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VIDEO AUTHENTICATION TECHNIQUE BASED ON DIGITAL WATERMARKING AND QR CODE IMAGE

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Abstract: As a result of the rapid developments in multimedia field and exchange information and data daily, including the video files, with the need to protect video file, during handling and transmission via the internet from tampering and manipulation (intentional attacks), and to ensure the integrity of the video.We proposed video authentication by using a digital watermark system, for uncompressed video files, by developing a system to extract video information, this information (name, video size, video dimensions, video length, frame number) and embedded these information in Quick Response code (QR code) for sampling these data by using QR generator system to compressed data, and using QR Code as watermark in the video, and video, passes several steps of the conversion, by converting a video to a frame and converting a frame to RGB domain and to YC_BC_R domain, and then converting the frames to Discreet Wavelet Transform (DWT), by using one of the Haar filter, for effective distribution of watermark and maintaining video quality.The oppositeprocedure is applied in order to checkthe authorized ownership of the video information and QR code. Suitablequalityrealizedusing the obtained results.

Keywords: Digital watermarking, video authentication, QR code, Wavelet Transform.

1. INTRODUCTION

Watermarking is a model of insertingsome informationin multimedia filesin order to protect the copyright and data integrity of these files. This watermark can be futureused in verify the ownership and recognize of an authorized people, trace the marked document's publishing through the network, or inform users about the rights-holder or the permissible use of the data. In the other words, the digital watermarking is the signal insert into the raw video in an accurate way[1].

The procedure of adding the watermark may be leadsto some distortion. However, watermarking proceduresusage heuristics or perceptual prototypes to hide the existence of the watermark inserted into the video data. Bothoriginaland watermarked videos are perceptually not different when showed. The inserted watermark can be extractedusing watermark extraction procedure, which allows an application to respond if the watermark presence or absence in the video. As well as, watermarking procedures have been suggested to protect text, images, audio, and other kinds of data [2].

In recent years a modern approach has emerged to use QR code as watermark information. In 2014, Ketcham and Ganokratanaa [3] proposed video watermarking technique based on QR code that is embedded as invisible video watermark by using Discrete Multi wavelet transformation (DMT). This technique developed by using the genetic algorithm, to search for optimal quantization step, to improve both quality of watermarked video and robustness of the watermark. In 2014, Hassanein [4] presented new technique that usedthe QR code as a message carrier for text key-print. This technique based on used the basic element of the language (like characters of the alphabet), to achieve the authenticity of electronic documents via transforming the structure from its physical logical form. In 2016, Khang [5] proposed dual-watermarking with QR code system, by using visible and invisible watermark. The proposed technique is compared with mohanty techniques. Visible QR code watermark is embedded into the image by using the least significant bit LSB 7 (embed at the 7thbit from the left of the binary number). After that, the invisible QR Code watermark was embedded into image by using LSB 1 (embed at the 1st bit from the left of the binary number). In 2016, Kasabe et al. [6] proposed video watermarking with text massage (Verification Massage) by using QR code. The QR code is prepared to be watermarked depending on a robust video watermarking scheme by using Singular Value Decomposition SVD and DWT. By using watermarking the proposed system can give copyrights for these video documents. In watermarking applications SVD is an attractive algebraic transform. SVD is added to the cover I-frame. The extracted diagonal value is merged with logo (or) watermark. DWT is added on SVD cover image and QR code image. The inversing transform of watermarking image and adding the frame into video with logo and QR code image send these video file to authorized user, for the reverse process checking the logo and QR code for authorized ownership. It can achieve acceptable imperceptibility and certain robustness in video processing.

In this paper, the main idea is based on generate the QR code from the video and then insert the generated QR code into same video based on DWT.

The DWT can summarize as follow[7]: the fundamental idea behind DWT results from multi resolution analysis, which is based on analysis of a video frame in frequency channels of constant bandwidth on a logarithmic scale. It has many advantages such as similarity of data structure with respect to the resolution and available analysis at any level. The DWT can be performed as a multistage transformation. A frame is analyzed into four sub bands denoted LL(Low-Low), LH(Low-High), HL(High-Low), and HH(High-High) at level 1 in the DWT domain, the LH, HL, and HH represent the finest scale wavelet coefficients

and LL stands for the tough level coefficients. The LL sub-band can further be analyzed to acquire another level of decomposition. The analysis process continues on the LL sub band until the specific number of levels determined by the application is reached. Due the human eye is much more sensitive to the low frequency part (the LL sub band); the watermark can be embedded into the other three sub-bands to preserve better quality.Also, the more information about QR Code and Audio Video Interleave (AVI) explained in [8], [9].

