

A Watermarking Technique Using Discrete Curvelet Transform for Security of Multiple Biometric Features

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The robustness and security of the biometric watermarking approach can be improved by using a multiple watermarking. This multiple watermarking proposed for improving security of biometric features and data. When the imposter tries to create the spoofed biometric feature, the invisible biometric watermark features can provide appropriate protection to multimedia data. In this paper, a biometric watermarking technique with multiple biometric watermarks are proposed in which biometric features of fingerprint, face, iris and signature is embedded in the image. Before embedding, fingerprint, iris, face and signature features are extracted using Shen-Castan edge detection and Principal Component Analysis. These all biometric watermark features are embedded into various mid band frequency curvelet coefficients of host image. All four fingerprint features, iris features, facial features and signature features are the biometric characteristics of the individual and they are used for cross verification and copyright protection if any manipulation occurs. The proposed technique is fragile enough; features cannot be extracted from the watermarked image when an imposter tries to remove watermark features illegally. It can be used for multiple copyright authentication and verification.

Keywords : Biometric Features, Discrete Curvelet Transform, Multiple Watermarking, ISEF Edge Detection.

1. INTRODUCTION

The rapidly use of internet and growth in multimedia data communication over the internet has created a problem of copyright authentication and protection. For prevention against copyright authentication and protection, Digital Rights Management (DRM) system provides one of the solutions. DRM refers to a range of access control mechanism used for copyright, digital data access [1]. Digital watermarking is one of the technologies used in DRM systems to provide copyright protection and authentication for digital data. Digital watermarking can hide important information into the digital data, such as digital images, audio and video [2-36].

Biometrics features are referred as behavioral and physiological characteristics of an individual.

These biometrics features of an individual are used for an individual verification and authentication. These biometrics features are unique for every individual. These biometrics features used as watermark in digital watermarking technique to provide unique identity of an individual, to improve ownership and protection of multimedia data.

1.1. Importance of Biometric Features as Watermark Information

The watermarking technique embeds a name, logo or text information about copyrighted individual into the host digital data which can be text information, digital image, video and audio [3]. There are some limitations of these types of watermarks such as less important information, less related to a copyrighted individual for authentication. These types of wa-

Table 3
Effect of Gain Factor on Watermark Insertion

Gain Factor	PSNR (dB)
0.005	48.47
0.010	42.44
0.015	38.92
0.020	36.42
0.025	34.49
0.030	32.90
0.035	31.56
0.040	30.40
0.045	29.38
0.050	28.46
0.055	27.64

this proposed watermarking technique because when increase gain factor above 0.05 then this technique does not fulfilled the requirement of human visual system (hvs) property of watermarking.

Table 4
Comparison of Proposed Watermarking Technique with Existing Watermarking Techniques in the Literature

Features	Mark Tech. [31]	Inamdar Tech. [1]	Proposed Tech.
Type	Successive	Successive	Composite
Watermark Used	PN Sequence	Biometric Trait	Biometric Features
Transform Used	Discrete Cosine Transform	Discrete Wavelet Transform	Discrete Curvelet Transform
PSNR (dB)	40	35.18	42.44

The proposed watermarking technique is compared with existing watermarking techniques available in literature with various features and parameters are summarized in Table 4. The existing watermarking techniques available in the literature are robust against various watermarking attacks while this proposed watermarking technique is fragile against attacks. The PSNR value shows that proposed watermarking technique is outperformed compared to existing watermarking techniques available in the literature.

5. CONCLUSIONS

A new approach approach for authentication of watermarked image has been proposed in this paper. A multiple biometric feature embedding technique by using ISEF edge detection, PCA and Fast Discrete Curvelet Transform (FDCT) has been proposed for individual recognition and copyright authentication. This paper is also presented various approaches for multiple biometric watermarking techniques for copyright protection and authentication. This proposed multiple watermarking algorithm is used various transform coefficients of curvelet for multiple watermark embedding. Invisible watermark biometric features provide authentication of copyright ownership of digital data. The experimental results show that proposed approach is performed better than existing watermarking approaches available in the literature.

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