"VIDEO STEGANOGRAPHY USING WAVELET TRANSFORM"

DISSERTATION-II

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By

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NOV 2017

CERTIFICATE

This is to certify that the Dissertation-II titled "**Video steganography using wavelet transform** ". That is being submitted by "**Shailendra Kumar Yadav**" in partial fulfillment of the requirements for the award of Master of Technology, is a record of bonafide work done under my guidance. The content of this report, in full or in parts, have neither taken from any other source nor have been submitted to any other Institute or university forward of any degree or diploma and the same is certified.

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Examiner I **Examiner II**

ABSTRACT

Present days, in this world it is very complex to handle the information internet or world wide web against hacker. Data is normally in the form of word , image, audio and video. Steganography is one of the best arts or methods to hiding the data secretly and sefly Steganography techniques can be applied to text, image, audio and video file**.** steganography is best technique for hiding the data (data may be text, Audio, image and video) . Steganography is the sculpture and science of literature text which is to be hide overdue chose one as a cover file like multimedia file as audio, image or video. So many of methods working on many kinds of steganography like text, video and Image steganography. Secret massage hiding is best of the techniques that provide for retreat by hiding secret word into the video or image file by some element s in the introduce or cover file. The main advantage of using video in hiding the main data is to be added safekeeping against hacker beats due to the comparative complexity of video compared to image files and audio files. Image and video upon the steganography techniques are mainly categorized into two main domain spatial domain and frequency domain techniques. The main idea of steganography is to hiding the personal information in the media file like video so that other examine the increase the hiding the data capacity. an image steganography has been a large region of research for many years but now day's increase the information hiding on the www (world wide web) and internet day by day so in this paper proposed the more data or information hide by though video steganography main purpose of that paper is increase the capacity of hiding information on the internet or www and also used different-2 methods and compare better result is depends on the parameter value matrix.

Keywords:**— Steganography (TEXT, IMAGE AND VIDEO), LSB method, DWT , DCT VIDEO, DWT ,BPCS, bitrate, capacity, information hiding, correlation, histogram, MSE , PSNR , BPCS, cloud system**

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DECLARATION

I, Shailendra Kumar Yadav, student of Master of Technology under Department of Electronics and Communication Engineering of Lovely Professional University, Punjab, hereby declare that all the information furnished in this dissertation-2 report is based on my own intensive research and is genuine. This dissertation-2, to the best of my knowledge, does not contain any work which is not done by me.

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LIST OF ABBREVIATIONS

DWT	Discrete Wavelet Transform
DCT	Discrete cosine transform
IWT	Integer Wavelet Transform
MSE	Mean Square Error
PSNR	Peak signal to noise ratio
SNR	Signal to noise ratio
RMSE	Root Mean Square Error
BPCS	Bit-plane complexity segmentation
SPIHT	Set partitioning in hierarchical trees
LSB	Least Significant Bit
HAS	Human auditory system

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INTRODUCTION

Video steganography is an engineering term define as hiding the secret massage in cover multimedia file like video file. This system e can be also defined as hiding of secret massage behind an video file. **.** Steganography also identified is the skill and learning of writing word which is want to be hide behind chose one as a cover multimedia file like audio, video or image The main work of in this research increases the capacity in video data hiding **.**

Steganography is the drawing and knowledge of writing secret messages which is to be hide behind original cover file which may be audio, video or image. Here is many steganography like text, audio, video and Image steganography, that here are using computer forensics performance for authentication purpose. Main aim is to hide secret information or data behind the multimedia file like image and video. As know that video is the combination of many immobile frames of images and audio[2].

Information security is a very important part of the IT industry. in today's life and it is a fast-growing area in the information technology sector. Hiding data is one of the new techniques that provide preservation by concealing secret information in the multimedia insides by varying a number of mechanisms in the host or cover file. The main idea of steganography is to hide the personal data or information in the media file such as video, so that others investigate the increase in hiding data capacity. an image Steganography has been a large part of the research for many years, but now the number of days is increasing. information is hiding daily on the www (world wide web) and the internet, so this article proposes how more data or information is hidden, although video steganography as the main purpose of that document increases the capacity of hiding information[3]. On the internet or www and also different methods are used and better results are compared depending on the parameter value matrix. Hiding information, steganography and watermark are three carefully connected areas that have a lot of overlap and share many technical methods as private, private and secret data in modern societies because malicious hackers and offenders use ever more sophisticated methods and technologies. influential data protection becomes a crucial need and because of the comfort with which multimedia content can be manipulated, measures to verify the authenticity of multimedia content.

1.1.1 Different Kinds of Steganography

Steganography, however, is nowadays meaningfully more cultivated than the above examples suggest, allowing a user to hide oversized amounts of information in image and audio files. These forms of steganography are often used in conjunction with cryptography. so that the information remains particularly protected.

1.1.1 Text Steganography

Steganography in the research is just focusing on changing part of his appearance. They may be so. Even text or text composition. Below, some enumerated and considered customs are almost the same implementation. Because everyone can read. The encoding of the text in unbiased text is uncertain. However, we can take the first letter of every word from the previous judgment and see what it is thought and not too difficult. Hiding information in plaintext can be done in various ways. One way is to easily add white spaces and labels at the end of the paper line [11]. The latter method was successfully used in training and even after printing and copying a text 10 times on paper, the secret message can still be retrieved. Another possible way of storing a secret in a text is to use a publicly accessible cover of a book or newspaper and to use a code that contains, for example, a combination of a page number and a line amount and a character C number includes. In this way, no information stored in the cover source leads to the hidden message. Determining it depends exclusively on the knowledge of the secret key.

1.1.2 Audio Steganography

Audio steganography is hiding the data in the audio file. Stereo sound hides the data in the audio file. Integrating information into a sound publication is the most exciting method in the X-ray [10]. This is because the human hearing system has such a pulsating range that it can happen. To put it in perspective, the (HAS) distinguishes a range of more than one billion in one and a range of frequencies above one thousandth to one, making it extremely difficult to add data from the original data structure or subtraction. The only softness (HAS) comes when you try to separate the sounds (the loud sounds turn off the sounds) and this must necessarily be transformed into encoding of secret information to the sound without being observed

1.1.2 Video Steganography

Video steganography actually a combination of multiple images In video steganography a video file will be implanted with additional data to hide hidden data. In this method, a transition signal that maintains a sense of hidden message data and the satisfied signal data will be generated. Satisfactory data (video files) are then combined with this intermediate signal in the result coding. Additional data may contain copy controller data, which may be brains from a customer's online device and used to disable copying. The interfering signal may also include a self-identified unreadable key to conceal encoding and decoding the decoding match key to extract hidden massage from encrypted content. In some, regulation is used, data is integrated into the satisfactory signal with additional data [12].These instruction items contain known things that allow it to be documented in the embedded content tag. This encoding is healthy against scaling, resampling, and other forms of content poverty so that extra data can be detected by the content being destroyed.

1.1.4 Image Steganography

Image steganography is that it hides the information in the cover image file. The picture steganography is that you hide the information in the color image folder. The image is the most common use of the steganography directory. Due to the availability of many file formats for the various applications, the training used for these schemes differs. A box is a collection of bytes (known as frame pixels) that include levels of different levels in different areas. In trade with the digital box for use with stagnation, the 8-bit and 24-bit files for the pie photo are distinct [10] The two advantages and disadvantages I-8 frames are excessive for use due to a fairly small size. The problem is that only the color obtained can be used during the whole encoding. Usually a gray scale color palette is used with the 8-bit mark. Because the ordinary color change is most noticeable when the painting is coded with the secret information. The box of 24 frames offers much more flexibility than used for Steganography. Incredible data can contain copy conversion dates, which can be tested by the customer's electronic services and use to deactivate the copy. Encryption and decryption require the growing key to scroll through the selected number of the digit contents

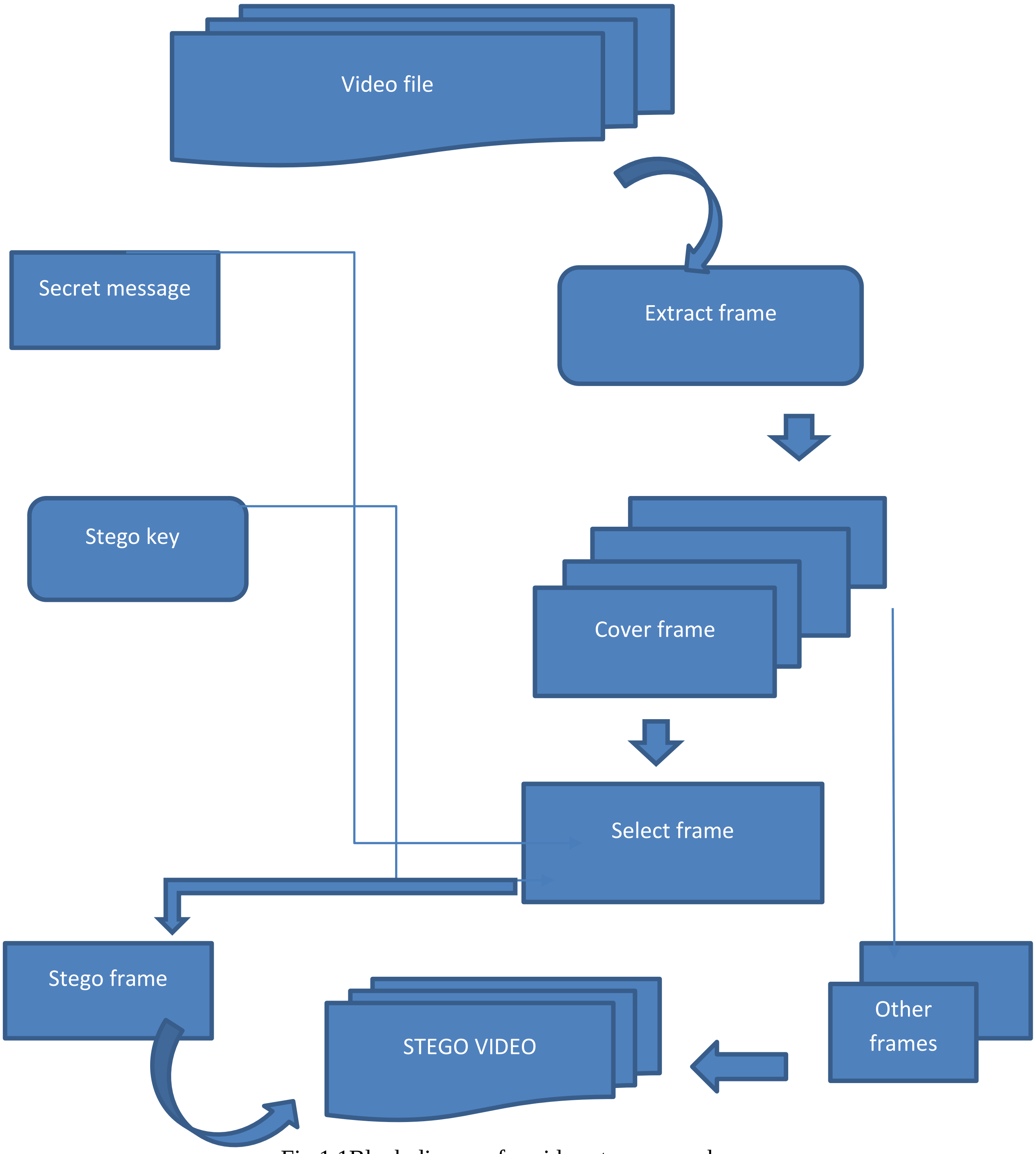

Fig.1.1Block diagram for video steganography

1.2 Types of video steganography Techniques

There are many techniques of video stenography. The best technical is without stopping the quality of the video steganography to hide the secret information, for not having been detected by the naked eyes. The implemented video is known as the video "stego" that is sent to the user's repertory. Several video steganography techniques are used today, to add meaningful information. Some known techniques are temporarily clarified in the following [15].

1.2.1 Video steganography using by LSB technique

LSB is the best method for data security for its past and present results. It's the easiest and most effective way to incubate massages [5]. In LSB, the pixel values of the video portlets that are in bytes are suddenly affected, after the LSB is replaced by the secret data bits that we have incopced. Now, since the LSB sound of the song change video, it is not unincorporated, and almost almost the same thing as the original video file .

1.2.2 Video steganography using by Non-uniform rectangular partition

This one. Techniques are for uncompressed studies. In a partition of form or a uniform, the hide of the information if you add add a video file in the video of no automobile. But make sure that the secret and the collection document are similar. All frames of the secret and the video of the fondue is applied by video steganography using most of the techniques [5]. The round video file is hidden in the minimum bits meaning of the video frame video.

1.2.3 Video steganography by Compressed

In this connection to the compression video file. The technique is only completed on the file of the compression. Massage can be incubated in the block with the change of the maximum scene and in P and block with the maximum number of motion vectors [5].

1.2.4 Video steganography by Anti-forensics technique

The anti-forensic techniques are movements that are carried out to finish, hide and manipulate the data of the attacker, the computer forensics [5]. Anti-forensic It provides security through unauthorized access control, but it can also be used for illegal use. Steganography is a kind of anti-forensic system where you will try to hide data under a cover file. Steganography, along with anti-forensics, make the system safer

1.2.5 Video steganography using by Masking and filtering:

Masking and filtering are used in an 8 bit / pixel video frame and are related both in the color frame and in the gray scale [5]. It looks like a watermark on a frame and does not indicate the quality of this video file. Unlike other techniques of steganography, when data is masked, the secret message is processed in such a way that.