2.PROPOSED WATERMARKING TECHNIQUE

The proposed techinque aims to achieve the video authentication by embedding information extracted form video information into QR Code and then embedding QR Code as watermark into the video.Figure (2) explain the block diagram of embedded watermark.

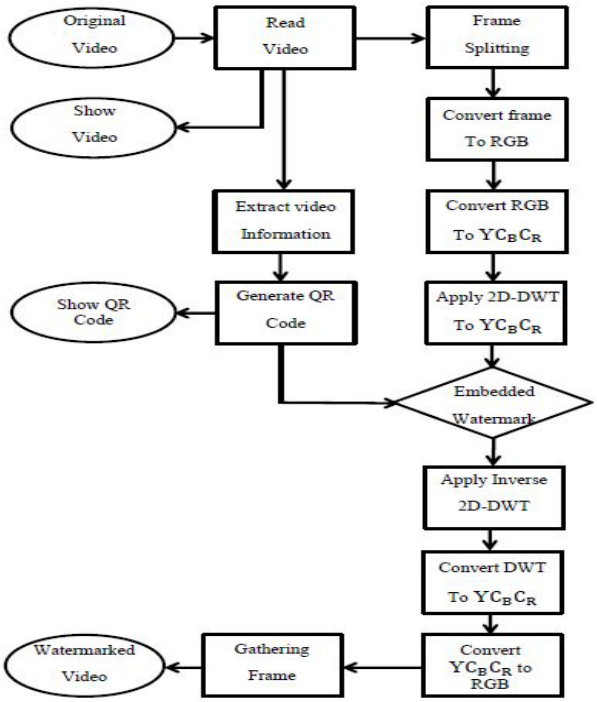

Figure (3)Block diagram of embedded watermark

The Embedded Watermark Phase consists of the following steps:

Step 1: Read the video file and extract video information
Step 2: Show the video file
Step 3: Splitting frame and convert the frame to RGB domain
Step 4: Convert RGB domain to YC_BC_R domain
Step 5: Apply 2D Discrete Wavelet Transform
Step 6: Generate QR Code of video information
Step 7: Embedding the watermark (QR Code) to each frame of the video
Step 8: Apply inverse 2D DWT by transform the DWT blocks of eachframe to YC_BC_R domain
Step 9: Converting all frame from YC_BC_R domain to RBG domain and Gathering the Frame to rebuilt the video sequence
Step10: Display Watermarked Video

Figure (2) explain the block diagram of extracting watermark information.

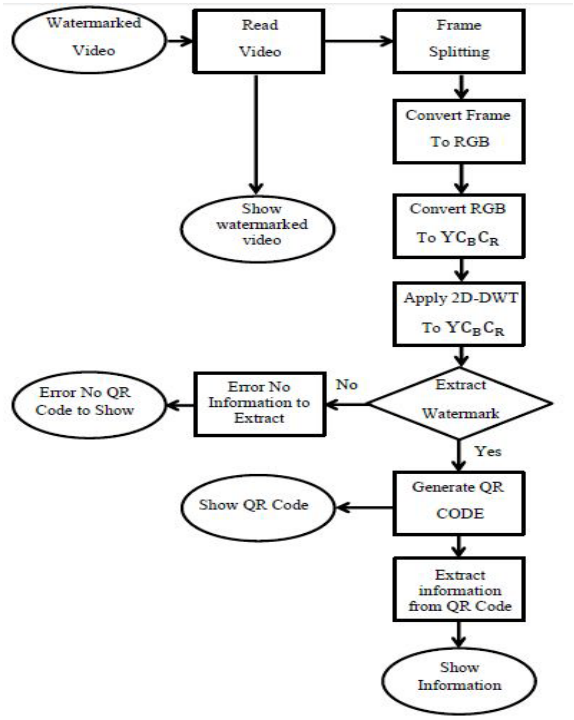

Figure (4) Block diagram of extract watermark

The Extracting Watermark Phase consists of the following steps:

Step 1:Load and Display Watermarked Video
Step 2: Splitting the watermarked video to frames, and converting eachframe to RGB domain, and then converting the RGB domain toYC_BC_R domain
Step 3:Applying 2D Discrete Wavelet Transform (DWT)
Step 4: Extract the watermark (QR Code) from any frame of the videomark by user.
Step 5: Generate QR Code and extracted watermark information
Step 6: If the watermark is destroyed the system display error No information to show
Step 7: If the watermark is not destroyed the system displayvideo information and show QR Code

