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Literature review on stegnography techniques used in video

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Abstract

In recent days, security is a major concern in the media owing to Internet growth and multimedia material, for example audio, picture, video, etc. Security concerns should be taken into account for the transmission of secret pictures since hackers may exploit a poor communication network connection to obtain information they desire. Video Steganography is the technique by which hidden information is concealed in a video. The human eye cannot recognise the addition of this information to the video, since the change in a pixel colour is minimal.**52**

Keywords: Video steganography, transmission, development, multimedia, etc.

Introduction

Video Steganography is the art and the science of writing secret messages in harmless movies such that nobody knows the presence of a hidden message apart from the sender and destination. To implant the hidden message, Steganography utilises repeating sections of the Video files. Although many different steganography methods have been developed and used, a perfect solution has yet to be found.

Several novel methods for video steganography have been suggested. Some of the most famous methods have been covered in this article. Most methods have been used for steganography on pictures, video, text, audio. The steganogrpahic methods based on video are widely categorised in time and space. Data are converted into frequency components using FFT, DCT or DWT in the frequency domain and then data are embedded into one or more of the altered coefficients. Bit level or block level may be embedded. In addition, the data bits may be placed in intensity pixels of the video LSB locations in the spatial domain. The benefit of the approach is that the quantity of data (payload) that can be included into LSB methods is more important. An unauthorised individual should not readily identify a steganographic method. The current steganographic method is deemed defective if the secret message is discovered with a random devaluation. Steganography may suffer from susceptible assaults, similar to cryptography.

The following qualities should be a successful steganography technique:

a. **Secrecy:** Hidden information must not be extracted from the video without prior consent from the intended user using a password.
b. **Imperceptibility:** the capacity to fully undetect.
c. **Capacity:** maximum hidden message length that can be integrated into a video.
d. **Currency:** Precise and reliable extraction of hidden data from the medium. **8**

Existing video steganography techniques

Video steganography may be split into two main classes:

- Incorporating data into raw video that is compressed later on.
- The alternative, which is harder, attempts to integrate data directly into the compressed video stream.

Video Steganography's popular approach is the LSB substitution method. There are many LSB methods for video steganography, such as:

First, the data is encrypted by a key and then integrated into the LSB AVI video carrier and the encryption key is kept in a separate file named key file. A data hiding method is created to conceal information using polynomial equation in the particular frames of the movie and in the precise position of the frame using LSB substitution.

Hash-based, least significant video steganography (HLSB) method is a spatial domain technique that incorporates secret information into the cover frame LSB. Eight secret information bits are split into three, three, two and integrated into the RGB pixel values of the cover frames. To choose the location of the insertion in LSB bits a hash function is employed.

Selected Last Measuring Bit (SLSB) that enhances LSB concealing information efficiency in only one of the three colours at each pixel of the cover picture. The Sample Pairs analysis is used to choose the colour since the analysis is more efficient at detecting concealed data. Finally, use the LSB Match technique so that the final colour in the colour scale is as near as feasible to the original.

Data hiding in **compressed video motion vectors** based on their associated prediction Error relates with compressed video data hidden. In contrast to data that hide in pictures and crude videos that function in the spatial or transformed domain itself, which are susceptible to steganalysis. There is a novel technique for hiding data in MPEG-2 compressed video motion vectors. The outcomes are assessed by two metrics: distortion of the quality of the video reconstructed and increase of the data size of the compressed video.

Measure performance

Every method of Steganography is primarily defined by two characteristics, imperceptibility and capacity. Imperceptibility implies that the embedded data must not be sensitive (perceptual invisibility) to the observer and computer analysis (statistical invisibility).

