WATERMARKING OF COMPRESSED ENCRYPTED IMAGES

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Abstract: *In digital images Digital asset management systems (DAMS) access the media data for the transfer over the channel in the form of compressed and encrypted image. This system apply watermark signal this compressed encrypted data for tamper detection or ownership declaration or copyright When media data is transform. There is a big problem to insert a watermark into compressed encrypted domain because the compression process applies over the each block of data or information. Which contain a redundant or a raw media which are replace by encryption process apply on low number of bits which are randomized and compressed process apply over each bit data or information which unable to see original data to unauthorized person for transmission purpose. Embedding process of a watermark to randomized bit stream cause degradation into image quality. So choose an encryption scheme for media data such that it will secure and will allow us to embed a watermarking scheme in a predictable manner into compressed encrypted domain and degradation of image should be Minimum.*

Watermarking algorithms are described to apply watermark to different types of image format to compressed and encrypted images. Data can be transfer from sender to Receiver in the form of block cipher or stream cipher .there is different encryption algorithm depending Key Selection but encryption process apply over the stream type. In this we propose insert of watermarking done in the compressed-encrypted domain, but watermark can be extracted into decrypted domain. By studding embedding capacity, perceptual quality, robustness, and security there are three watermarking schemes such as Spread Spectrum (SS), Scalar Costa Scheme Quantization Index Modulation (SCS-QIM), and Rational Dither Modulation (RDM).

Keywords : *DAMS, SC-QIM, RDM, DRM,DWT, DCT*

1. INTRODUCTION

Now a days, all media data transfer through a network. That media data contain information which must be protect by accessing it by unauthorized way or use that data for wrong purpose so digital watermarking techniques provide facility to author to protect the data by copyright, ownership declaration. Three watermarking schemes have been proposed for multimedia content (images, video and audio signal) for protection purpose and ownership. Now digital watermarking is use by many organization or person by which document can be protect by illegal access or copying process and use it. As data may send into piece of data by breaking it into stream or packet and it provides a good protection to this embedding a message by maintaining quality. Digital watermarking is nothing but insert some useful information into a piece of digital data which authenticate the ownership of data. These techniques are useful for many types of digital data including still imagery, movies, and music etc.

Motivation

Images make a major component of multimedia content. Images may be arts, diagrams, cultural painting in digitized form and digital photographs. Now in computer hardware, software, and networks have created threads to copyright protection and content integrity. For instance, Images can be copied, modified, and distributed easily. To protect a data we need a watermarking which protect the data and secure our copyright authentication.

2. LITERATURE REVIEW

2.1 DAMS

Digital asset Management System use a media data for grouping, archiving, and optimizing, maintaining, reforming and sending files and they are create a cipher text and followed by compression process. Digital asset management systems can be distinguished in a following terms.

A) First are the contents which are available can be reuse by many organizations. Where the contents are related with product marketing, sales, processing to represent it by using logos, special symbolic mark these are few examples and issues.
B) Second is large amount of dynamic media data like images, videos, greeting images are store and retrieve centrally in Library asset management systems.

C) Third is Production asset management systems where it point to manage and arrange data which is being created for digital data production. (Video game and movies, 3D pictures, animated videos, graphics screen shots, etc.). They sometimes loop within work-flow and project-management choices for the purpose of the storage, organization and revision management of often dynamic digital assets.

2.2. DRM

In this system media content of which is compressed and in code format is distribution over to all consumers through multilevel or tree like distributor network. This contains many levels of distributers between author and consumers. Which between two-party delivered in secure and copyrighted content transmit over multilevel structure. The policies apply for watermarking data service between two parties may not be transfer upload directly within multilevel structure. As it has information about reference about security rules and regulations between multilevel owner, multilevel distributors and receiver which are the part of the system process. This scheme maintains the record of security rules and policies which are placed between the communications of the multi parties. License server can improve the protocol.