1.2.6 Video steganography using by DCT

The DCT video steganography technology plays a dynamic role in compression technique in JPEG frame format. For example, a video with the frame is divided into 8x8 squares. Each square has changed DCT that produces 63 coefficients. A multidimensional series of outputs. Now the coefficient is rounded off with a quantized value [10]. The watermark is embedded with the middle frequency band of DCT block carrying the low-frequency components. It is inserted by adjusting the DCT coefficients of the image and using the private key

1.2.7 Video steganography using by DWT

The DWT (discrete Wavelet transformation) is now used in several presentations for signal processing, such as text, audio, image and video compression, DWT must convert the frame in the spatial domain to the frequency domain, where it is They generate the wavy coefficients, Information data has changed, such as a text or image file. In this type of transformation, the nodulation coefficients separate high and low frequency data in pixels to pixels [9]. The DWT approach used in the proposed work is the "level -2 Its DWT, the simplest of all wavelet transformation methods." In this transformation, the time domain is passed through low and high pass filters and the wavelet coefficients of high and low frequency are generated and the difference and average values of two pixels [10] taken L Operation of your DWT on the deck The image results in the formation of 4 sub-bands, that is, low-frequency low-band (LL) band, low-frequency horizontal band (HL), low vertical band high frequency (LH) and high frequency diagonal band

(HH). The estimated band contains the most significant information on the spatial domain image and other bands include high-frequency information, such as edge details, that is, the DWT technique.

L L	H L
L H	H H

Fig 1.2. Sub bands formed after applying DWT

Data hiding in video:

Step 1 First take one of the frame in the Video file as a cover frame

Step2 Now ,Apply DWT on that cover frame, from this we get 4 sub bands

Step3 Then apply DWT on Low low sub-band.

Step4 Now a have an information which want to hide inside the cover frame in the video file.

Step5 Then now hare get the Hidden frame by performing the IDWT using . known as stego video file .

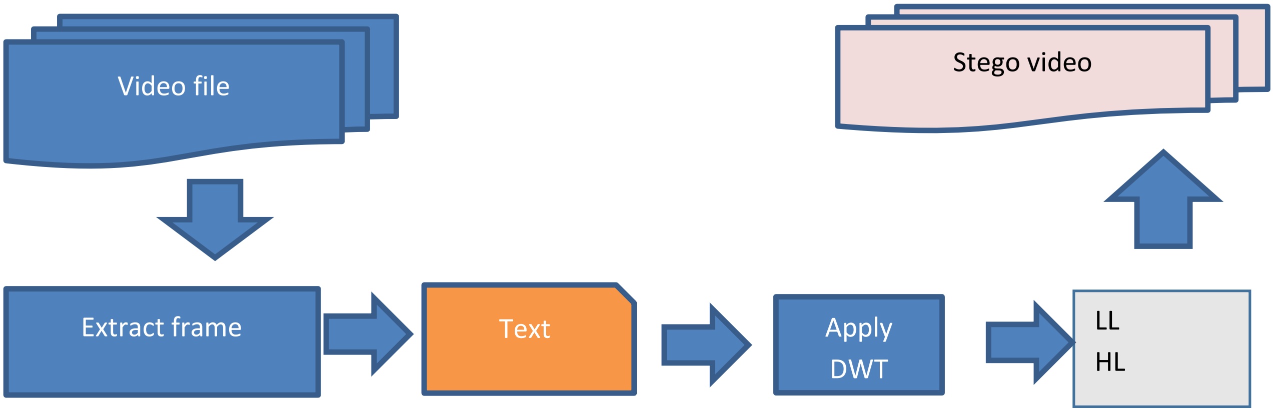

Fig.1.3. Flowchart for DWT steganography

1.2.8 Video steganography using by Integer Wavelet Transform

In that technique, Integer assigns integer wavelet transformations an integer vector set to another entire vector set. This transformation is perfectly invertible and accurately cuts the original video file. A 1-dimensional DWT is a recurring filter set algorithm. The renewal implies a convolution with the combination filters and the results of these convolutions are sum. In the 2-dimension matrix, first enter a step of the transformation on all rows. Then replication here is the same for all columns. In the next step continue with the coefficients that result from a convolution in both directions. Because the IWT allows self-regulating processing of the resulting components without any significant discernable communication between them, it is likely that the process of invisible embedding becomes more effective. However, used wrinkle filters have floating point coefficients. If the input data contains sequences of integers (as in the case of a video frame), the resulting clarified versions therefore no longer contain the value of integers, so that perfect modernization of the original video file is not possible. With the overview of Wavelet these map integers transform into integers .

Data hiding in video:

Step 1 First take one of the frame in the Video file as a cover frame

Step2 Now ,Apply IWT on that cover frame, from this we get 4 sub bands

Step3 Then apply IWT on Low low sub-band.

Step4 Now a have an information which want to hide inside the cover frame in the vi deo file.

Step5 Then now hare get the Hidden frame by performing the IT using . knows stego video file

2

SCOPE & OBJECTIVE OF THE STUDY

2.1 Scope of study

Now a days, in this world it is very complex to handle the information internet or world wide web against hacker. Data is normally in the form of word , image, audio and video. Steganography is one of the best arts or methods to hiding the data secretly and safely Steganography techniques can be applied to text, image, audio and video file**.**

Steganography is technique for hiding the data (data may be text, Audio, image and video). As we know that previous decade researchers many technique to used for steganography like LSB, DWT,DCT,IWT and many other also In the previous decade researchers has been solve many problems using DWT,LSB and DWT many other methods. our data make more secure and safe communication Because the real world applications may require high capacity hiding data or more security required for personal information and other purpose so here used video is carried of the data for hiding data capacity is high and provide more security .steganography provide the data hide in any of multimedia file like image and audio file as cover file but not much data hiding .so here ,will be try hiding the data more by using video steganography IWT ,so increases the data capacity or payload .main work here is to hiding the data safe and secure.

2.2 Objective of the study

In the previous era researchers has been solve many problems using DCT ,DWT , LSB and many other methods because lots of data hiding are present in many situations .Day by day increases data on the internet or www so here to improve the hiding data capacity , to increase the security and to safe exchange or sharing the data . Because the in real world applications may are require high capacity of hiding data and more security required for personal information and other information data hiding .Therefore, video steganography is used for increases hiding data capacity and also security of the data .

i Requirement of the video steganography is the hider massage carried by stego video should not be sensible to human beings

ii To the video steganography is to increases hiding data capacity or payload .

iii. It is very important to sharing the data which not hack by Hecker so it also make communication more secure .

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3

LITERATURE SURVEY

This chapter contains review on Steganography techniques and methodologies. It has listed down the various methodologies and their uses. Along with these, it has also included about that so here now discuss many paper about steganography

3.1 "Wen-Chuan Wu and Shang-Chian Yang, Enhancing Image Security and Privacy in Cloud System ,Using Steganography 2017"

Key point— The Cloud systems are a standard type of Internet-based computing that provides shared digital sources to computers and other devices on demand. Such systems also allow users uploading and offloading data to the cloud by mobile applications. In this paper, an data defense method is planned to digital images' security and privacy over the cloud system. We are used the steganography technique to disguise the luminance as well as the subsampled Chroma components of a personal data or image. Forbidden hackers and attackers will not perceive the reality of personal data or images file even they intruded aimlessly into the cloud storage. Main is this wished-for that algorithm can reduce the size of the video files and increase the cloud storage capacity[27] means data more amount we are hiding .Most of paper the steganography done by DWT simply algorithm .

Cloud systems are a popular type of Internet-based computing that provides shared digital resources to computers and other devices on demand. Such systems also allow users uploading and offloading data to the cloud by mobile applications. There are some potential security and privacy concerns using mobile devices since cloud systems are usually in a public domain.This paper presents an efficient image protection method to secure the existence of important private images in the cloud by using steganography technique. Experimental results show that the proposed method is able to not only enhance image security but also increase the cloud storage capacity

3.2. "Dr.P.Rajeswari1, Ms.P.Shwetha2, Dr.S.Purushothaman3, 'Application of Wavelet and Particle Swarm Optimization in Steganography'(2017)"

Key point**—** The information in the approximation matrix is hidden in the lower nibble of the cover image using the particles locations obtained by training the PSO algorithm. The number of elements of the 8x8 matrix is 64. Hence, a minimum of 64 particles is generated. Based on a specific generation number and the current best value, the locations of the particles are stored. An implementation of particle swarm optimization (PSO) for image steganography is presented. Message image of 256x256 is decomposed by using daubauchi-1 wavelet to five levels. Only approximation matrix is considered in all levels of decompositions. At the fifth level of decomposition, the approximation matrix size is 8x8. In the information hiding process, each coefficient value of the 8x8 matrix is stored in the corresponding locations in the cover image using least significant bit process (LSB).

3.3 " A Secure Steganography Technique Using MSB , Aditi Sharma, Monika Poriye, Vinod Kumar(2017)"

Key point **-**In this paper to conceal messages coverlet mysterious messages cover to hide image. steganography (MSB) of the most famous secret to conceal the privacy button taste of pixels is used to plan a new recommended. Environmental unnecessary pixels to hide the personal information it contains. In addition, a central part of the image is selected to hide a secret message for more security. Here, the red channel is used as an indicator to hide a secret message in the 5 and 6 bits of a green channel or a blue channel of an RGB image .The number 1 station itself, if you like red and blue channel is used to enter the channel used in Matlab evaluated by using the proposed algorithm to the results of the images of the higher PSNR of stego images show very high. Security and a better view. Better load.

3.4 "Ramadhan J. Mstafa1, (Member, IEEE), Khaled M. Elleithy1, 'A Robust and Secure Video Steganography Method in DWT-DCT Domains Based on Multiple Object Tracking (2016)'"

Key point**–** The data hiding process is made by hiding a secret message from the DWT and DCT coefficients in all motion areas on this video, depending on the previous mask. Over the decades

decades, the art of secrecy and digital data communication has been cared for by the technological development of both digital content and communication. Misunderstandings, the ability to conceal and stabilize against the attacks are three essential needs to be considered in all steganography video modes. This article reflects the powerful and secure algorithm of the discrete algorithm of the discrete Wavelet Transform (DWT) and Discrete Cosine Transform (DCT) based on the Multiple Object Tracking (MOT) algorithm and Error Correction Codes (ECC). The secret message is edited by using Hamming and Bose codes, Chaudhuri- Hocquenghem (BCH) to encrypt data. First, the MOT-based algorithm is used for videos that hold to distinguish interesting places from moving things. Than,. Our experimental results show that the proposed algorithm is not only enhancing input and visibility, but also enhances security and stability by entering a hidden message code and dealing with various attacks.

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3.5 "Bit-Plane Decomposition Steganography Using Wavelet Compressed Video[BPCS],Tomonori Furuta, Hideki Noda, Michiharu Niimi, Eiji Kawaguchi(2013)"

Key point_ The method of "Bit-Plane Decomposition Steganography Using Wavelet Compressed Video[BPCS]" in This research offerings a steganography techniques for hiding that data using compressed video which provides a one beat methods to send the big data of secret information. That proposed techniques is based on 3-D set separating categorized trees (SPIHT) approach for video compression[24] and BPCS steganography. The three-dimensional SPIHT is for the video compression by also Used two dimensional-D SPIHT methods for frame or video compression. In the three-D SPIHT, 3-D DWT is applying to a video file. The wavelets coefficients in three-D SPHIT sub bands are then bit-plane- programmed into a bit-stream by three -D SPIHT determined. Then bit-planes for WC can be inserted, BPCS steganography can be applied to deep-rooted information. n the DWT spatial domain[24].

This paper presents a steganography method that uses compressed video with lossy, which provides a natural way to send a large amount of secret data. The proposed method is based on three-dimensional set partitioning in hierarchical trees (SPIHT) algorithm for video compression and bit-plane complexity segmentation (BPCS) steganography. In 3D SPIHT coding, wavelet coefficients in 3D discrete wavelet transformed video are quantized in a bit plane structure and therefore BPCS steganography can be used in the wavelet domain. Insertion rates of about 28% of the compressed video size were achieved for twelve bit reproduction of wavelet coefficients without noticeable deterioration of the video quality.

3.6 "**A High Capacity Video Steganography Based on Integer Wavelet Transform,' Lakshmi narayanan K M.E (CSE), Dept. of CSE, Prabakaran GAsst Professor,(2012)"**

Key point - That paper main purpose is Integer to integer wavelet transforms used an one integer information set into another of integer type of data usual. That transform is same or revenue same the real data set. An 1- dimensional DWT is a normal filter algorithm. In two possibilities, firs is to apply 1- step of the1- dimensional transmute to all rows. Then, that is repeat to all columns also. [25]. Here get a new improved Video steganography approach along with a suitable system. Also it involves integration wavelets decomposition of the identical variety of both an cover video file and personal text into a single result of fused both cover video file and furtive text into I WT domain further apply IWT on the secret data to Increase the security greatness In this paper IWT are used to advance the spatial and chronological correspondence in and between the video Frames or minimizing The hiding massage misrepresentation

Steganography is a data-keeping technology and is widely used for the application of security applications. It's an invisible link of art. The Steganography communication system contains an entry algorithm and leather algorithm. Video Steganography is a way to hide all types of files extension to the video support file. An application that has been incorporated into a particular type of file (file) in another file, this is called a network file. The network file should be a video file. It affects the installation of data on empty sources. How to hide data to insert different types of data in video formats presented. In our time we use the unique wavelet conversion in the picture to get a stego picture. The amount of the proposed algorithm is expanded only if the approximate belt of the private image is considered. The extraction model is actually a distinctive mode of entry model. The results of testing indicate that our method is provided with a powerful stego image and strong stability security.