In comparing the original picture or video with its stego equivalent, the perceived imperceptibility of the embedded data is given so that visual discrepancies may be identified when appropriate. Furthermore, the mean squared error (MSE), peak noise ratio signal (PSNR) and image fidelity (IF) are examined as an objective assessment between the frame of the stego and its matching cover.**5**

Review of literature

(Singh, 2015) studied "*A Review on the Various Recent Steganography Techniques*" And discovered that secret information security was a problem when huge amounts of data was transferred over the internet. Steganography with cryptography may provide a safe transmission of information. Steganography is a tool to hide visual information.**1**

(Vanmathi & Prabu, 2013) studied "*A Survey of State of the Art techniques of Steganography*" And Steganography has been discovered to be a science that includes the communication of hidden information in a suitable multimedia carrier, such as images, audio and video files. The primary aim of steganography is to guarantee that the information is fully disguised so as not to intruders or unauthorised parties, the message is available only to the intended recipient.**2**

(A. Saleh, 2018) studied "*Image Steganography: A Review*" And discovered that the internet provides tremendous ease in our contemporary day in transferring huge quantities of data in various areas of the globe. However, long-distance communication safety and security remains a problem. In order to address this issue, steganography methods have been developed.**3**

(Chhajed Krupali V Deshmukh Trupti S Kulkarni VPCOE & Vpcoe, 2011) studied "Review on Binary Image Steganography and Watermarking" And discovered that digital media is becoming widespread nowadays. Digital picture, digital audio or digital video may be used. Digital media applications including identification of ownership, copy control, annotation and authentication are many.**4**

(Banik & Bandyopadhyay, 2015) studied "*Review on Steganography in Digital Media*" Steganography was discovered to be a technology to conceal information that seeks to disguise the existence of secret communication and to prevent any third-party ignorance - thus ensuring data transmission, of the presence of the steganographic information exchange.**5**

(Choudry & Wanjari, 2015) studied "*A Survey Paper on Video Steganography*" And discovered SNow a few days, it's very hazardous to manage intruders on the Internet. Data is usually in text, audio, video and picture form. Steganography is one of the greatest ways of discreetly and securely sharing data. You may use the Steganographic method for audio, video and picture files.**6**

(Al-Harbi, Alahmadi, & Aljahdali, 2020) studied "*Security analysis of DNA based steganography techniques*" and discovered that cryptography and steganography are typically interlinked and share similar objectives and information preservation services in some of the most important areas of computer safety. Cryptography and steganography are techniques for the safe transmission of information**7**

(Shinde & Rehman, 2015) studied "*A Survey: Video Steganography techniques*" and discovered that Video Steganography is a way to hide data from a video clip, thus reducing the risk of unwanted user access. Various carrier file types, among which videos are quite popular on the internet, may be utilised in steganography. Video steganography provides far more opportunity to hide hidden data since the video contains a lot of redundant bits.**8**

(Danti & Manjula, 2016) studied "*An Innovative Approach for Video Steganography Using Statistical Features in Round-Lsb*" And nowadays, in view of assaults, misuse or non-approved access to data, record security through computerised media is of major importance. Steganography is the ability to hide communication inside a multimedia block. Video Steganography manages within a video to hide hidden info. In the suggested method, cover videos of different formats are used.**9**

(Stuti Goel, 2013) studied "*A Review of Comparison Techniques of Image Steganography*" And it was discovered that Steganography has been a significant field of study encompassing a lot of applications in recent years. It is the science of incorporating information into the cover picture (payload) without producing a statistically significant change to the cover image. The current, secure picture steganography poses a challenge in order not to detect the incoming information.**10**

(Arya & Soni, 2018) studied "*A Literature Review on Various Recent Steganography Techniques*" And discovered that communication is the fundamental requirement of every developing sector in current global trends. The development of contemporary communication technology requires specific security measures, particularly for data networks. Everyone desires the confidentiality and security of their communications.**11**

(Sajid Ansari, 2019) studied "*A Comparative Study of Recent Steganography Techniques for Multiple Image Formats*" And Steganography was discovered to be a method for the exchange of hidden secret information in order to escape suspicion. Steganography's objective is to transmit a secret message to another person by concealing the data in a cover object, such that the impostor monitoring the traffic does not differentiate between a real secret message and the cover object.**12**

(Mashi & Rohana, 2016) studied "*A Review on current Methods and application of Digital image Steganography*" and discovered that individuals now use the Internet mainly for sending and receiving data for days, since it is accurate, simpler and quicker than all other methods of data transmission. But the major shortcoming of this information-sharing method is its security. Various methods have been developed to address this issue.**13**

