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Abstract:

Growing demand for e - healthcare across the globe has raised concerns towards the secure and authentication enhanced medical image sharing. One of the services offered by health informatics in hospitals include an user interface through the Local Area Network (LAN) for enabling storage and access of medical records. In this paper, a security enhanced DICOM image sharing over a LAN addressing confidentiality, integrity and authentication has been proposed. Initially, the AES encrypted patient history was combined along with the thumb impression and Quick Response (QR) code of patient ID as watermark. This watermark was encrypted employing Integer Wavelet Transform (IWT), chaotic map and attractors with confusion-diffusion operations. Further, the encrypted watermark was embedded in the selected Region Of Non-Interest (RONI) pixels of DICOM image. Username & unique password credentials, Face identification and FPGA generated One Time Password (OTP) form the three layer authentication scheme for secure DICOM image access through the LAN. Web publishing medium of storing secured DICOM images in cloud has also been addressed in this work. To validate the proposed hybrid crypto-watermarking system, parameters such as key sensitivity, key space, correlation, entropy, histogram, cropping attack, Mean Square Error (MSE), Peak Signal to Noise Ratio (PSNR) and Structural Similarity Index Metric (SSIM) were performed and the results obtained have proved the strength of the proposed algorithm against brute force, statistical and cropping attacks.

Keywords: Image Encryption, Chaos, Watermarking, Web Publishing, FPGA, DICOM

1. Introduction

Modern technologies play a significant role in the advancements of military, aerospace, agriculture and healthcare applications. Healthcare domain is benefitted because of the

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