3.7 “Manisha Kude1 Manjusha Borse2 E&TC Engineering Department, E&TC Engineering Department, *Skintone Detection Based Steganography Using Wavelet Transform(2016)*”

Key point— That research based upon Skin tone Detection Based Steganography Using Wavelet Transform in this paper present a one of the most new method to hiding the data into skin image or video file, that is not more much more critical to HVS (Human Visual System)[13] .Biometric features like skin-ton is very important for this approach’s.

This paper present a unique method in which secret data can be embedded within skin, as it is not that much critical to HVS (Human Visual System) .Biometric features like skin-ton is beneficial for this method. In this process, the secret data is embedded in specified regions, in place of embedding data anywhere in image. At first take input image and then perform skin-tone detection on Hue, saturation, value (HSV) color model. Secondly, mask images converted in frequency domain. This is achieved by applying Haar-Discrete Wavelet Transform (DWT), leading to four sub-bands. Sub-band LL (Low-Low band) is used for processing the data. Different levels of DWT are used with Haar transforms. Then the payload (number of bits that can be embedded) is calculated. By tracing skin pixel in one of the given high frequency sub-band, secret data embedding is Performed. First cropped the image then performed all steps for embedding process. Cropping results provides more security than with outcropping, because at the decoding side this cropped region works asa key.

3.8 “Ramadhan J. Mstafa and Khaled M. Elleithy, *Senior Member,”* ‘A Highly Secure Video Steganography using Hamming Code (7, 4)(2016)”

Keypoint— In this paper suggest a safe steganographic video algorithm based on standard block policy. Nineteen blocked video sequences are used as cover data and binary image goal as a private message. Pixels for both cover videos and private messaging are periodically updated using the private key to improve system security. The private message is written by entering the Hamming code (7, 4) before the login procedure to make the message secure. The result of the targeted message will be added to unused randomly using XOR function. After steps that make sure the message is safe enough, you can access the cover video clips. Additionally, access to each sector is selected periodically and will vary in some cases to enhance the stability of the steganographic strategy.

Additionally, the algorithm has the highest ability to enter, as shown by the results of the test we have received. Regarding system quality, Pick-signal-to-noise (PSNR) rating for Stego videos is above 51 dB, which is close to original video quality. Uploading input is also acceptable, with 16 Kbits integrated into each video frame and up to 90 Kbits without any visible damage to Stego's video.

3.9 Ramadhan J. Mstafa, Khaled M. Elleithy, “A High Payload Video Steganography Algorithm Based on BCH Codes”(2015)

***Key point*—** Video-steganografie is het gevolg van de aanzienlijke toename van videogegevens ten opzichte van de prestaties van steganografie-algoritmefactoren: efficiëntie inbedden en papier insluiten, een hoge inbedding van de payload van het video-algoritme is voorgesteld op basis van de verbetering van de beveiliging van het algoritme, een secre gecodeerd door codering. Vervolgens zijn het de discrete wavelet-transformatiecoëfficiënten (DWT) Omdat het DWT-midden- en hoogfrequentiegebied minder gevoelige gegevens zijn, wordt het geheime bericht ingesloten. Het middelste en hoogfrequente DWT-coëfficiëntalgoritme wordt getest onder twee soorten video's en fast motion-objecten . De resultaten van de pr worden vergeleken met zowel de Least Significant Bit-algoritmen. De resultaten demonstreren per voorgesteld algoritme beter dan voor de anderen. Het hproposed algoritme is ongeveer 28%, wat een hoge inbeddingspayload is met een minimale tqualiteit. De robuustheid van het voorgestelde algoritme onder verschillende aanvallen.

3.10 Prabakaran G, Dr. Bhavani R , Sankaran “Dual Wavelet Transform Used in Color Image Steganography Method”, (2014)

***Key point*---**Steganography is an art of activity of the data inside the folder, such as the simplest way, it is like simple coverage, although the hidden information. In this article, the secret image activity is in two totally different domains such as IWT (Integer Wavelet Transform) and DWT (Discrete Wavelet Transform). We tend to apply different combinations of DWT and IWT to each image and obtain good quality stego images. Every domain offers safer with secret key and certain robustness of our algorithm. This double wavelet transformation used in the Color Image Steganography Method (DWTSM) in Blue Channel (B-Channel) offers great possibilities and security. This proposed algorithm is tested with image quality parameters and compared with other algorithms. The experimental results show that a dual approach achieved high power and high security of our system in B-Channel while improving the performance of the steganography system. The proposed algorithm reached high PSNR quantitative relation 45 to 55 and other parameter values reached the best solution and compared this methodology with different combinations of transformations.

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4

RESEARCH METHODOLOGY

In this chapter explain many methodology for hiding information for inside video file as choose cover one or more frame. so now many methods are present here to various types of video steganography.

4.1 Video steganography using LSB techniques

The minimum significant insertion of bits is a common and simple approach to insert information into an image file. In this method, the LSB of a byte is replaced by a bit of M. This technique works well for image steganography. In the human eye, the image of the stegoage will be identical to the image of the carrier. To hide the information inside the images, the LSB method is used (less significant). On a computer an image file is simply a file that shows different colors and intensities of light in different areas of an image. The best type of image file to hide inside information is a 24-bit BMP image (bitmap). When an image is of high quality and resolution, it is easier to hide the information inside the image. Although the 24-bit frame is to hide the information due to its size. The reason is that publishing more images on the Internet can stimulate thought. When using a 24-bit image, you can store 3 bits in each pixel by changing one bit of each of the red, green, and blue components.

ALGORITHM

Step 1 Take a picture or frame size M * N as an entry.

Step 2: The hidden message is embedded in the RGB component only of an image.

Step 3 Use a selection of pixels to get the best areas to hide the information in the cover image
Step 4 After this, the message is hidden using the LSB method by replacing bit.

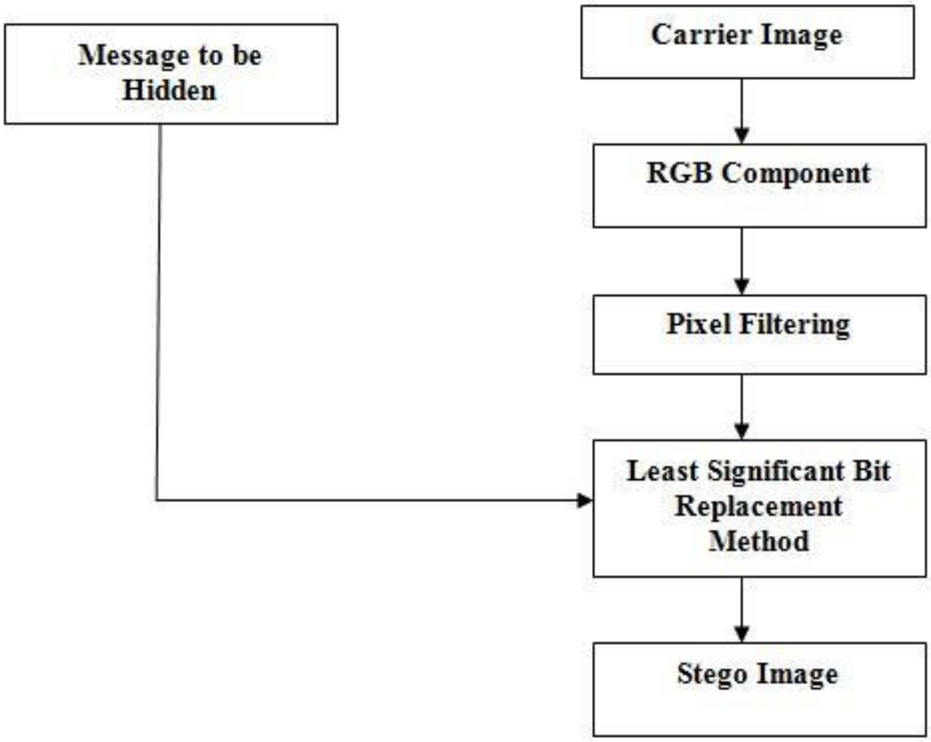


Fig.4.1 Block diagram of LSB

4.2 Video steganography using by DWT

DWT (Transformed Wavelet Discrete) is used in different signal processing slides, such as text, audio, image and video compression, to convert the DWT spatial domain frame to a frequency domain, where wavelet coefficients are generated, data change to data or text file information . In this type of transformation, wavelet coefficients differentiate between high frequency data and low frequency from pixels to pixels [9]. The DWT approach applied to the proposed work "-2 Haar DWT, Wavelet is the simplest of all methods of transformation." In this transformation, the time domain passes through low pass filters and low frequency and low frequency coefficients are generated, and the difference and average difference between two pixels are taken [10]. As a result of the operation of the cover explanations by Haar DWT, the formation of 4 subband bands is achieved, approximate small bands (LL), low frequency low bandwidth (HL), low vertical bandwidth (high frequencies and LH) and high bandwidth frequencies (HH). The nearby band is the most significant information of the spatial domain image and other bands have high frequency information, such as the edge details. Thus, DWT technique

Data hiding in video

Step 1 Here we select a single frame in the video archive

Step 2: In this frame apply the DWT, from there we will get 4banda (LL, HL, LH and HH).

Step 3 Then apply the SVD LL sub-band.

Step 4 Now we have an authentication logo that we want to hide inside the selected video frame. Step 5 Apply SVD in this image of authentication. that is, S + α W = UW SW VW T, where W hidden image and α scale factor are used to control the hidden force used by the scale factor.

$$A = USW\ VT \qquad (4.1)$$

Step 6 To get the hidden image AW, it has been done using an inverted DWT reverse. DWT coefficients and DWT coefficients

4.3 Video steganography using by DCT

DCT (Discrete Cosine Transform) is a fundamental technique in the frame compression technique. For example, an image is divided into octaves. Each square is transformed by DCT, which produces a coefficient of output of 63 coefficients. Now, the coefficient is rounded off. The watermark is integrated with the frequent bandwidth frequency of the DCT block, with low frequency components. Adjusting the image DCT coefficients and using the private key.

4.4 3-D SPIHT-BPCS steganography:

BPCS steganography usages bit-plane decomposition. When an one video file chose after this extract frame and   frame decomposed into bit-planes, we can get dualistic frame for each bit-plane.in this algorithm   follow step as[24] .

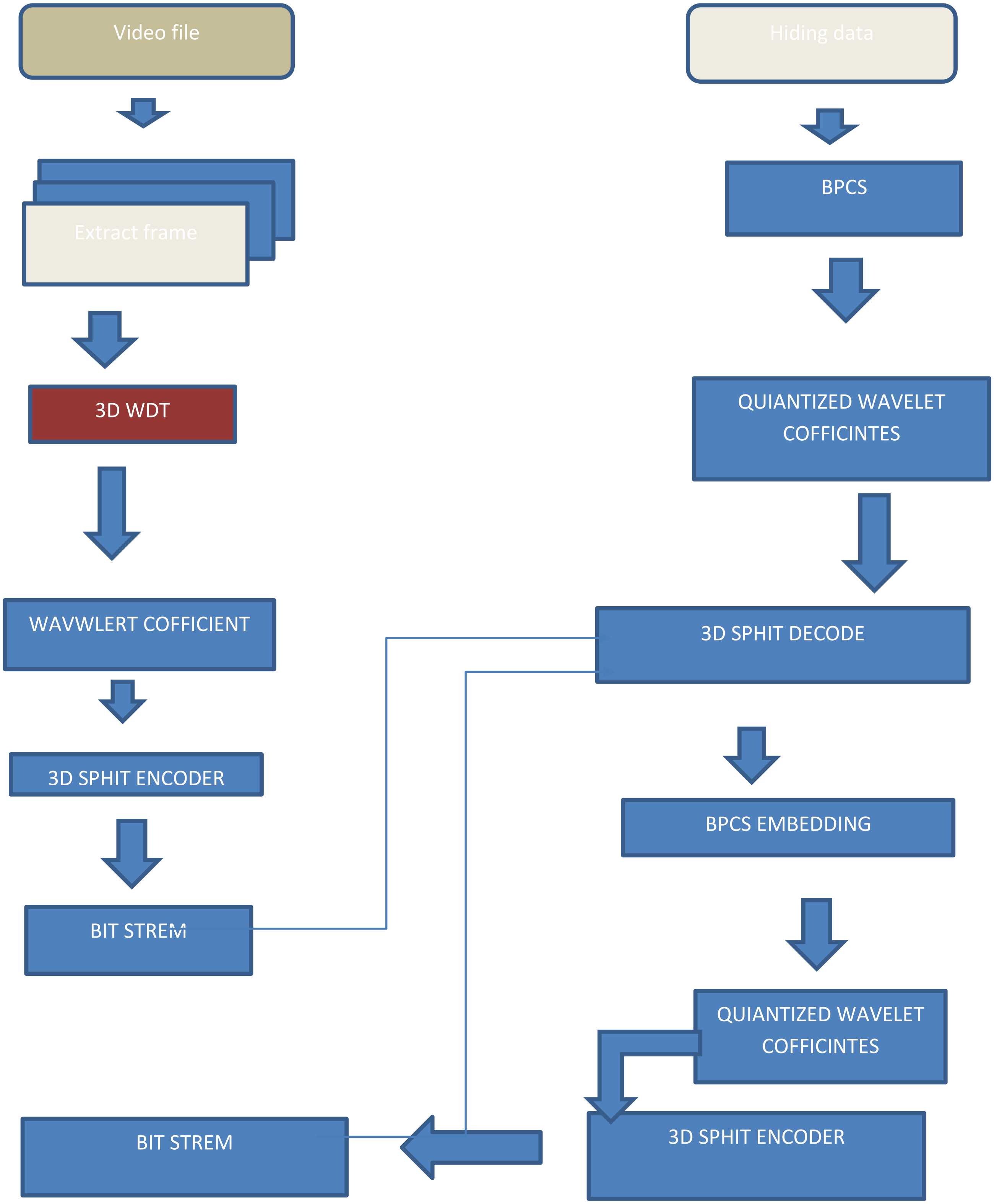


Fig 4.2. A flowchart using by 3-D SPIHT-BPCS steganography

4.5 Video Steganography using by Integer Wavelet Transform

The main purpose for that algorithm is the Integer wavelets transform based union technique. it means simple a the wavelets decomposition of the standardized based of both the cover video file and secret information into an single united result. Both file as cover video and secret information into IWT domain. More security purpose used that IWT on the closet data to increase the security for hiding data. The single fused resultant matrix is get by the sum of WC of the personal sub bands of the cover video file [25]

