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Performance Analysis of Attacks on Watermarking Techniques for Color Images

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Abstract: ***The paper offer the types of watermark attacks and the evaluations for performance metrics against attacks applied on the watermarking hybrid technique to amalgamate the safeguard for secretion information and it is demonstrated that this technique is more procure against these types of attacks.***

Keywords: watermark, Attacks, Robustness, QSSIM, SSIM, UACI, NPCR.

I. Introduction

An algorithm to plant the data to assure the information so as not to be inclined by any attack this is called the watermarking. In the watermarking, the image is entrenched into another image using different techniques to make it robust and for increasing security. The robustness and security is measured by making some specific attacks [i]. Watermarking produce high encrypted data. It is better method of cryptography. Attacks are needful controller in the watermarking cadres because the attacks assess the value of the techniques and algorithms, to decide to use it or leave it. The main intent of watermarking is that the watermark should be so firmly root into the image that it can't be retrieved from it by any method other than its detected process [iv]. When the watermark is firmed into the host image then the image is suffused to the network where image can be attacked by the malicious users or it may be damaged by the noise in the network. Attacks are modifications and manipulations on watermarked image that destroy and damage that watermark also, decrease the security and distort the information.

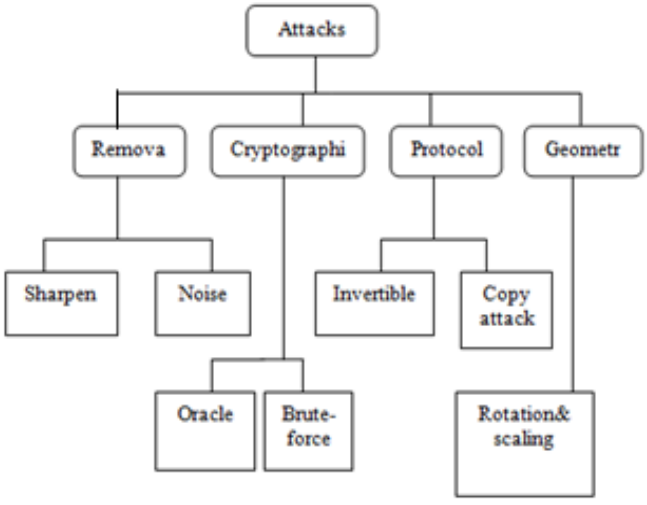

Fig. 1 watermarking attacks [i].

II. Material and Methodology

There are many works about attacks contra watermarking and their congruous alleviation manners. The attacks that doesn't affect the quality of watermarked content not referring to the mitigation methods. Types of attacks rest on their effect on the watermark. The watermarking algorithm to classify the attacks to fair and unfair attacks. Watermarking alone for file safeguard not the best solution for attacking problems. It can be hacked by the attacker. If the file is encrypted before watermarking using cryptographic technique then it is tough for hacker to gain the file and use. The data that encrypted by the transmitter we can make decryption to it by the receiver by the secret keys from the transmitter. The offshoots of attacks are the cryptographic, protocol, Removal and geometric attacks [iii]. The basal intention for these attacks is to ruin the watermark, contort the watermarked image and rebate the sturdy and pledget of watermark mechanisms.

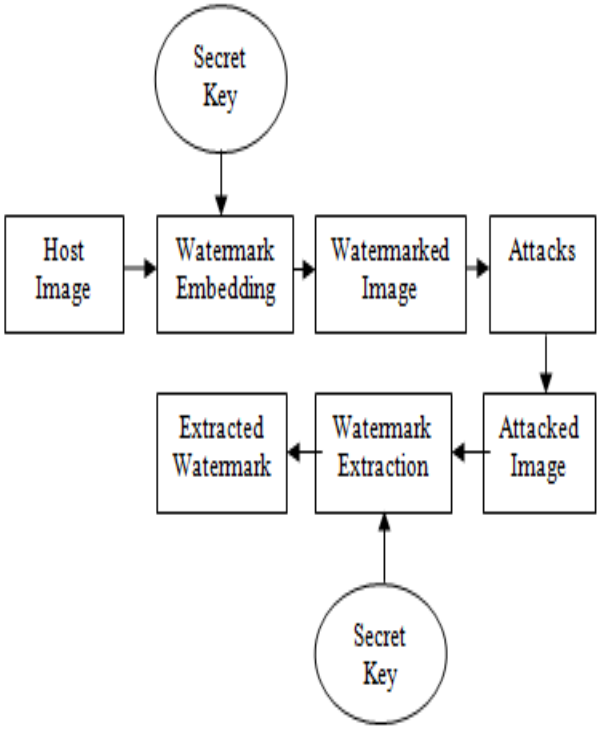

Fig. 1 watermarking attacks [ii].