3. METHODOLOGY

Proposed System

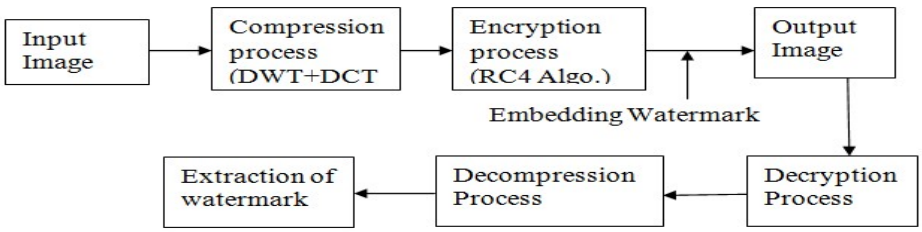
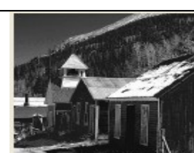


Figure.1 Proposed System

4. RESULTS

The main objectives of this work are: a) to improve image quality, b) to improve watermarking result and, c) to compare watermarking result on basis of SSIM and PSNR value for multiple watermarking schemes on multiple images. For watermarking SS, SCS-QIM AND RDM are used. The method is checked out on various database images. Database used is SIPI image database for checking the algorithm. Results of watermarking are compared on various images for various watermarking sachems.

4.1 Results of Watermarking using SS, SCS-QIM AND RDM ON JPEG IMAGES

Sr.no	Image Name	Image	Compression ratio	PSNR	SSIM
1	House.jpg		0.3104	60.122	0.9854
2	Pecock.jpg		0.26612344	60.845703	0.9765625

Sr No.	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	House.jpg	SS	NORMAL	3200	0.32	408	58.122	
			ROTATION	3400	0.1	400	57.122	58.122
			GAUSSION	2500	0.56	409	57.122	58.12207
			BLURRING	3100	0.38	405	57.122	58.12207
			SALT &PEPPER	2400	0.5	409	56.122	58.12207
2	Pecock.Jpg	SS	NORMAL	3400	0.50	405	56.8457	
			ROTATION	3400	0.38	396	58.8457	57.845703
			GAUSSION	2000	0.10	409	56.8457	58.84
			BLURRING	2500	0.38	405	56.8457	57.845703
			SALT &PEPPER	3300	0.5	409	56.8457	57.845703

Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	House.jpg	SCS-QIM	NORMAL	2400	0.35	408	58.122	
			ROTATION	3300	0.42	408	58.122	57.12207
			GAUSSION	3300	0.35	408	56.122	59.12207
			BLURRING	3400	088	408	57.122	58.12207
			SALT &PEPPER	2000	0.088	408	59.12	58.12207
2	Pecock.Jpg	SCS-QIM	NORMAL	3300	0.42	405	59.8457	
			ROTATION	3200	0.1	405	57.8457	57.845703
			GAUSSION	2100	0.35	408	58.8457	59.845703
			BLURRING	2300	0.88	396	57.8457	56.845703
			SALT &PEPPER	3100	0.35	400	57.8457	56.845703

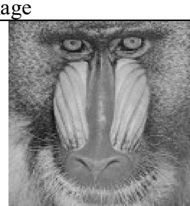
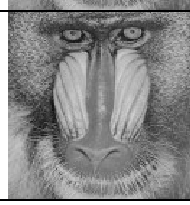
Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	House.jpg	RDM	NORMAL	2400	0.38	409	58.12207	
			ROTATION	3300	0.42	408	55.122	56.122
			GAUSSION	2500	0.38	399	54.12207	56.122
			BLURRING	3400	0.48	408	56.12207	58.12207
			SALT &PEPPER	2500	0.5	396	57.122	58.12207
2	Pecock.Jpg	RDM	NORMAL	3200	0.5	396	56.8457	
			ROTATION	3100	0.56	400	55.8457	56.845703
			GAUSSION	2400	0.88	396	58.8457	59.845703
			BLURRING	3300	0.5	399	55.8457	58.845703
			SALT &PEPPER	2100	0.1	405	58.8457	58.845703

4.2. Results of Watermarking using SS,SCS-QIM AND RDM ON PNG IMAGES

Sr.no	Image Name	Image	Compression ratio	PSNR	SSIM
1	LENA.png		0.304	58.723	0.9521
2	POOL.png		0.30732727	60.63379	0.9892578

Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	LENA.png	RDM	NORMAL	2400	0.35	399	55.72256	
			ROTATION	3100	0.35	400	57.72266	56.722656
			GAUSSION	3300	0.35	408	55.72256	55.72256
			BLURRING	3000	0.56	408	56.72266	56.722656
			SALT &PEPPER	2500	0.35	409	52.72266	56.722656
2	POOL.png	RDM	NORMAL	2000	0.88	408	55.63379	
			ROTATION	3400	0.56	399	57.63379	56.63379
			GAUSSION	3200	0.88	405	55.63379	59.63379
			BLURRING	3000	0.88	405	57.63379	56.63379
			SALT &PEPPER	2300	0.1	400	58.63379	56.63379