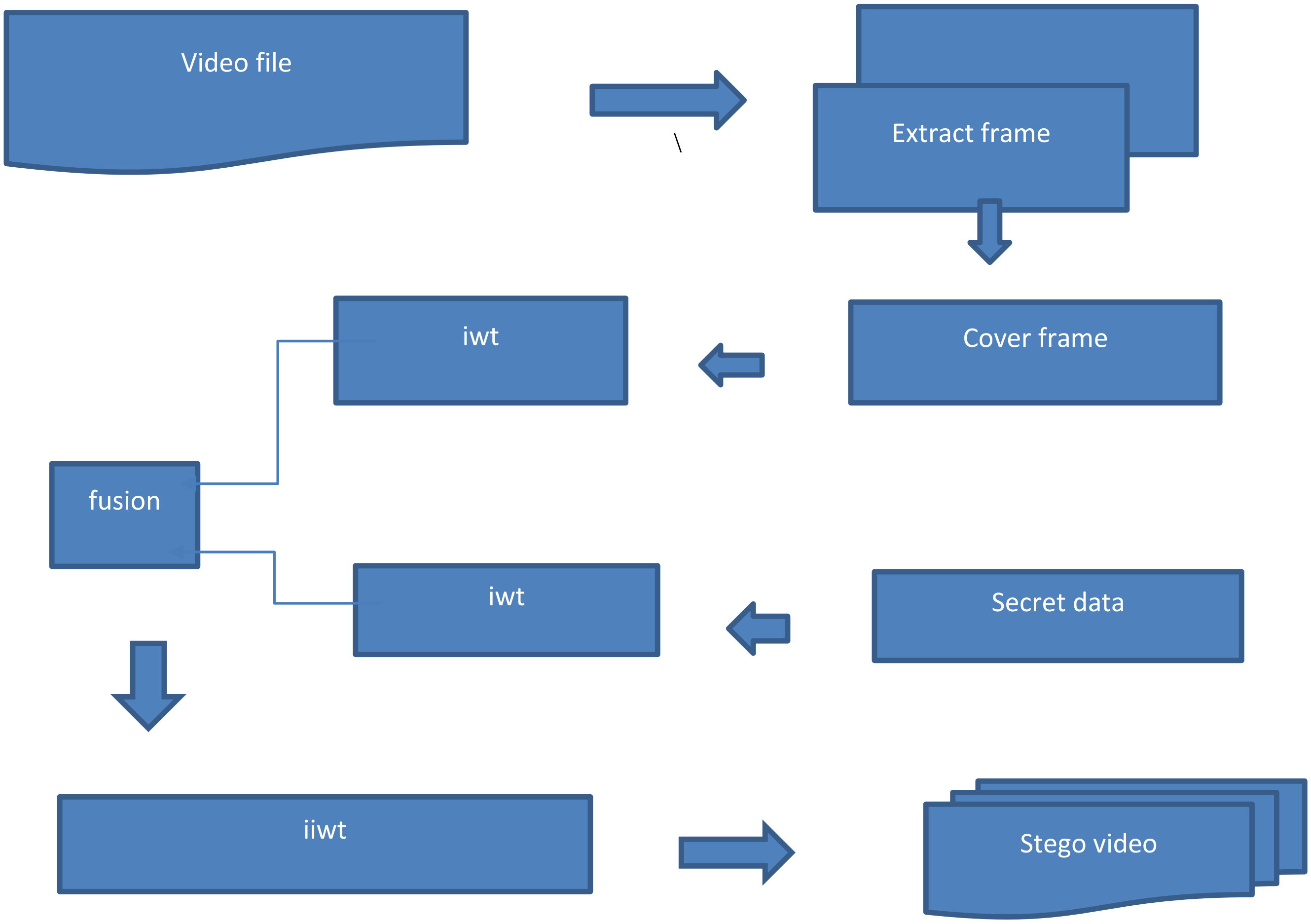


Fig.4.3: Flowchart video Fusion Encoding Process

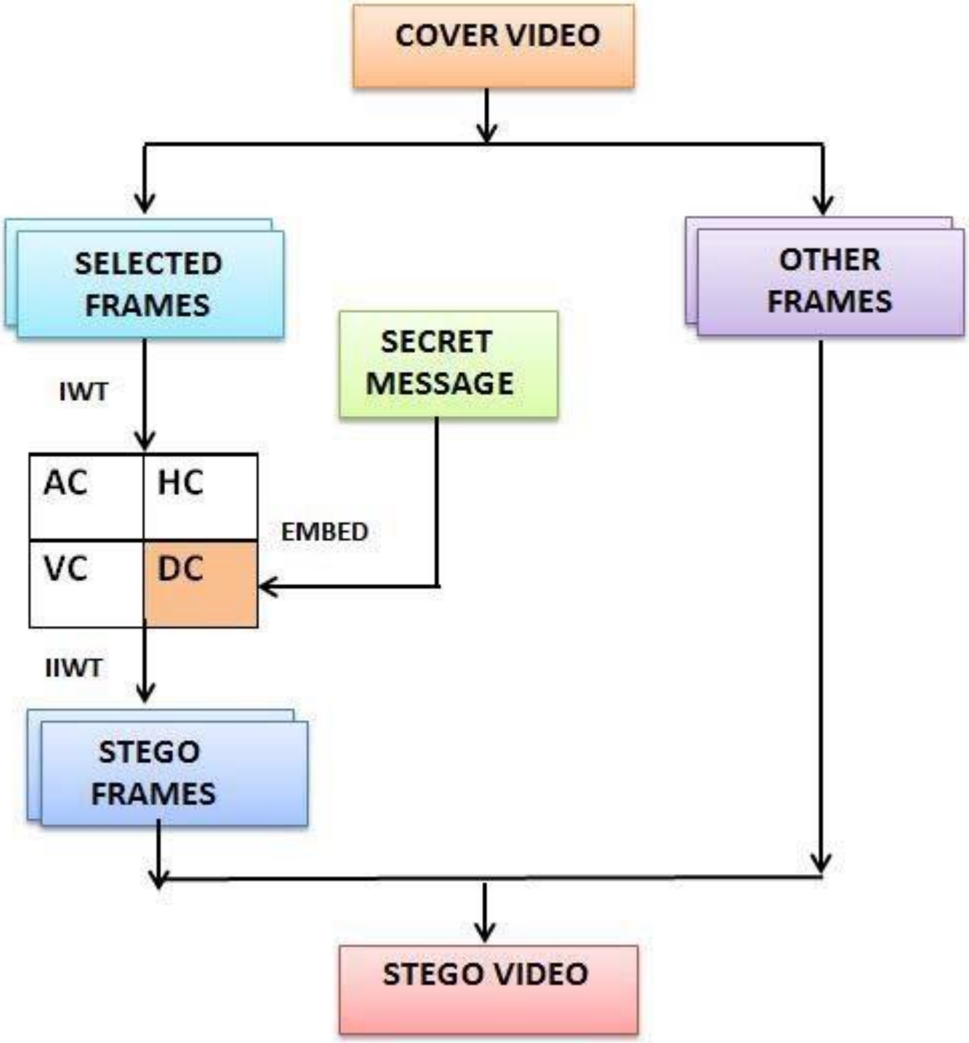


Fig 4.4 Block Diagram of IWT

4.6 Enhancing Image Security and Privacy in Cloud System Using Steganography

Cloud systems are a current type of Internet-based computing that offers shared digital sources to computers and other devices on requirement. Such methods also allow users and discharging data to the cloud by mobile applications. This section introduces the proposed method for defending individual close video over the cloud[26]. It consists of two ways: reserved data embedding as well as private image removal. Before executing the first one route, we need to prepare two color frame, one called cover frame C and another called personal data or image P, with H × W pixels[26].

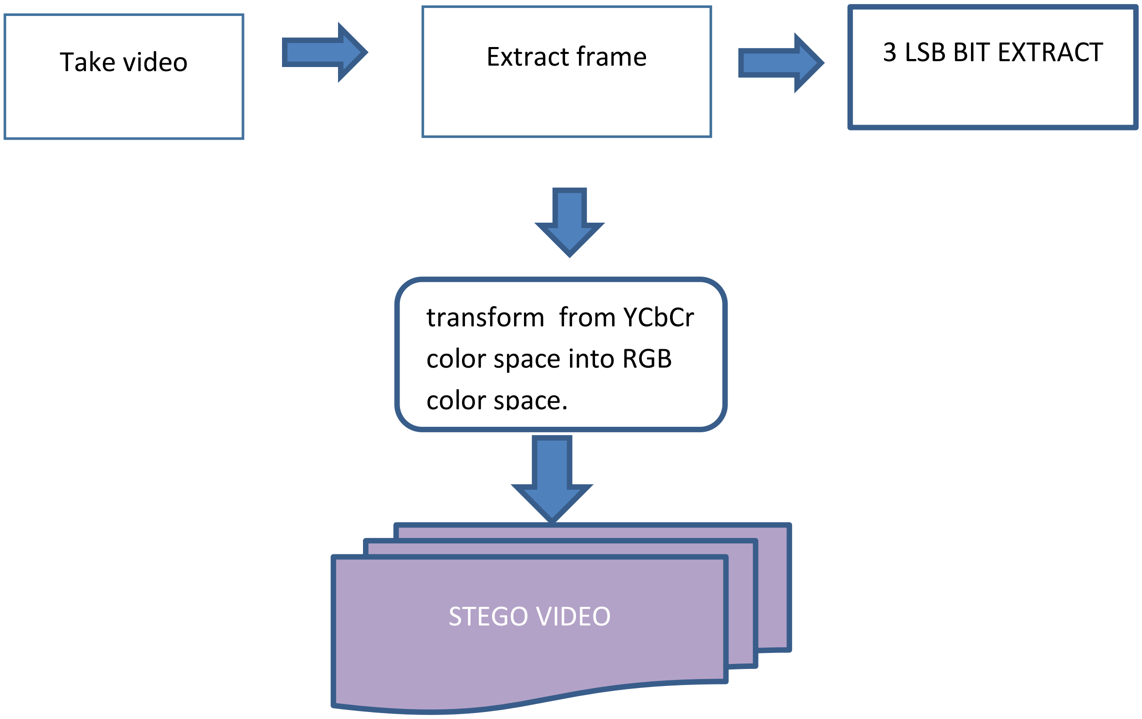


Fig.4.5 Flowchart cloud System Using Steganography

4.7 Protect Cloud Data using Multilayer Steganography

In this method simple means , the cloud computing can be means like as " save the personal data or impotent data in our personal computer", and save the other information in some other palace else the same data massage will be in everywhere in all over the www. The main advantages of computing cloud is to find different types of option to sharing the data as our wish .simply the Cloud computing the three types of the services which is following as a Service (PaaS), (IaaS) Infrastructure as a Service and (SaaS)software as a Service [27]. To improve the current hiding information.