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III. Results and Discussions

Fig. 2 Cropping Attack

Fig. 3 JPEG Compression Attack

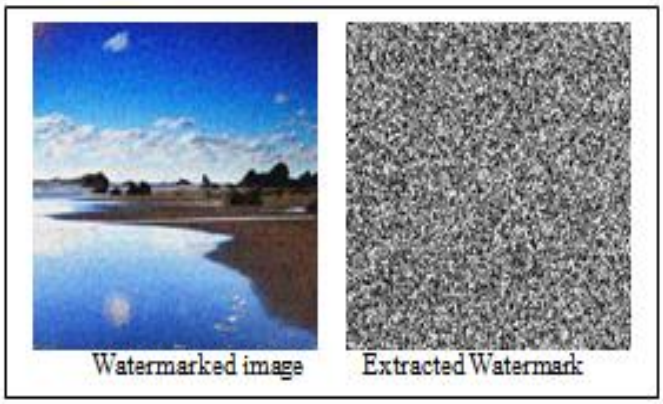

Fig. 4 Noise Attack

Attacks on host and watermarked image	Max	Min	Mean	STD
SSIM	0.9175	0.7041	0.8252	0.0310
QSSIM	0.9178	0.7425	0.8427	0.0248
PSNR	31.6612	20.6267	26.9243	2.0233
MSE	562.8772	44.3567	147.8959	78.7038
Correlation coefficient	0.9978	0.9271	0.9830	0.0118
Attacks on watermark and extracted watermark	Max	Min	Mean	STD
SSIM	0.0051	0.0012	0.0031	6.6138e-04
PSNR	5.0123	4.9443	4.9774	0.0139
MSE	2.0828e+04	2.0505e+04	2.0670e+04	66.1181

Table.1 Host, watermarked image, original and extracted watermark attacks

Attacks on Host and watermarked image	Max	Min	Mean	STD
SSIM	0.9759	0.9181	0.9562	0.0060
QSSIM	0.9760	0.9345	0.9599	0.0040
PSNR	33.5338	14.2936	20.9742	3.9237
MSE	2.4195e+03	28.8204	717.9867	517.5440
Correlation coefficient	0.9991	0.5862	0.9194	0.0650
Attacks on original and extracted watermark	Max	Min	Mean	STD
SSIM	0.0424	0.0149	0.0310	0.0044
PSNR	6.1589	5.9987	6.0747	0.0252
MSE	1.6339e+04	1.5747e+04	1.6055e+04	93.2205
Correlation coefficient	0.0021	-0.0107	-0.0021	0.0021

Table.2 Host, watermarked image, original and

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extracted watermark attacks

Attacks on host and watermarked image	Max	Min	Mean	STD
SSIM	0.7398	0.1238	0.3396	0.0934
QSSIM	0.7490	0.1371	0.3534	0.0966
PSNR	16.075	14.3319	14.9561	0.2923
MSE	2.3982 e+03	1.6051 e+03	2.0818 e+03	137.4028
Correlation coefficient	0.9552	0.6158	0.8558	0.0506
Attacks on Original watermark and extracted watermark	Max	Min	Mean	STD
SSIM	0.0124	0.0124	0.0124	5.3880 e-17
PSNR	5.0285	5.0285	5.0285	7.1191 e-15
MSE	2.0428 e+04	2.0428 e+04	2.0428 e+04	0
Correlation coefficient	0.0062	0.0062	0.0062	2.0857 e-17

Table.3 Host, watermarked image, original and extracted watermark attacks

Images	Red	Green	Blue
UACI	99.5986	99.4926	99.3028
NPCR	33.24568	33.31256	33.45698

Table.4 UACI and NPCR (%)

IV. Conclusion

The paper exhibits some sorts of attacks to trial the indemnity of the watermarking manners. The paper ameliorates some analysis and debate for these attacks; cropping, JPEG compression and noise attacks on the watermarked image. This paper improves the performance metrics due to applied attacks and makes evaluation for this metrics such as SSIM and QSSIM for images.

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