Chapter IV

Face Recognition Technology:
A Biometric Solution to Security Problems

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ABSTRACT
Face recognition technology is one of the most widely used problems in computer vision. It is widely used in applications related to security and human-computer interfaces. The two reasons for this are the wide range of commercial and law enforcement applications and the availability of feasible technologies. In this chapter the various biometric systems and the commonly used techniques of face recognition, Feature Based, eigenface based, Line Based Approach and Local Feature Analysis are explained along with the results. A performance comparison of these algorithms is also given.

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INTRODUCTION

Biometrics is defined as the automated use of physiological or behavioral characteristics to determine or verify an identity. A biometric device compares unique personal characteristics to identify the individuals. The two major categories of biometric devices are Physiological and Behavioral. Physiological biometric identification measures unique body characteristics such as fingerprint details, retina blood vessel patterns, features of the iris, the size and shape of a hand or facial scan. It compares these characteristics against a pattern recorded during an enrollment process. Behavioral measurements identify unique learned traits such as a person’s signature, voice scan, and keystrokes scan. The major biometric technologies that are being used nowadays are:

- Finger scan
- Iris scan
- Hand scan
- Voice scan
- Retina scan
- Signature scan
- Facial scan

It is clear that the events of September 11 had a profound effect on security-based systems. Clearly, the recent events will have a significant impact on the future demand in the biometrics industry.

In this chapter, the main emphasis is on “facial scan or face recognition.” Face recognition is distinguishing people’s faces. Humans have the capability to recognize faces. A large database of human faces is stored in our brain and to identify any face the face of the person is matched with the face database of persons stored in our memory. If a successful result is obtained, a person recalls the identity of the face or else it is added into the database of faces in the brain. This performance is related to neurons and all but actually what happens in the brain during recognition is still not clear. Here, a brief description of the major biometric technologies is given.

Finger-Scan Technology

Finger-scan biometrics is based on the distinctive characteristics of the human fingerprint. A fingerprint image is read from a capture device, features are extracted from the image, and a template is created. If appropriate precautions are followed, what results is a very accurate means of authentication. Following are the terminology for the method:

- Fingerprints vs. Finger-scans — Fingerprint Characteristics — Feature Extraction — Silicon, Optical, Ultrasound

Fingerprints vs. Finger-Scans

The aura of criminality that accompanies the term “fingerprint” has not significantly impeded the acceptance of finger-scan technology, because the two authentication methods are very different. Fingerprinting, as the name suggests, is the acquisition and
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