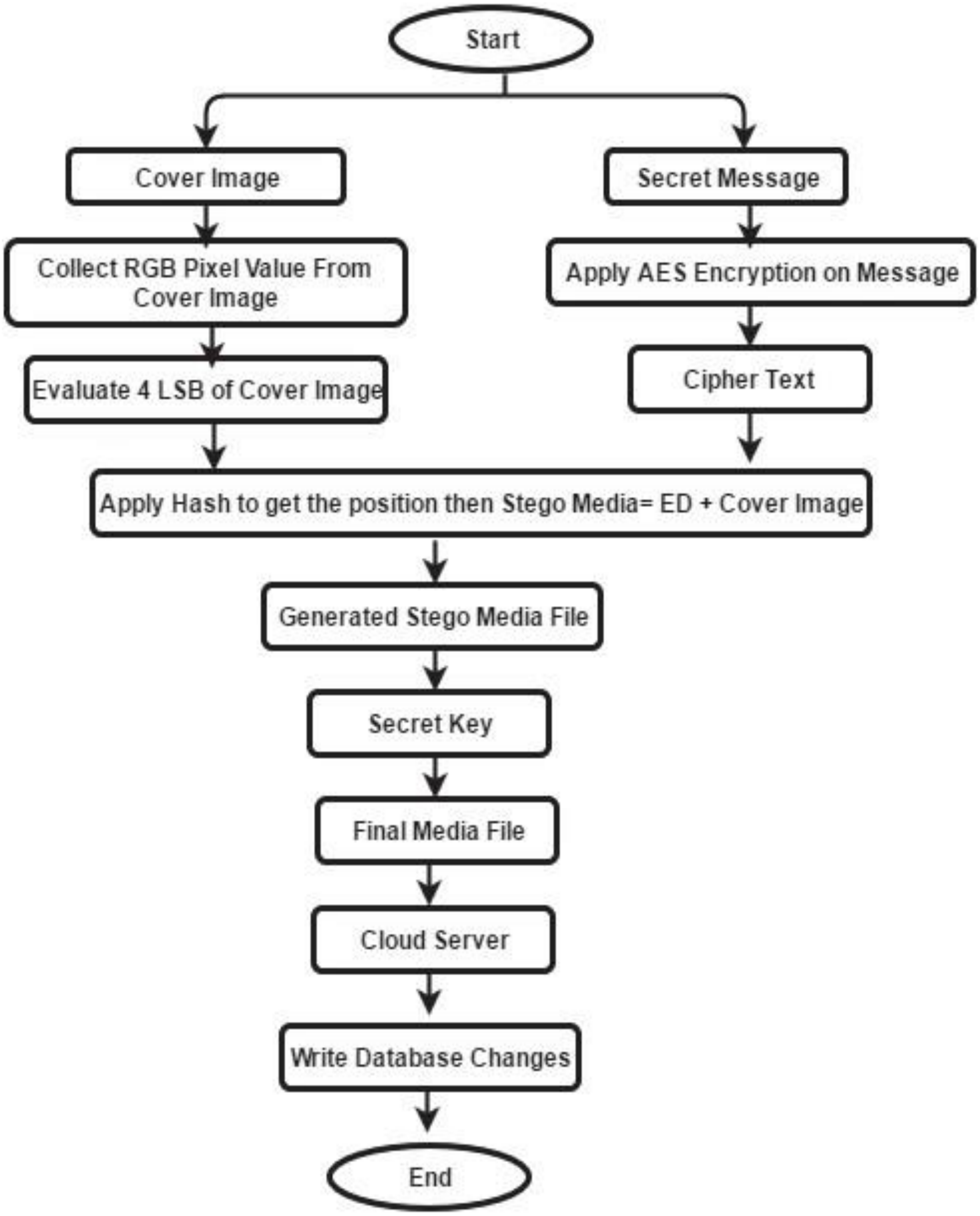

Start
Cover Image
Secret Message
Collect RGB Pixel Value From Cover Image
Apply AES Encryption on Message
Evaluate 4 LSB of Cover Image
Cipher Text
Apply Hash to get the position then Stego Media= ED + Cover Image
Generated Stego Media File
Secret Key
Final Media File
Cloud Server
Write Database Changes
End

Fig. 4.6 Flow Structure of proposed methods

4.8 High payload Algorithm in Video Steganography

In this method, a high payload of video steganography process in the DWT domain founded on BCH codes. The steganography algorithm decomposes the video file into frames, after this

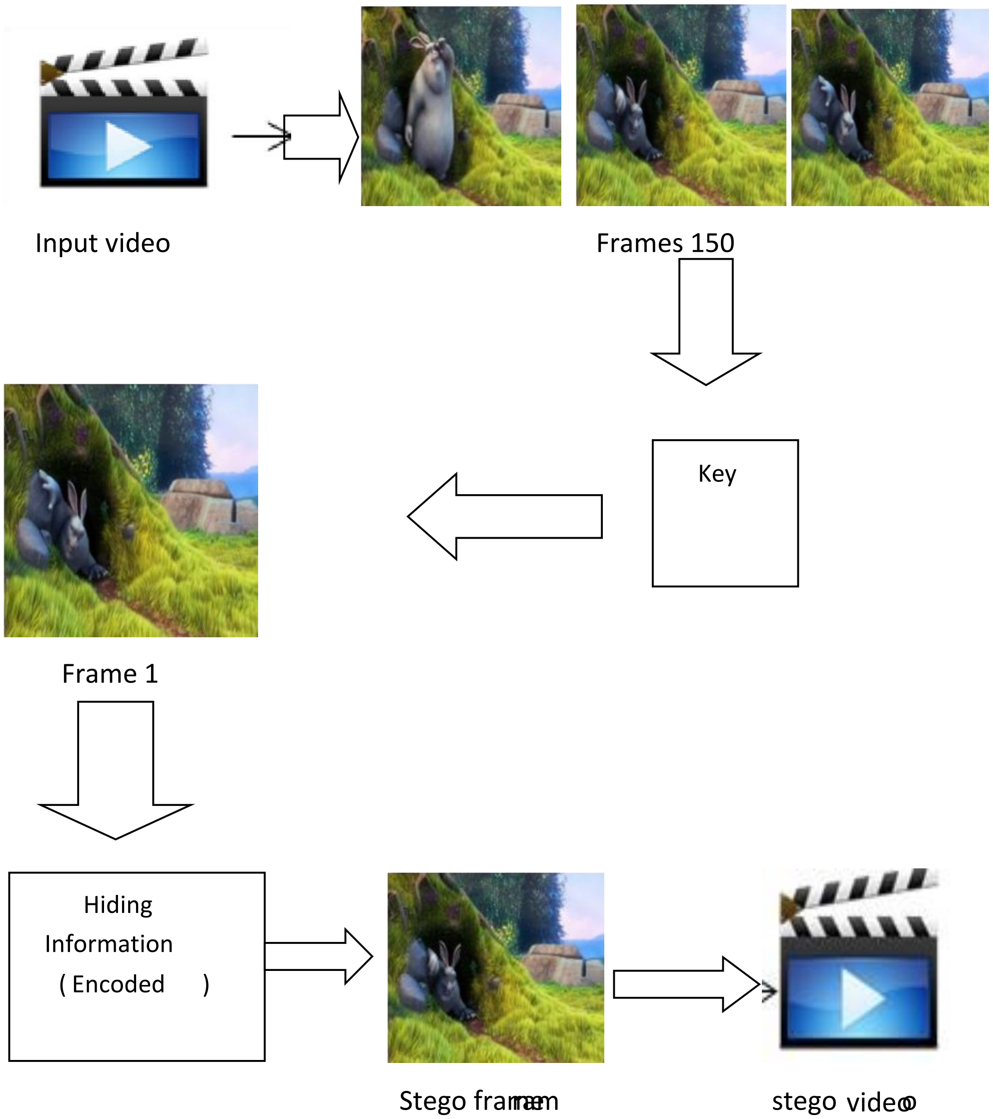


Fig 4.7 High payload of video steganography process

divides each image into 3 component (Y, U, and V). Before the embedding progression, the secret information is hiding data by using BCH (15, 11) codes to increase the efficiency of the algorithm. in that method we are using 2D-DWT has been applied to each frame of the cover video

4.9 Skin tone Detection Based Steganography Using Wavelet Transform

In this paper present a one of the most new method to hiding the data within skin, like it is not that more much critical to HVS (Human Visual System).Biometric features like skin-ton is very important for this method. In this methods , the secret text is hiding in defend the area , in place of hiding text anywhere in pideo. At first take input video and then process to detection skin-tone on Hue, saturation, value (HSV) color model. Secondly, mask image converted in frequency domain. This is achieved by applying (DWT), leading to four sub-bands. Sub-band LL is used for processing the information

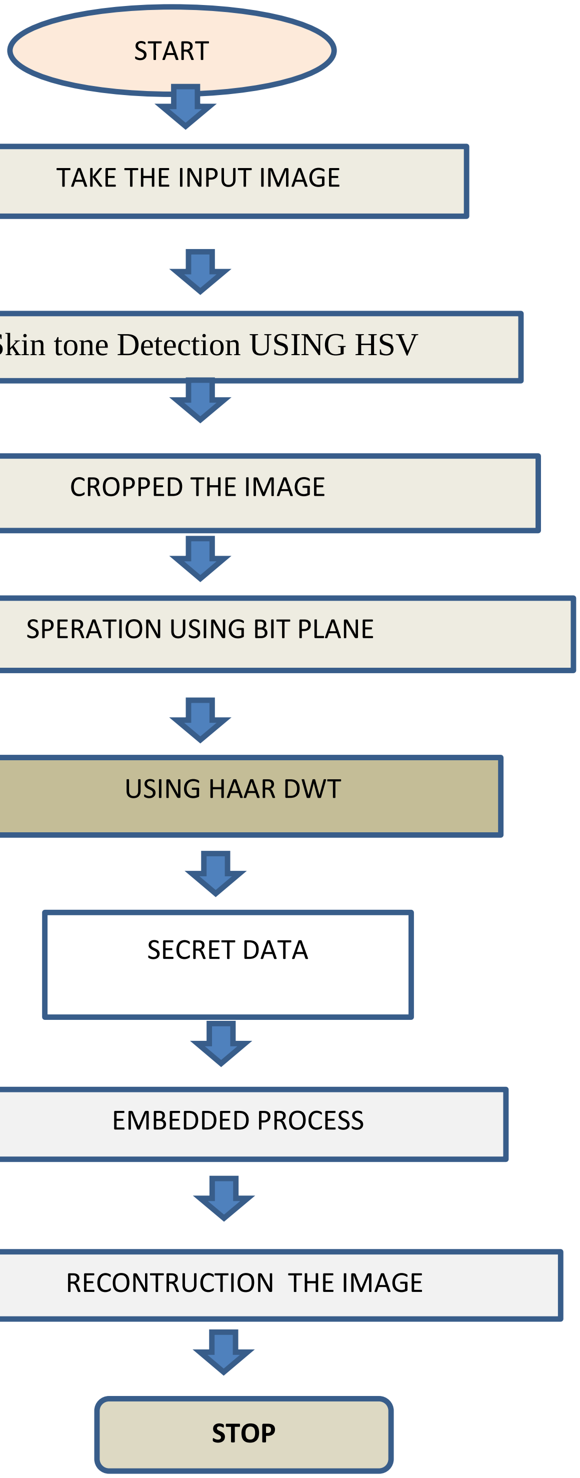


Fig.4.8.Flowchart Skin tone Detection Based Steganography

4.10 Some other techniques also as following

Same other techniques also present many paper of image or video steganography but some paper block diagram are same so here common block diagram of image steganography

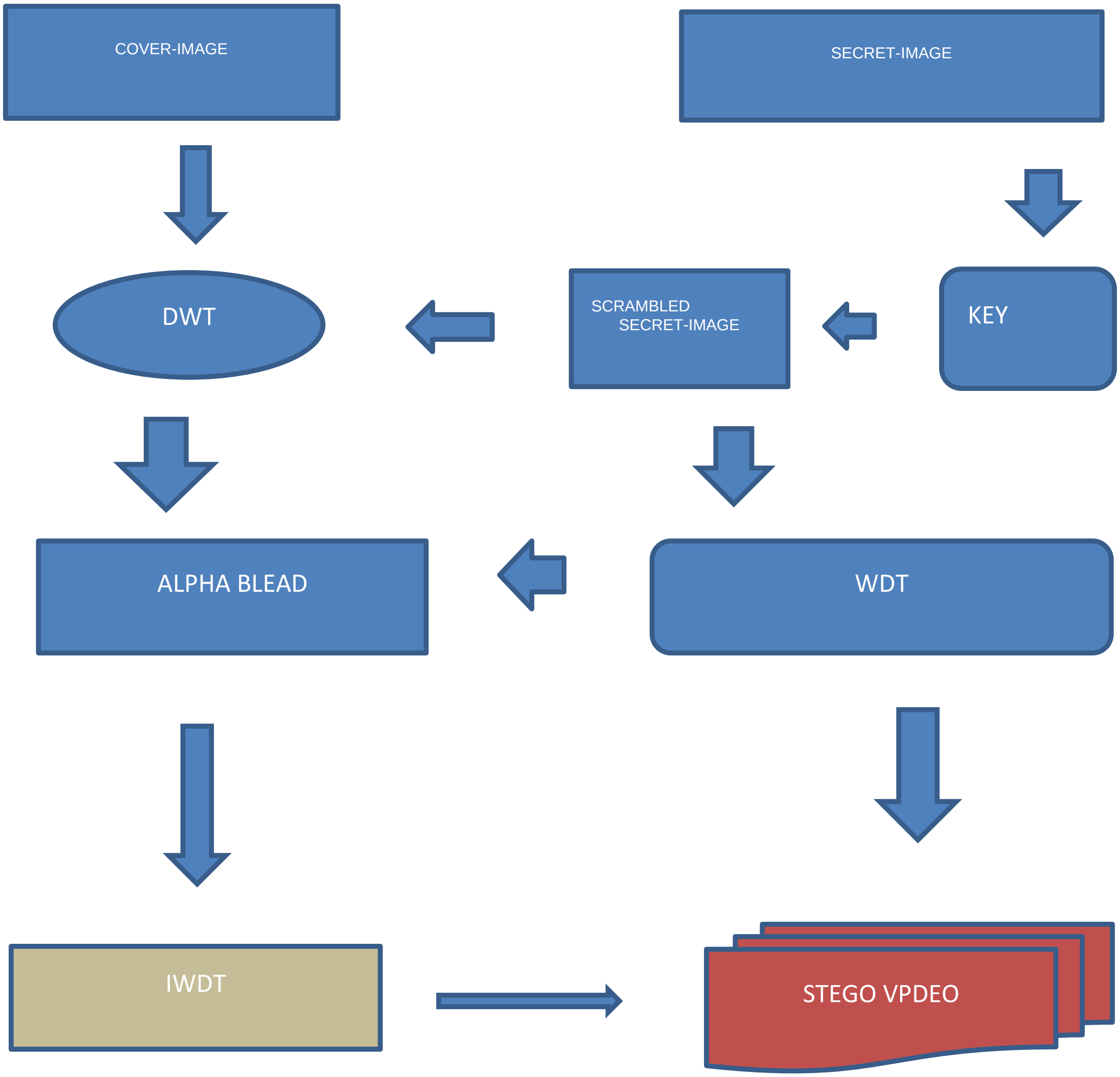


Fig.4.9. Flowchart steganography using DWT

5

PROPOSED & FUTURE WORK PLAN WITH TIMELINES

In this four main different methods for video steganography LSB,DCT,DWT and IWT has been implemented. Comparison has been made among these four techniques.

