Chapter 3

Hybrid Biometrics and Watermarking Authentication

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ABSTRACT

There are many tools and techniques that can support management in the information security field. In order to deal with any kind of security, authentication plays an important role. In biometrics, a human being needs to be identified based on some unique personal characteristics and parameters. In this book chapter, the researchers will present an automatic Face Recognition and Authentication Methodology (FRAM). The most significant contribution of this work is using three face recognition methods; the Eigenface, the Fisherface, and color histogram quantization. Finally, the researchers proposed a hybrid approach which is based on a DNA encoding process and embedding the resulting data into a face image using the discrete wavelet transform. In the reverse process, the researchers performed DNA decoding based on the data extracted from the face image.
INTRODUCTION

Biometrics identification have been a popular topic of research and study for the last decades. The number of fields that it involves makes this topic relevant through many departments and research institutions. From scientist, psychologists and many different fields of engineering and computer science has resulted in a considerable amount of knowledge. Many face analysis, face modeling, and DNA encoding techniques have progressed significantly in the last decade. However, the reliability of biometrics identification schemes still poses a great challenge to the scientific community.

Biometrics identification is an inherently difficult problem for both humans and computers. This is due to many problems and adaptations in the inputs related to the actual images of faces. The nature of human faces and fingerprint furthermore complicate this task. The spatial layout of faces being so similar makes the task somewhat challenging. This is before considering the difference in appearance of a single individual due to age, hairstyles, make-up, facial hair or glasses. Even if we could eliminate these variations of each individual, the variability of the input image due to pose, lighting and picture quality all make the process of face recognition a very complex undertaking. With all these difficulties Humans have the great ability to recognize a face in a large crowd within seconds.

DNA typing is very useful in crime detection. Since DNA requires a form of blood, tissue, or other bodily sample, it has not yet been adopted as a major biometrics method, even though it is now possible to analyze human within 10 minutes.

The DNA bases are combined in specific sequences to form base pairs which determine the physiology and anatomy of the organism. Each base pair with phosphate and sugar creates a nucleotide. Nucleotides form two long strands connected by the base pairs as a ladder and form the characteristic double helix.

Digital watermarking methods should be imperceptible in order to be effective, while at the same time robust to common image manipulations like rotation, compression, scaling, filtering, cropping, and collusion attacks through other signal processing operations. Current digital image watermarking techniques can be grouped into two main categories: spatial domain watermarking and frequency domain watermarking algorithms.

THE PROPOSED FACE RECOGNITION AND AUTHENTICATION SYSTEM

The proposed Face Recognition and Authentication System are composed of three main phases; pre-processing, feature extraction, and classification and authentication.
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