3.TESTING AND EXPERIMENTAL RESULTS

The experimental video sequence taken randomly from many different sources with AVI format, The set of six original video sources of assumed high quality: 'River', 'Car', 'Mount', 'Bird', 'Nature', 'Plane', this set of videos is commonly used and publicly available ,the AVI video must be 24 bit video and with resolution 320 × 240pixels with length at max 20 seconds. After input the video to the system it's read the AVI video file, where the full path of the file video is specified. Header information of AVI video is read to extract video frames from the video file and extracts video information (video name, video size, date, length, number of frames, video dimensions), and save these info as plaintext to use it in QR Code generation as watermark and to compare with the extracted watermark information latter, The quality metrics that used in this system to evaluate imperceptibility characteristics are; Peak Signal to Noise

Ratio (PSNR) [10], Mean Square Error (MSE), Structural Similarity (SSIM) [11].

Various attacks like cropping; scaling, sharpening, and compressionwere used on the watermarked frame in order to assess the robustness performance of proposed vedio watermarking technique.

Table 1: Performance of video frame quality metrics

VideoWatermarked	MSE	PSNR	SSIM
bird	0.3297	52. 983	0.9758
car	0.6412	50.094	0.8634
mount	0.3016	53.368	0.8826
nature	0.5406	50.845	0.8874
plane	0.3163	53.163	0.8621
river	0.6386	50.112	0.9706

4.CONCLUSION

The proposed watermarking technique has realized the enhanced integrity and authentication for vedio content. In this paper, the QR code play main role inembedding process to got good performances. The watermark information inserted into a medille sub-band based after applied wavelet transform. The experimental results proved that the proposed technique can be recovering the watermark with asuitablequality level. The quality metrics such as MSE, PSNR and SSIM are subject to amount of noise level in vedio watermarked. For future work some issues need to investigationincluded development more efficientmethods to resistseveraltypes of attacks such as geometric distortion,high compression, andstronger noise.

REFERENCES

[1]. Methaq GAATA, Sattar SADKHN, HASSON, “Evaluation of Perceptual Quality for Watermarked Images Based on Combination of Fuzzy Similarity Measures Using Neural Network” International Journal of Computer Science Issues, Issues 9 (4), pp. 1694-0814, 2012.

[2]. Methaq GAATA, William PUECH, Sattar SADKHN and Saad HASSON, "No-Reference Quality Metric for Watermarked Images Based on Combining of Objective Metrics Using Neural Network,” IEEE International Conference on Image Processing Theory, Tools & Applications, Istanbul -Turkey, 2012.

[3]. M. Ketcham and T.Ganokratanaa," The Evolutionary Computation Video Watermarking Using Quick Response Code Based on Discrete Multiwavelet Transformation", Advances in Intelligent Systems and Computing, Volume 265 , pp. 113-123, Springer,2014.

[4]. M. S. Hassanein," Secure Digital Documents Using Steganography and QR Code", PhD thesis, Department of Computer Science, Brunel University, UK,2014.

[5]. Lau Wei Khang," A Dual-Watermarking With QR Code Against Cropping And Resizing Attack", MSc thesis, Faculty of Computer Science and IT, University Tun Hussein , Malaysia,2016.

[6]. S.S. Kasabe, R. S. Darandale, T.D.Chikhale, N.S.Jadhav ,"Robust QR Code Video Watermarking", International Journal of Innovative Research in Computer and Communication Engineering Dept. of Computer Engineering, Jaihind College of Engineering, India, 2016.

[7]. G. Prabakaran, R Bhavani,"An Invisible QR Code Video Watermarking Scheme Based on Wavelet Transform and Tensor Algebra", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 1, India, 2015.

[8]. K.Ashwini, U.Priyanka, P.Shalaka, K.Sagar," A Robust QR-Code Video Watermarking With DCT Domain", International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 3, India, 2015.

[9]. N.M.Jasud, V.k.Borude, P.D.Khodal, W.A.Shital," Secure Watermark Detection Based on Robust QR-code Video Watermarking Using DWT Domain", International Journal of Scientific and Research Publications, Volume 5, Issue 11,India, 2015.

[10]. H. Sheikh, M. Sabir and C. Bovik, “A Statistical Evaluation of Recent Full Reference Image Quality Assessment Algorithms,” IEEE Trans. on Image Processing, 2006, 15, (11), pp. 3441–3451.

[11]. Z. Wang, A. Bovik, H. Sheikh and E.Simoncelli, “Image Quality Assessment: From Error Visibility to Structural Similarity,”IEEE Transactions on Image Processing, vol. 13, no.4, pp. 600-612, April 2004.