In the next stage IWT has been implemented on different video or image a comparison has been made among all four techniques. The proposed work plan with timeline is shown in the table 5.1 and future work plan is shown in the table 5.2.

5.1 Proposed Work Plan

Table 5.1 Proposed work plan with timeline

s.no	**MONTHS** **WORK**	**Jan-July 2017**	**Aug 2017**	**Sept 2017**	**Oct-Nov 2017**
1	Study on image and video steganography	*			
2	Paper writing on “Review-comparative study Video steganography”	*	*		
3	Implementation of video steganography using LSB		*	*	

4	Implementation of video steganography using DCT			*	
5	Implementation of video steganography using DWT			*	
6	Comparison of implemented algorithms			*	
7	Paper writing on “Video steganography using wavelet transform”			*	*

5.2 Future Work Plan

Table 5.2 Future work plan with timeline

s.no	**MONTHS** **WORK**	**Jan 2018**	**Feb 2018**	**March 2018**	**April 2018**
1	Implementation of video steganography using IWT	*			
2	Comparison of all kind of techniques for video steganography	*	*		
3	Paper writing on “ Video steganography using IWT”		*	*	
4	Report Writing			*	*

6

RESULTS & DISCUSSION

Previous chapter discuses many techniques about video or image steganography here perform the payload of data hiding parameter and stego parameter also find out

6.1 Performance Metrics

To calculated the imperceptibility of steganography numerous metrics are used. The metrics show how similar or dissimilar the stago frame is from cover frame . The following metrics are as :

6.1.1 MSE

It is calculated by performing byte by byte evaluation of the cover frame and stago frame. The Calculation formula is

$$\text{MSE} = \frac{1}{M*N}\sum_{1}^{M}\sum_{1}^{N}(\text{Fij} - \text{Gij})^2 \qquad (6.1)$$

M : rows of cover image is presented

N : the column of Cover frame presented

Fij : the value of cover frame Pixel

Gij : the value of Stego frame Pixel value.

6.1.2 PSNR

The calculated in volumes the quality of the stago video related with the cover video. The greater the PSNR well the quality. PSNR is calculated using the following equation [1].

$$\text{PSNR}= 20\log_{10}255 - 10\log_{10}\text{MSE} \qquad (6.2)$$

6.1.3.Correlation Factor

The Correlation factor is defined as .the Correlation factor ‘r’ is the amount of magnitude and direction of linear mixture of two random variables. If two frame pixel value are close to each other ,then the correlation factor is near to the value 1. On the other side , if the factor is close to 0, two image pixel are not close to each other equation 3[1].

$$r = \frac{\sum_i (Xi - Xm)(Yi - Ym)}{\sqrt{\sum_i (\mathrm{Xi} - \mathrm{Xm})^2}\sqrt{\sum_i (\mathrm{Yi} - \mathrm{Ym})^2}} \qquad (6.\ 3)$$

Where

Xi – the intensity of cover frame Pixel

Xm- the frame intensity of Mean value

Yi- the intensity Pixel of embedded frame

Ym – the frame intensity Mean value of embedded data

6.1.4. The Bit rate

To sense the Bit Rate Increase (BRI) of our methods used after hiding, we are used the following BRI formula equation [1]:

$$BBRI = (B0rat - Brate)/Brate \quad * 100\% \qquad (6.4)$$

Where

B0rate :the embedding bit rate

Brate: the cover video sequence bit.

6.1.5 Histogram

The Histogram simply defined as the graphy representation of intensity value of each frame same specific range .it can be show intensity level of cover frame of stego frame.

6.2.Discussion

Here find out the all parameter biased upon parameter maxis and compare average PSNR and MSE all input image or cover image and stego image like video file.show in table no.1,2,3and4.

6.2.1 Video steganography using LSB

Least Significant Bit (LSB) is a common and simple technique for viewing data in video files. In this method, one byte of LSB is replaced by a M bit. This technique is suitable for video steganography [8]. For the human eye, the stage video looks the same as the carrier video.

Table 6.1 Using LSB on the image

Cover frame jpeg and png	**MSE**	**PSNR**
Lena	0.0065	69.95
Tiffany	0.0110	67.95
Sailboat	0.0559	68.55
Tiffany	0.0081	70.64
Sailboat	0.0090	69.02
Akiyo	0.0145	44.25
Coastguard	0.0145	39.65
Bus	0.1142	37.54
Soccer	0.2251	45.25
Tenpins	0.1451	39.35
Foreman	0.0.15	41.37
Bridge	0.502	51.165
Flower	0.497	50.072
Person	0.554	49.352
Cloud	0.497	50.231
Credrit card	0.481	49.858
Address	0.594	50.454

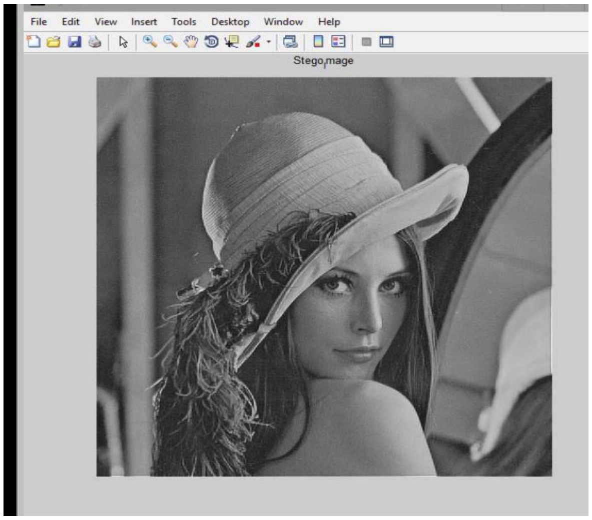
SampleVideo_1280x720_5mb.mp4

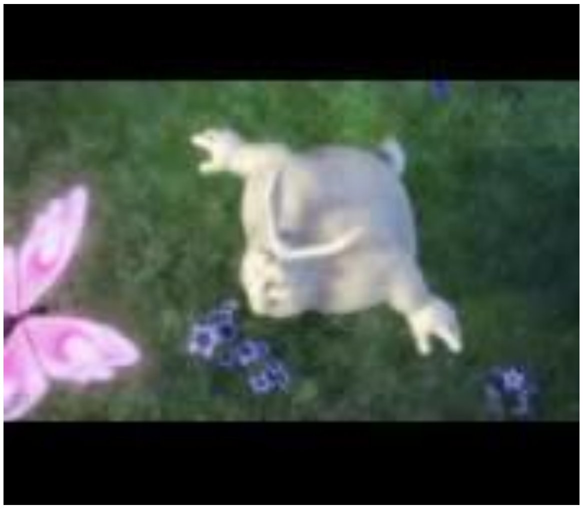
Fig .6.1 Video file

Credrit card

Coastguard

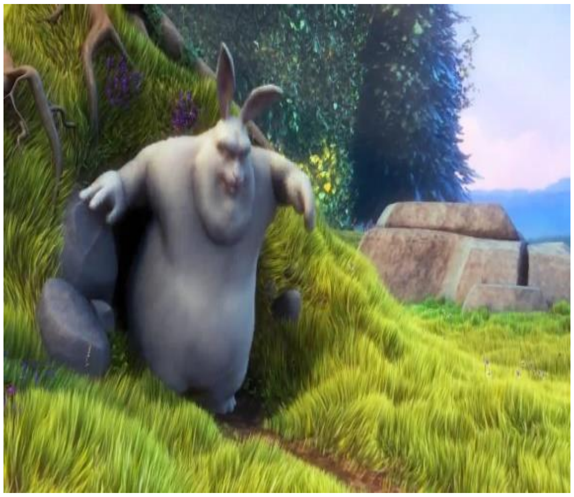
Flower Bridge



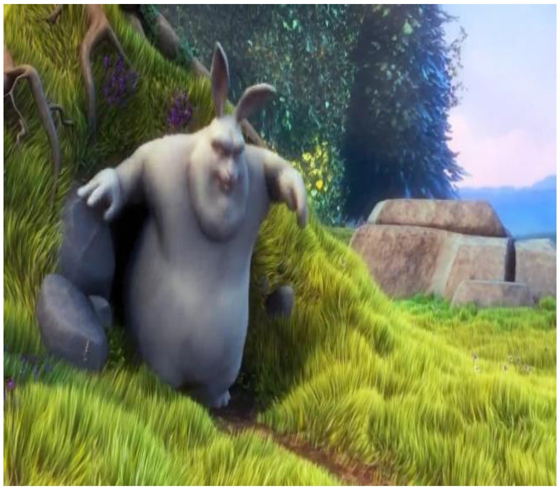


lena frame 200

Fig.6.2 Input frame or image Fig.6.3 Stego image



(a)



(b)

(c)

(d)

(e)

(f)

(g)

(h)

(i)

(j)

(k)

(l)

(m)

(n)

Table 6.2 Using .LSB (Least Significant Bit)

Video file	**SNR**	**MSE**	**PSNR**	**RMSE**	**STD**
SV.3gp(original frame)	10.96	72.16	29.58	8.49	72.16
Stego frame	10.76	63.64	30.14	7.94	63.64
SV1.web(original image)	10.07	63.34	30.12	7.97	63.65
Stego frame	10.56	63.44	30.05	7.65	63.44
SV2.mp4(original image)	11.86	65.03	30.03	8.06	65.03
Stego frame	11.87	65.06	30.04	8.08	65.06

6.2.2 Video steganography using DWT

At present DWT has been widely used in various fields of signal processing applications such as voice, image and video compression. DWT is used to change the frame from the spatial domain to the frequency domain, and the WC is modified into text and other information. This transformation of the WC wavelet coefficients to split high and low frequency data on a pixel basis [9]. The DWT method is pre-applied to the work of this program. It is a two-level DWT, a system of all wavelet transforms

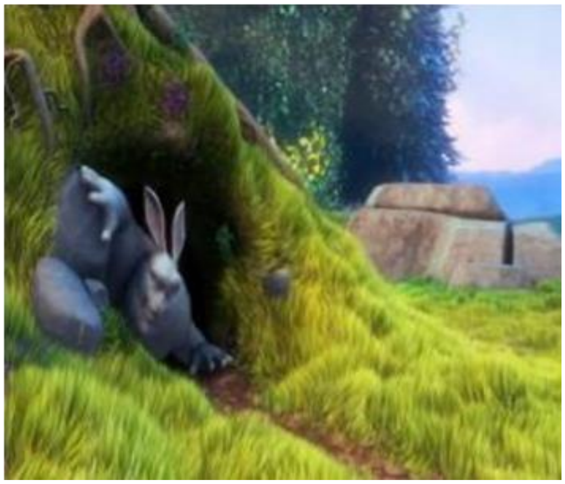


Fig6.4 Input video for dwt

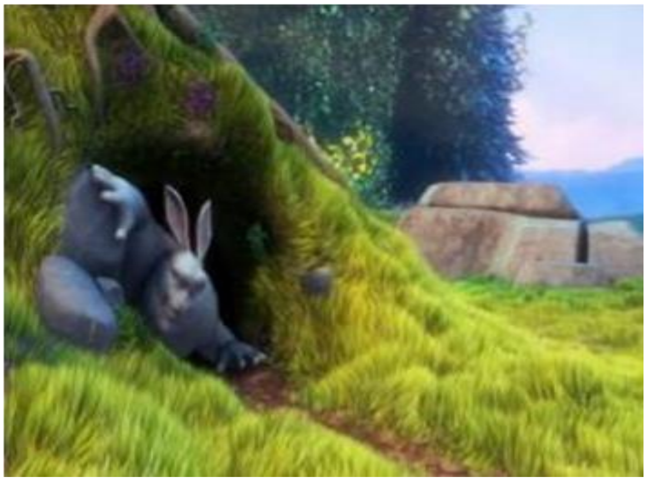


Fig 6.5 stego video

Table.6.3 Using DWT (DISCRETE WAVELET TRANSFORM)

DWT						
Video Format	**Stego Frame**	**SNR**	**MSE**	**STD**	**RMSE**	**PSNR**
Big_Buck_ Bunny_144p_ 2mb.3gp	Frame4.Png	13.01	58.21	30.42	8.02	57.21
	Frame12.Png	**12.01**	**63.96**	**30.10**	**7.99**	**63.97**
	Frmae10.Png	12.25	59.21	31.02	8.12	58.62
	Frame50.Png	13.4874	54.19	30.82	7.36	54.19
	Frame100.Png	13.97	51.03	30.80	7.14	51.40
	Frame150.Png	13.56	52.02	31.02	7.16	52.14
	Frame200.Png	12.85	53.25	31.25	7.77	53.26

Table 6.4 Video Steganography Using DWT

Video Format	Stego Frame	SNR	MSE	RMSE	STD	PSNR
Drop.AVI	Frame1.Png	11.23	56.23	31.25	8.1	61.23
	Frame5.Png	11.63	60.12	30.25	7.25	59.2
	Frame10.Png	12.36	59.25	31.25	8.12	60.23
	Frame10.Png	12.54	61.25	31.6	7.95	62.11
	Frame15png	**11.52**	**63.12**	**32.14**	**8.22**	**64.21**
	Frame20.Png	13.69	62.36	31.24	8.6	59.89
	Frame25.Png	13.78	60.15	30.15	7.8	60.25
Samplevideo_ 1280x720_ 2mb.MP4	Frame1.Png	13.21	58.21	30.12	8.25	59.21
	Frame5.Png	14.27	60.12	31.52	7.55	61.24
	Frame10.Png	12.96	59.25	31.25	7.96	60.02
	Frame20.Png	14.02	60.12	32.14	8.40	59.89
	Frame30png	13.26	57.12	32.04	7.45	59.01
	Frame40.Png	14.21	58.26	31.26	7.55	58.12
	Frame50.Png	**13.25**	**62.14**	**30.25**	**8.14**	**62.58**

6.2.3 Video steganography using DCT

DCT technology plays a crucial role in compression technology, and the image is divided into 8 × 8 squares. Each square is transformed by DCT, resulting in a multi-dimensional array of 63 coefficient outputs [5]. Now, the coefficients are rounded by the quantizer. The watermark is embedded in the mid-band of DCT blocks with low frequency components. It is inserted by adjusting the image's DCT coefficient and using the key.

