

Chapter 1

Biometric Technologies in Healthcare Biometrics

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ABSTRACT

The aim of this chapter is to introduce biometrics systems and discuss the essential components of biometrics technologies in the healthcare system. The discussion also includes the state-of-the-art biometrics technologies, selection criteria of a suitable biometrics system, biometrics identity management, and multi-biometrics fusion for healthcare biometrics system.

INTRODUCTION

Recently the concernment for biometrics is increasing swiftly to safeguard a patient's secrecy and the confidentiality of patient's actuality in the healthcare system. Identifying a patient and protecting a patient file is a ticklish task in any healthcare system. Due to improper identification, patients may lose their life in some cases. An unconscious patient cannot present an ID. The traditional patient tagging or mismatch between patient tag and hospital records are not free from flaws due to clerical mistakes or errors. This type of error can raise the inaccurate identification, wrong blood transfusion, or deceitful medicine infliction, which may be very dangerous for a patient's life. Therefore, there is a need for robust identification using biometrics in the healthcare system.

The term biometrics is a combination of two terms – 'bios' means life and 'metrics' means assessment. It refers to the metrics related to the physical and behavioral traits of human beings. The biometrics technology is implemented to analyze people for their identification, access control or surveillance by means of their biological information. Every person is unique and comprises a separate identity in the form of physical traits like fingerprint, face, iris, hand geometry and behavioral traits like voice, typing rhythm, and gait. Biometrics technologies are defined as automated way of recognizing or ascertaining the identity of an individual arisen on an idiosyncratic biological (anatomical or physiological) or be-

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havioral characteristics. It is very ticklish to feign a biometrics authentication system as biometrics can give invulnerable and competent recognition of a person and they cannot be plundered or unremembered. A biometrics system comprises four major modules –

- A device is used to take sample of a particular biometrics trait of an individual. These devices capture biometrics sample in some digital form.
- A feature extraction software module is used to transform the input biometrics sample into a template that is the fundamental component of the matching phase.
- A matching software module perpetrates comparison of an input biometrics sample with previously stored biometrics templates.
- An interface facilitates the communication of a person with the application system.

The choice of the applicable biometrics technology is a crucial task. It depends on the circumstance where the identification or verification system is enacted, the user scheme, needs for matching precision, and the implementation cost of the system and strengths, and cultural convention that could influence user adoption. To choose the proper biometrics technology, the prime factor which is used is its accuracy.

Biometrics identity is the physical or behavioral traits of a human being. Using biometrics identity of a patient, a healthcare system can simplify patient admission and immediately get entree to previous medical files. Biometrics identity also facilitates to recognize senseless or wretched patients easily, find out abuse of medical services, and establish an unprecedented way of identification across all medical services.

Biometrics identity management in healthcare is a combination of computer security and business management to ascertain that resources are to be accessed by patients, physicians, and the right healthcare personnel must be available for the right reasons. As the healthcare systems are growing exponentially and related records are accessed by several healthcare personnel concurrently, therefore the records must be protected securely. Resources in a healthcare system are very important artifacts for patients, doctors, and other healthcare personnel, so assuring that resources are protected against unauthorized access become crucial. Biometrically authenticated identity ensures that only authorized user is accessing the resources, not by imposters using fabricated identity token. Biometrics identity management eliminates the likelihood of spoofing.

Sometimes unimodal biometrics identification systems fail to produce the expected level of accuracy due to image quality, intra class variability, sensitivity to noise, non-universality, and various factors. To enhance the perfection of the biometrics system, multibiometrics system is required, which required many biometrics samples as a proof of the same individual. The fusion in biometrics system refers to the process of combining two or more biometrics modalities together. Multimodal biometrics fusion is possible using different fusion strategies and various levels of fusions. The fusion of separate modalities can ameliorate the overall perfection of the biometrics system in the different challenging environments. This provides additional tools to healthcare to accurately identify patients, physicians, and other healthcare related personnel.

Correct identification of physicians, supporting staffs and patients along with patient record maintenance, assignment of access permission for healthcare providers are major challenges in any healthcare system. These challenges can be overcome by integration of biometrics technology with healthcare system, due to its ability to provide a mechanism for verification or identification of individuals. However, biometrics technologies are vulnerable to spoofing from the faked copies of different biometrics samples.

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