humans to identify each other. In this chapter we provide the basic details to develop a facial recognition system.