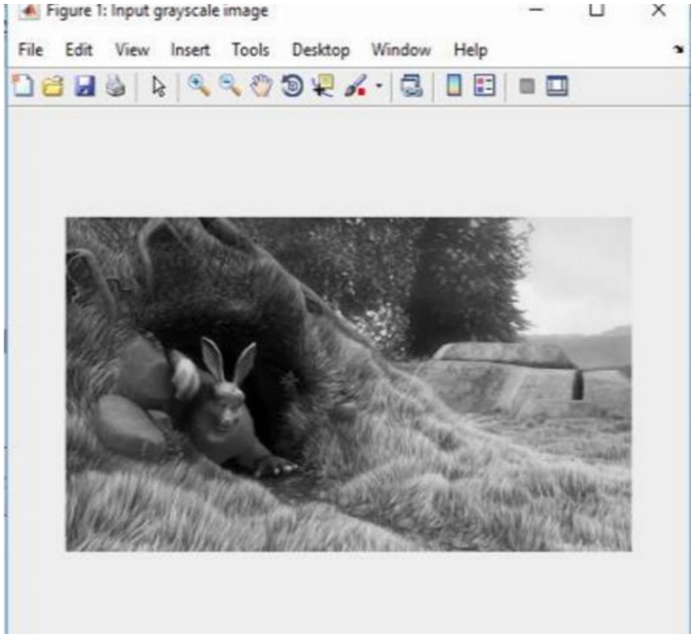


Fig.6.6 Input video

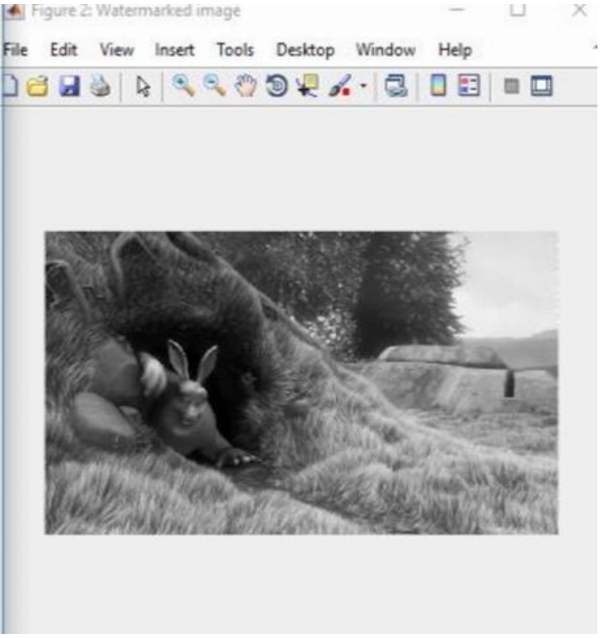


Fig.6.7 stego video

Table6.5 Using DCT Video Steganography

Video file	**SNR**	**MSE**	**PSNR**	**RMSE**	**STD**
SV.3gp(original frame)	10.96	72.16	29.58	8.49	72.16
Stego frame	10.45	62.57	29.10	8.54	62.67
SV1.web(original image)	10.07	62.34	30.12	7.97	63.65
Stego frame	9.46	61.84	28.17	8.02	61.98
SV2.mp4(original image)	11.86	65.03	30.03	8.06	65.03
Stego frame	10.89	64.11	29.11	8.15	64.17

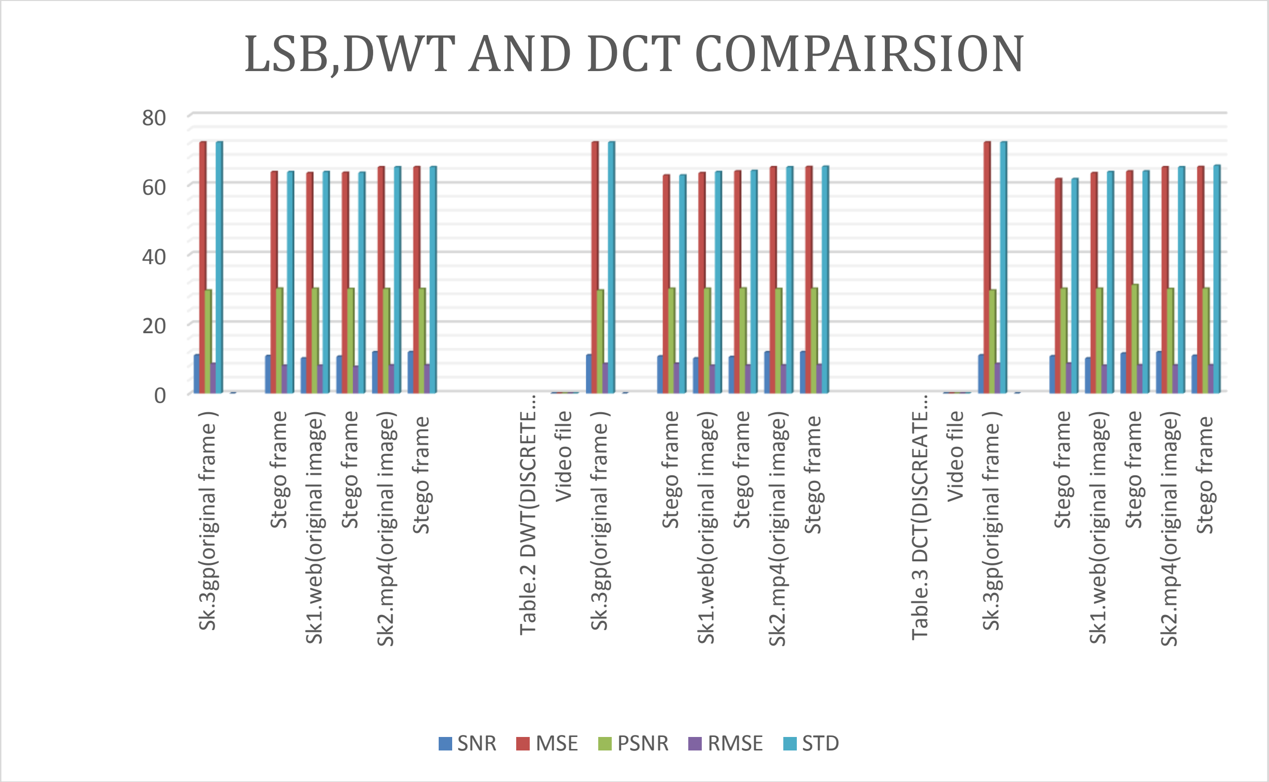


Fig.6.8 Graph between LSB,DCT and DWT

6.2.4 Video steganography using Integer Wavelet Transforms(IWT)

The main purpose of this algorithm is a joint technique based on integer wavelet transform. This means that simple normalized wavelet decomposition based on overlay video files and confidential information breaks down into a single unified result. These two files serve as cover videos and secret information to the IWT domain. A safer purpose is to use closet data on the IWT to increase the security of hidden data [25]

Table 6.6 Video Steganography Using IWT

Integer Wavelet						
Video Format	**Stego Frame**	**SNR**	**MSE**	**STD**	**RMSE**	**PSNR**
Big_Buck_Bunny_144p_2mb.3gp	Frame4.Png	12.83	58.17	30.51	7.62	58.24
	Frame11.Png	12.93	57.53	30.57	7.58	58.05
	Frame10.Png	13.52	7.23	30.56	7.65	58.12
	Frame50.Png	13.48	53.97	30.84	7.34	53.97
	Frame100.Png	14.00	51.03	31.08	7.14	71.23
	Frame150.Png	14.21	52.14	31.23	8.10	52.62
	Frame200.Png	**11.06**	**70.13**	**33.63**	**8.44**	**71.34**

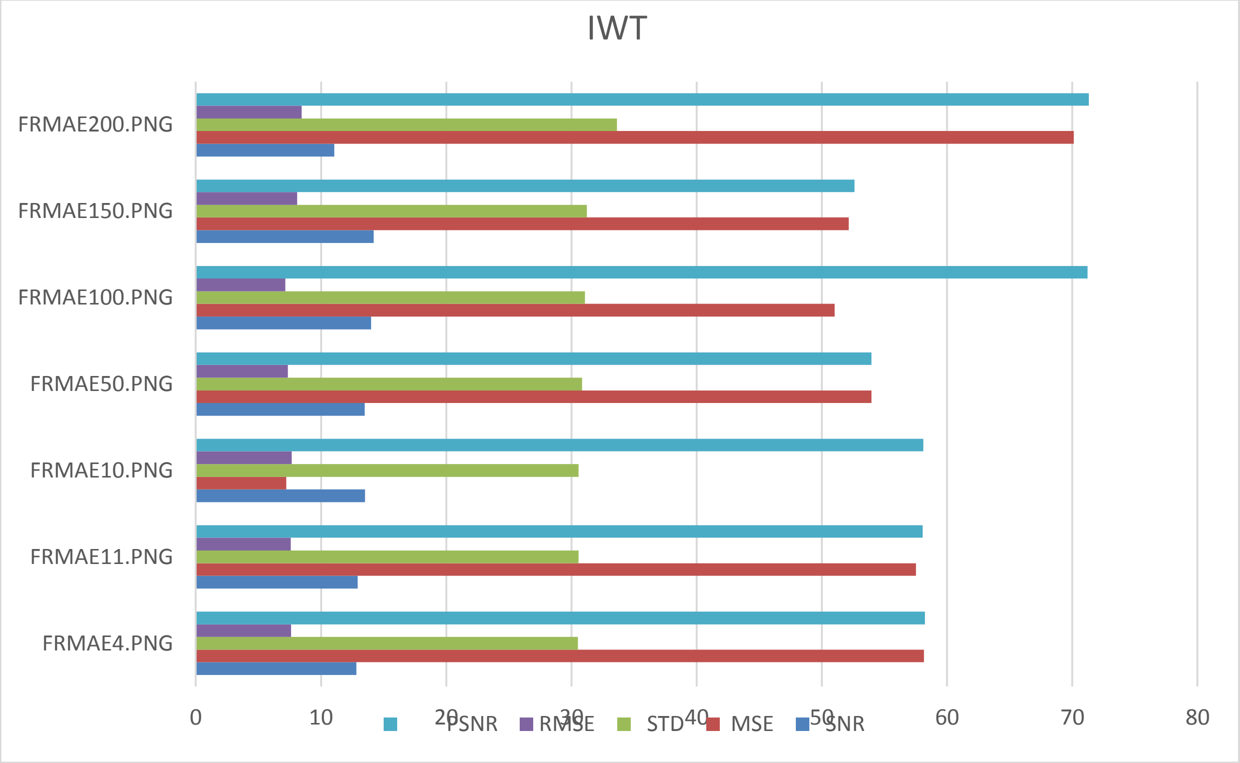
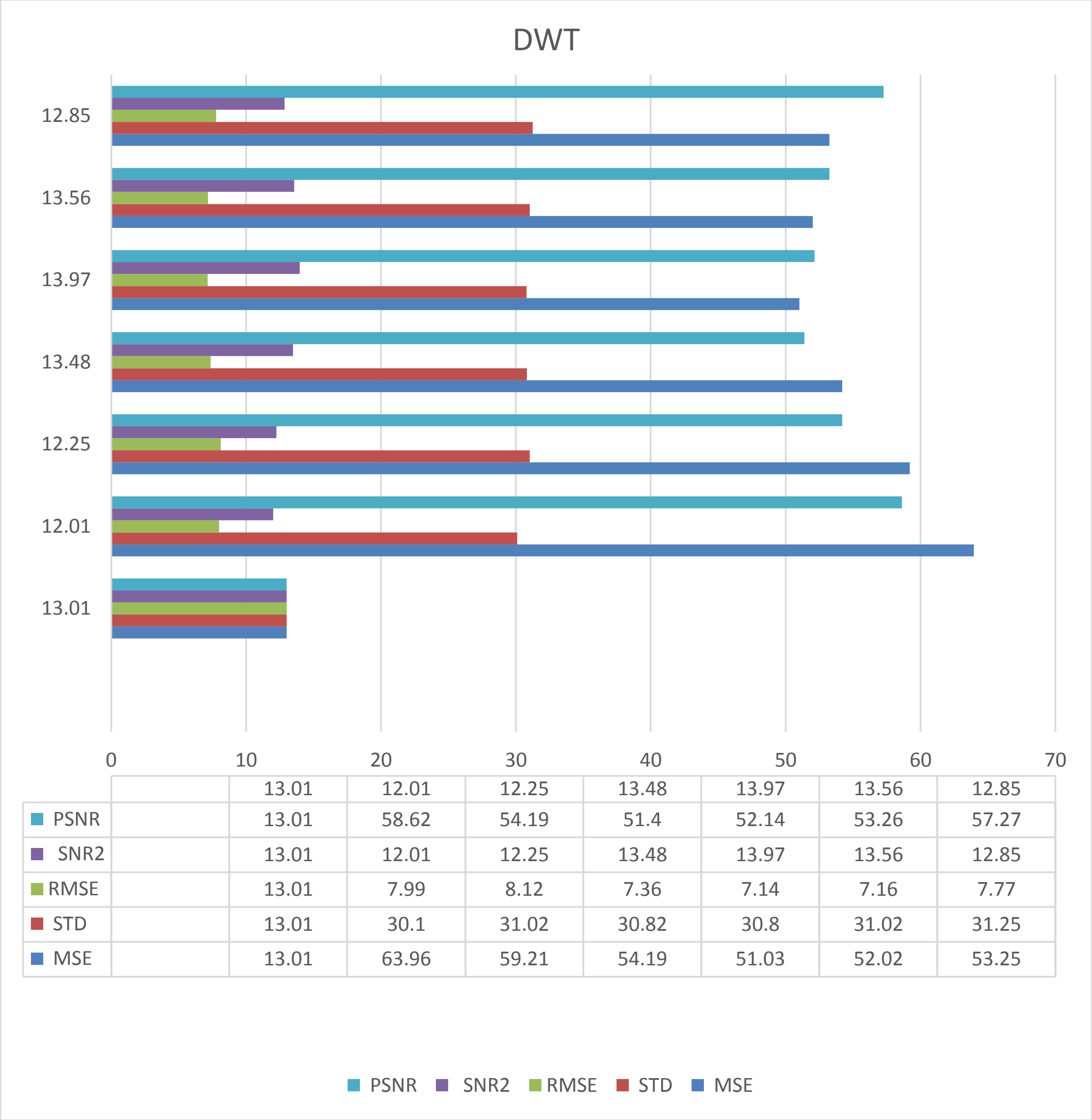