4.3 Results of Watermarking using SS, SCS-QIM AND RDM ON GIF IMAGES

Sr.no	Image Name	Image	Compression ratio	PSNR	SSIM
1	Burbon.gif		0.33547974	45.450195	0.9394531
2	Burbon.gif		0.29412842	46.93457	0.9765625

Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	LENA.png	SS	NORMAL	3100	0.56	399	55.72266	
			ROTATION	2500	0.35	405	57.72266	57.722656
			GAUSSION	3100	0.1	408	55.72266	56.722656
			BLURRING	2500	0.88	405	57.72266	55.722656
			SALT &PEPPER	2000	0.38	409	56.72266	55.722656
2	POOL.png	SS	NORMAL	2300	0.5	400	56.63379	
			ROTATION	2500	0.5	396	58.63379	56.63379
			GAUSSION	2000	0.38	399	59.63379	57.63379
			BLURRING	3200	0.5	396	56.63379	57.63379
			SALT &PEPPER	3100	0.5	399	59.63379	57.63379

Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	LENA.png	SCS-QIM	NORMAL	3300	0.42	409	57.72266	
			ROTATION	2500	0.5	400	53.72266	57.722656
			GAUSSION	2400	0.56	408	53.72266	56.722656
			BLURRING	2300	0.1	408	56.72266	54.722656
			SALT &PEPPER	2000	0,10	405	56.72266	54.722656
2	POOL.png	SCS-QIM	NORMAL	3200	0.88	409	56.63379	
			ROTATION	2000	0.42	400	59.63379	57.63379
			GAUSSION	2400	0.42	405	55.63379	58.63379
			BLURRING	3000	0.42	399	55.63379	56.63379
			SALT &PEPPER	2000	0.35	408	56.6337	56.63379

Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	Burbon.gif	SS	NORMAL	2400	0.35	408	42.935	
			ROTATION	2100	0.56	409	44.4502	43.4501
			GAUSSION	2100	0.35	399	45.451	45.45109
			BLURRING	2100	0.38	396	44.4502	43.4501
			SALT &PEPPER	2000	0.5	408	43.450	43.4501
2	Burbon.gif	SS	NORMAL	3100	0.88	399	42.04395	
			ROTATION	3100	0.48	396	44.04395	43.043945
			GAUSSION	2400	0.88	396	45.04395	43.043945
			BLURRING	6200	0.1	405	42.04395	42.043945
			SALT &PEPPER	2400	0.5	399	42.04395	43.043945

Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	Burbon.gif	SCS-QIM	NORMAL	3200	0.38	405	43.4502	
			ROTATION	2500	0.42	409	40.4502	41.450195
			GAUSSION	3400	0.5	409	43.4502	44.450195
			BLURRING	2100	0.56	408	40.4502	41.450195
			SALT &PEPPER	2100	0.38	396	40.4502	41.450195
2	Burbon.gif	SCS-QIM	NORMAL	3300	0.88	399	42.450	
			ROTATION	3100	0.5	409	42.4502	41.450195
			GAUSSION	2400	0.35	399	41.4502	44.450195
			BLURRING	3100	0.1	408	40.4502	44.450195
			SALT &PEPPER	2400	0.56	409	41.4502	43.450195

Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	Burbon.gif	RDM	NORMAL	3300	0.38	396	42.4502	
			ROTATION	2500	0.35	399	41.4502	43.450195
			GAUSSION	2400	0.88	408	44.4502	42.450195
			BLURRING	2100	0.56	408	40.4502	43.450195
			SALT &PEPPER	3100	0.35	408	43.4502	43.450195
2	Burbon.gif	RDM	NORMAL	3100	0.42	399	45.4502	
			ROTATION	2400	0.56	405	39.4502	42.450195
			GAUSSION	2100	0.88	400	42.4502	44.450195
			BLURRING	2400	0.5	400	39.4502	44.450195
			SALT &PEPPER	2100	0.88	405	44.4502	44.450196

4.4 Results of Watermarking using SS,SCS-QIM AND RDM ON TIF IMAGES

Sr.no	Image Name	Image	Compression ratio	PSNR	SSIM
1	Woman.tif		0.33410645	46.043945	0.91015625
2	River.tif		0.2948049	58.50293	0.97265625

Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	Woman.tif	SS	NORMAL	3100	0.88	399	42.04395	
			ROTATION	3100	0.48	396	44.04395	43.043945
			GAUSSION	2400	0.88	396	45.04395	43.043945
			BLURRING	6200	0.1	405	42.04395	42.043945
			SALT &PEPPER	2400	0.5	399	42.04395	43.043945
2	River.tif	SS	NORMAL	3100	0.88	399	42.04395	
			ROTATION	3100	0.48	396	44.04395	43.043945
			GAUSSION	2400	0.88	396	45.04395	43.043945
			BLURRING	6200	0.1	405	42.04395	42.043945
			SALT &PEPPER	2400	0.5	399	42.04395	43.043945

Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	Woman.tif	SCS-QIM	NORMAL	2400	0.42	408	45.04395	
			ROTATION	3400	0.1	408	42.04395	44.043945
			GAUSSION	3400	0.5	408	44.04395	44.043945
			BLURRING	2300	0.5	409	45.04395	43.043945
			SALT &PEPPER	2300	0.38	396	45.04395	43.043945
2	River.tif	SCS-QIM	NORMAL	2100	0.42	399	54.50293	
			ROTATION	2000	0.1	399	54.50293	56.50293
			GAUSSION	2100	0.38	409	57.50293	55.50293
			BLURRING	3400	0.88	405	54.50293	55.50293
			SALT &PEPPER	3000	0.1	399	56.50293	55.50293

Sr. no	Image name	Name of scheme	Noise type	Payload (bits)	Watermark capacity	Algo.Exe. time	PSNR for schemes	PSNR after noise attack
1	Woman.tif	RDM	NORMAL	3400	0.38	399	42.04395	
			ROTATION	3200	0.1	405	40.04395	42.043945
			GAUSSION	3200	0.35	409	43.04395	42.043945
			BLURRING	3000	0.56	408	42.04395	42.043945
			SALT &PEPPER	2400	0.1	399	45.04395	44.043945
2	River.tif	RDM	NORMAL	3100	0.38	400	56.50293	
			ROTATION	2500	0.42	396	54.50293	54.50293
			GAUSSION	3200	0.56	399	53.50293	57.50293
			BLURRING	3300	0.5	409	53.50293	54.50293
			SALT &PEPPER	3000	0.42	405	52.50293	54.50293

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5. CONCLUSION

Digital watermarking techniques design to protect the copyright of media data for transmission purpose. There have been Different watermarking schemes proposed for multimedia content (images, video). Insertion of watermark in such a way that it is invisible and not easy to separate it from host image data and It resist to many operation to modify it or detect it from host image by maintain image quality. So, it embedded such a way that it will permanently reside into host document

REFERENCES

[1] *"Multimedia security: staganography and digital watermarking techniques for protection of intellectual property", Chun-Shien Lu , Institute of Information Science Academia Sinica, Taiwan, ROC, Idea Group Publishing.*

[2] *"Steganography And Digital Watermarking" , Jonathan Cummins, Patrick Diskin, Samuel Lau and Robert Parlett, School of Computer Science, The University of Birmingham.*

[3] *Prabhishek Singh, R S Chadha , "A Survey of Digital Watermarking Techniques, Applications and Attacks", International Journal of Engineering and Innovative Technology (IJEIT) Vol. 2, Issue 9, March 2013.*

[4] *Sin-Joo Lee, Sung-Hwan Jung"A survey of watermarking techniques Applied to multimedia ",IEEE,2001.*

[5] *Mahmoud El-Gayyar "Watermarking Techniques Spatial Domain Digital Rights Seminar "Media Informatics University of Bonn Germany, May 06 .*

[6] *http://www.digitalwatermarkingalliance.org/dwm.asp*

[7] *Wei Zhou Xifeng Liang, "Color Image Segmentation Algorithm based on Target Characteristic Analysis ", IEEE transaction, pp.3028-3830, 2011.*

[8] *Jun Tang,"A Color Image Segmentation algorithm Based on Region Growing",2nd International Conference on Computer Engineering and Technology, Vol. 6 ,pp.635-637,2010.*

[9] *Shikai Wang,"Color Image Segmentation Based on Color Similarity", International Conference on Digital Object Identifier CISE,IEEE 2009.*

[10] *Keri Woods, "Genetic Algorithms: Color Image Segmentation Literature Review", July 24, 2007.*