

A
Major Project Report II
On
DIGITAL WATERMARKING IN VIDEO

Submitted in Partial fulfilment of the requirement
For the award of the degree of

MASTER OF TECHNOLOGY

In
(Signal Processing and Digital Design)



Submitted by

Naved Alam

Roll No. 2k10/SPD/12

Under the Guidance of

Assoc. Prof. Jeebanand Panda

Department of Electronics and Communication Engineering

**DEPARTMENT OF ELECTRONICS & COMMUNICATION
ENGINEERING**

DELHI TECHNOLOGICAL UNIVERSITY

BAWANA ROAD, DELHI- 110042

July 2013

DECLARATION BY THE CANDIDATE

July 2013

Date: _____

I hereby declare that the work presented in this dissertation entitled “**Digital watermarking in video**” has been carried out by me under the guidance of **Mr. Jeebanand Panda**, Associate Professor, Department of Electronics & Communication Engineering, Delhi Technological University, Delhi and hereby submitted for the partial fulfillment for the award of degree of Master of Technology in Signal Processing & Digital Design at Electronics & Communication Department, Delhi Technological University, Delhi.

I further undertake that the work embodied in this major project has not been submitted for the award of any other degree elsewhere.

Naved Alam

DTU/M.Tech/180

M.Tech (SP&DD)

CERTIFICATE

It is to certify that the above statement made by the candidate is true to the best of my knowledge and belief.

Mr. Jeebanand Panda

Associate Professor

Electronics & Communication Department

Delhi Technological University, Delhi-42

Dated:_____

ACKNOWLEDGEMENTS

At this point I would like to thank the people that helped me producing this dissertation. First, I thank **Dr. Rajiv Kapoor** Head of Department (Electronics and Communication Engineering, DTU), and **Mr. Jeebanand Panda** for giving me the opportunity to write this dissertation and supporting me along the way. Next, I would like to say thanks to all my seniors and friends for their goodwill and support that helped me a lot in successful completion of this dissertation.

Naved Alam

DTU/M.Tech/180

M.Tech (SP&DD)

ABSTRACT

In this era, any type of digital media such as image, text, audio, video All are easily accessible and transferable through the use of high speed internet, as the use of internet is increased in banks, big industries and in government organizations. Security and authenticity is must required, so the need of securing and protecting the multimedia data is also increased. In our thesis work we are proposing a most secure and authentication technique using 1-Level 2-D DWT and 2-level SVD for robust watermarking in video. In this thesis first we are starting from the introduction of watermarking followed by various techniques available in video watermarking. Literature survey of previous research paper based on video watermarking and in next section theory of wavelet and singular value decomposition. DWT and SVD both are mathematical technique. Wavelet is a compression technique in frequency domain which divide the image into low frequency, diagonal frequency and in high frequency band. In our proposed technique we convert a video into frames then after resizing we applied DWT on each frame of the video. Then we applied SVD in diagonal frequency (LH, HL) Sub-band. In watermark image we converted it into GRAY scale from RGB scale then divide it into columns matrix. Frame 1 to 64 and frame 65 to 128 and embed it into host frames of DWT in HL and LH band with some scaling factor C. After embedding the image we again applied SVD to make it more robust and then multiply the S2 matrices with the U1 and V1 matrices of HL and LH band to make inverse SVD then we applied IDWT to get watermarked video after rearranging these frames. For evaluation the watermarking in video we applied attacks on watermarked video such as Gaussian noise attack, Median Filtering attack, Histogram Equalization attack, Contrast adjustment attack, Sharpening attack and rotation attack. After applying these attacks we compute the PSNR and NCC of all attacks and compare the results with the watermarked video without attacks. Which shows this watermarking scheme is more secure and robust.

Keywords– DWT, SVD, ATTACKS, PSNR, NCC.

CONTENTS

Acknowledgement	iii
Abstract	iv
1 Introduction	1
1.1 Requirements of watermarking	2
1.2 Principle of watermarking	3
1.3 Structure of typical watermarking system	3
1.4 Classification tree of watermarking	5
1.5 Types of watermarking	6
1.5.1 based on detected media signal	6
1.5.2 based on visibility	6
1.5.3 based on robustness	7
1.5.4 based on encoding format	7
1.6 Application of watermarking	9
1.7 Attacks of watermarking	10
1.8 Challenges and limitation	11
2 Techniques of video watermarking	12
2.1 Aspects of video watermarking	13
2.2 Challenges in video watermarking	14
2.3 An overview of video watermarking	14
2.3.1 spatial domain video watermarking	15
2.3.2 frequency domain video watermarking	16
2.3.3 compression based watermarking	20
2.4 Attacks on watermarked video	24
3 Literature survey	26
4 Theory of DWT and SVD	59
4.1 Introduction of fourier transform	59

4.2 History of wavelet.....	60
4.3 Scaling in DWT.....	61
4.4 DWT and filter banks.....	61
4.4.1 multi-resolution analysis and filter bank.....	61
4.4.2 condition for perfect reconstruction.....	62
4.5 Classification of wavelet.....	63
4.6 Wavelet families.....	64
4.7 Application of wavelet.....	65
4.8 Singular value decomposition.....	66
5 Proposed Algorithm in DWT-SVD	
5.1 DWT.....	67
5.2 SVD.....	69
5.3 Combination of DWT and SVD.....	70
5.4 Watermark Embedding Process.....	71
5.5 Watermark Extraction Process.....	74
5.6 Results and Simulation.....	75

LIST OF FIGURES

1	Digital watermarking system.....	3
2	Watermark embedding block.....	4
3	Watermark extraction block.....	4
4	Classification tree of watermarking.....	5
5	Classification of digital watermarking in video.....	18
6	Definition of DCT region and Quantization.....	19
7.a	DWT decomposition of image	19
7.b	2-Level DWT.....	19
8	MPEG GOP Structure.....	23
9	Watermark Embedding Process in DWT domain.....	33
10	Embedding Process for 4-Level DWT.....	44
11	Watermark Embedding order in 3-Level DWT Sub-bands.....	54
12.a	1-D Bar Code.....	55
12.b	QR-Bar Code.....	56
13	Embedding Block Diagram in QR.....	55
14	Extraction Block Diagram in QR.....	58
15.a	A Wave.....	59
15.b	A Wavelet.....	60
16	Analysis and synthesis Bank in DWT.....	61
17	Three Level wavelet decomposition tree.....	62
18	1-Level DWT.....	72
19	Watermark Embedding Process.....	73
20	Watermark Extraction Process.....	74

LIST OF TABLES

1.	Wavelet families and its result.....	64
2.	Watermarking results after applying attacks.....	75
3.	Extracted Watermark and its psnr, ncc value after applying attacks.....	76