Fig.6.9 PSNR,SNR,MSE,RMSE, And STD of IWT

Table 6.7 Video Steganography Using IWT

Video Format	**Stego Frame**	**SNR**	**MSE**	**RMSE**	**STD**	**PSNR**
Drop.AVP	Frame1.Png	12.56	62.25	32.01	7.82	65.02
	Framae5.Png	12.25	64.25	32.01	7.96	68.21
	Frame10.Png	12.365	63.32	33.21	8.02	71.25
	Farme10.Png	11.25	61.23	33.25	8.36	70.25
	Frame15png	14.25	60.15	33.65	8.25	70.25
	Frame20.Png	14.2	64.12	33.96	7.95	71.58
	Frame25.Png	12.25	64.82	33.25	8.56	69.96
SampleVideo_ 1280x720_ 2mb.MP4	**Frame1.Png**	**14.24**	**63.25**	**32.25**	**8.22**	**72.15**
	Frame5.Png	**12.13**	**63.05**	**30.16**	**7.95**	**63.50**
	Farme10.Png	12.93	57.53	30.56	7.58	57.55
	Frame20.Png	13.12	58.26	31.02	7.57	58.36
	Frame30png	12.25	58.65	30.25	7.95	58.94
	Frame40.Png	13.24	59.15	30.15	7.91	59.25



		13.01	12.01	12.25	13.48	13.97	13.56	12.85
PSNR		13.01	58.62	54.19	51.4	52.14	53.26	57.27
SNR2		13.01	12.01	12.25	13.48	13.97	13.56	12.85
RMSE		13.01	7.99	8.12	7.36	7.14	7.16	7.77
STD		13.01	30.1	31.02	30.82	30.8	31.02	31.25
MSE		13.01	63.96	59.21	54.19	51.03	52.02	53.25

Fig.6.10 PSNR,SNR.MSE.RMSE and STD Using DWT

7

CONCLUSION & FUTURE SCOPE

7.1 CONCLUSION

That research high hiding information payload. the secret massage in each or every video frame is round **6.12** Mbytes and the hiding rate is **28.66** Agreeing embedding payload, the methods of this the quality of the stego videos frame is also high and the PSNR range between **50 – 80** dBs.

This research presents many methods of video steganography such as LSB,DCT and DWT. Its an attempt to calculates all the parameters of video steganography (SNR, PSNR.MSE, STD) and the best technique is DWT when compared to LSB and DCT . The Table no 6.1(LSB), 6.3.(DWT) and 6.5(DCT) contains the results of PSNR, MSE and SNR. The best result shows in table no.6.3(DWT) and video quality is high in case of DWT as compare LSB and DCT stego video. The PSNR ranged between 29.59 - 41.17 dBs by using DWT. All the results are simulated in MATLAB software 2017a.This research discusses the performance of the DWT technique in video steganography. This research compared the all results with LSB and DCT algorithm. The PSNR has improved and given high value of PSNR after applying DWT technique for video steganography and also highest PSNR value as compared to the DCT and LSB techniques.

Afterwards, the comparison between IWT(6.6&6.7) and DWT(6.3&6.4) ,take place, based on (PSNR,SNR,MSE,RMSE and STD) parameters. And the result shows that, IWT techniques gives better result among all .Because the value of PSNR is more and MSE is less in case of IWT based video steganography applied for every videos (mp4,3pg and web) used in this research.

7.2 FUTURE SCOPE

Increasingly the Internet and the World Wide Web data or exchange, video steganography has become an essential tool for information security. This study outlines the different video information hiding techniques whose classification and classification of steganography have been proposed in the literature over the past few years. In this dissertation, various video steganalysis methods, such as key exchange, Hash function, MSE, PSNR, MSE and STD, such as LSB, DCT, DWT and IWT Defied Hall are analyzed. However, the prior art has some limitations, such as embedded capacity, security, and video quality degradation.

Future we will try to improve video steganography, to improve the PSNR and decrease the Mean Square Error(MSE).and also increases capacity ,security and video quality .

REFERENCES

[1] M. Shirali Shahreza, "*An Improved Method for Steganography on Mobile Phone*", *ICS'05 Proc. of the 9th WSEAS International Conf. on Systems*, vol. 4, no. 7, 2005, pp. 955-957.

[2] Y. He, *et al.*, "A real-time dual watermvideo stream for Video-onDemand Journal of Electronics and Communica vol. 66, pp. 305-312, 2012.

[3] V. Sathya, K Balasubramaniyam, N Murali "*Data hiding in audio signal, video signal text and JPEG Images*" IEEICAESM 2012.Mrach 30-3 I 2012, pp74l -746.

[4] Hamsathavani. "*Image hiding in the video sequencebased on MSE*" International Journal of Electronics and Computer Science Engineering IJECSE, Volume1,Number 2013

[5] Blossom Kaur, Amandeep Kaur and Jasdeep Singh *"Steganographic Approach For Hiding Image In DCT Domai*n" International Journal Of Advances In Engineering & Technology, July 2011. 72 vol. 1,issue 3,pp.72-78

[6] Sumathi Poobal, G. Ravindran,"*The Performance of Fractal Image Compression on Different Imaging Modalities Using Objective Quality Measures*," International Journal of Engineering Science and Technology (IJEST), Vol. 2, Issue 1, Jan-Feb 2011, pp 239-246

[7] V. Sathya, K Balasubramaniyam, N Murali *"Data hiding in audio signal, video signal text and JPEG Images*" IEEICAESM 2012.Mrach 30-3 I 2012, pp74l -746.

[8] Lee, Y., Chen, L. "*High capacity image steganography model*", IEEE Proceedings on Vision, Image and Signal Processing 2000, 147, 3, 288-294.

[9] Y. He, *et al.*, "*A real-time dual watermvideo stream for Video-onDemand*" Journal of Electronics and Communica vol. 66, pp. 305-312, 2012.

[10] Po-Yueh Chen and Hung-Ju Lin, *"A DWT Based Approach for Image Steganography"*, International Journal of Applied Science and Engineering 2006. Vol 4, No. 3, pp 275-290.

[11] S. G. Mallat, "*A theory for multiresolution signal decomposition: the wavelet representation," IEEE transactions on pattern analysis and machine intelligence*, vol. 11, pp. 674-693, 1989.

[12] Yedla Dinesh and Addanki Purna Ramesh, *"Efficient Capacity Image Steganography by Using Wavelets"* ", *International Journal of Engineering Research and Applications* (IJERA), Vol. 2, Issue 1, Jan-Feb 2012, pp 251-259.

[13] Miss. Prajakta Deshmane, Prof. S.R. Jagtap,”*Skin Tone Steganography for Real Time Images”, International Journal of Engineering Research and Applications* (IJERA), Vol. 3, Issue 2, Mar-Apr 2013, pp 1246-1249.

[14] R. J. Mstafa and K. M. Elleithy, "*A New Video Steganography Algorithm Based on the Multiple Object Tracking and Hamming Codes*," in *2015 IEEE 14th International Conference on Machine Learning and Applications (ICMLA)*, 2015, pp. 335-340.

[15] C. Ma, J. B. Huang, X. Yang, and M. H. Yang, "Hierarchical Convolutional Features for Visual Tracking," in *2015 IEEE International Conference on Computer Vision (ICCV)*, 2015, pp. 3074-3082.

[16] Kekre, H. B., Archana Athawale, and Pallavi N. Halarnkar. "*Increased Capacity of Information Hiding in LSBs Method for Text and Image*."International Journal of Electrical, Computer and Systems Engineering 2.4 (2008): 246-249..

[17] Bloisi, D., Iocchi, L., *'Image based Steganography and Cryptography'*,International Conf. on Computer Vision Theory and Applications (VISAPP), 2007.

[18] Mandal, J. K., and A. Khamrui. "*A Data Embedding Technique for Gray “scale Image Using Genetic Algorithm (DEGGA)."* International Confrence on Electronic Systems (ICES-2011) (2011).

[19] Mona, M.C., S.B. Chitra, V. Gayathri, “*A survey on various encryption and decryption algorithms,”*Singapore Journal of Scientific Researech, Vol.6.No.6 2014, pp. 289-300

[20] S Manjuatha Reddy and K.B Raja. “*High Capacity and Secirity Steganography uing Integer Wavelet Transform*”, International journal of Computer Scince and Security, (IJCSS), Volume(3): Issue (6), 2010

[21] E. Kawaguchi and R. O. Eason, “*Principle and applications of BPCS-steganography*”, Proc. of SPIE, Vol. 3528, pp.464-473, 1998.

[22] Divya E., and Raj kumar P., “*Steganographic data hiding using modified APSO,”*International Journal of Intelligent systems and applications,2016, Vol.7, pp.37-45

[23] Po-Yueh Chen and Hung Ju Lin, “*A DWT based approach for image steganograph*y” International Journal of Applied Science and Engineering, 2006, Vol.4, Issue 3, pp.275-290.

[24] Tomonori Furuta, Hideki Noda, Michiharu Niimi, Eiji Kawaguchi “ *Bit-Plane Decomposition Steganography Using Wavelet*” Compressed Video”,Kyushu Institute of Technology, Dept. of Electrical, Electronic and Computer Engineering, 1-1 Sensui-cho, Tobata-ku, Kitakyushu, 804-8550 Japan

[25] Lakshmi narayanan K\,M.E (CSEE-mail:gpaucse@yahoo.com\, Prabakaran GAsst Professor Bhavani R ," *" A High Capacity Video Steganography Based on Integer Wavelet Transform" Journal of Computer Applications* ISSN: 0974 – 1925, Volume-5, Issue EICA2012-4, February 10, 2012]

[26] Wen-Chuan Wu and Shang-Chian Yang, "*Enhancing Image Security and Privacy in Cloud System*" Using Steganography 2017 IEEE International Conference on Consumer Electronics - Taiwan (ICCE-TW)

[27] Alok Ranjan Mansi Bhonsle. Asst. Prof., Department of Computer Engineering "*Advanced technics to Shared &Protect Cloud Data using Multilayer Steganography and Cryptography*" 2016 International Conference on Automatic Control and Dynamic Optimization Techniques (ICACDOT) International Institute of Information Technology (I²IT), Pune\, 978-1-5090-2080-5/16/$31.00 ©2016 IEEE

[28]] Dr. H. B. Kekre, Archana B. Patankar, Dipali Koshti, "*Performance comparison of Simple Orthogonal Transforms and Wavelet Transforms for Image Stegaography*", InternationalJournal of Computer Applications(0975-8887), Volume 44-No.6, April 2012.

[29] Niels. Provos, Peter. Honeyman, "*Hide and Seek: an introduction to steganography*," IEEE Security and Privacy, May-June 2003

[30] Namita T., Dr. Madhu S. and Dr. Meenu C., "*Spatial Domain Image Steganography based on Security and Randomization*", International Journal of Advanced Computer Science and Applications (IJACSA), ISSN: 2345 - 4854, VOL. 5, No. 1, 2014

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