(Sheth & Tank, 2015) studied "*Image Steganography Techniques: A Review*" And in recent years Steganography has been proven to be a significant field of study. Steganography typically deals with the methods in which the presence of the transmitted data is kept secret. Steganography has been used to conceal data on various media coverage such as picture file, audio file, video file and text. In the image steganography, secrecy is obtained by incorporating data into the picture and creating a stego-image.**14**

(Dave & Somani, 2016) studied "*A Survey on Digital Video Steganography Techniques Used for Secure Transmission of Data*" And it is discovered that the need for Internet apps in our daily lives is more variable to different types of security threats. For the protection of the system, two major areas of steganography and cryptography are extensively utilised. Data confidentiality and data integrity are

protected throughout the transfer of data. Steganography is a technique where essential data (message) are hidden inside other carrier (cover) data to safeguard the message from unwanted usage.**15**

(A. Sharma, Kumar, & Mansotra, 2016) studied "*A Survey Paper on Steganography Techniques*" and observed that And Steganography has discovered that it will become more important because to the exponential development and secret communication via the Internet of prospective computer users. It may also be described as the study of unseen communication, which typically addresses methods of disguising the presence of the message conveyed.**16**

(Yunus, Rahman, & Ibrahim, 2013) studied "*Steganography: A Review of Information Security Research and Development in Muslim World*" And discovered that the Internet played a crucial role in communication and information exchange in today's information technology age. As information technology and communication and the Internet developed quickly, data security and information security was enhanced.**17**

(R.Poornima, 2013) studied "*An Overview Of Digital Image Steganography*" And that has been found The fast growth of the internet in the past two decades demands private data that must be secured from unwanted users. This is done by concealing the data. It is a way of concealing secret communications from an unintentional observer so that he is not aware of the concealed information. This is done via steganography.**18**

(Bandyopadhyay, Bhattacharyya, Ganguly, Mukherjee, & Das, n.d.) studied "*A Tutorial Review on Steganography*" and found that And the desire to transmit a message as safely and securely as feasible has always been the subject of debate. Information is every organization's treasure. This gives a company dealing with sensitive data high attention to security concerns. Whatever technique we select for safety, the primary issue is the level of safety.**19**

(S. Sharma & Kumar, 2015) studied "*Review of Transform Domain Techniques for Image Steganography*" And now a day's computer usage is rising every day. Computers assist to transform analogue data into digital data before it is stored and/or processed. In the meanwhile, the Internet is developing and becoming an essential means of digital communication. Although it was a completely open medium, the internet not only caught comfort but also minimal risks.**20**

(Kaur & Behal, 2014) studied "*A Survey on various types of Steganography and Analysis of Hiding Techniques*" Digital Steganography was discovered to be a science involving the communication of secret data in a relevant multimedia carrier, i.e. picture, audio and video files. If the feature is visible, then the assault is obvious, so that the aim here is to hide the presence of the embedded data.**21**

(Liu, Liu, Wang, Zhao, & Liu, 2019) studied" *Video Steganography: A Review*" And Video Steganography became a promising technique in the development of a variety of technology in the field of data concealing, which not only increased the safety need of secret messaging, but also preferred video. In this article, video steganography is classified into three types according to the embedding location of the hidden message: intra-embedding, **22**

(Seo, Manoharan, & Mahanti, 2016) studied "*A Discussion and Review of Network Steganography*" and discovered that the Network Steganography or Covert Channel enables hidden communication in the expectation that no adversary can identify such communication. It seems to be an advantageous instrument that may bring everyone the next degree of communication secrecy. There is a lot of study into the forming and use of covered channels, but also a lot of effort into how an opponent may collect information about the existence of the channels and the contents they transport.**23**

(Sahu, Sahu, & Pradesh, 2016) studied "*Digital Image Steganography Techniques in Spatial Domain: A Study*" and found that and it has been shown that secure digital data transmission is always an issue. In safe digital data transmission, cryptography and Steganography are important areas. It is extremely difficult to comprehend that the picture performs the job of a message by viewing an innocent image. If a picture contains information without the awareness of an external person, it is termed steganography.**24**

(Djebbar, Ayad, Hamam, & Abed-Meraim, 2011) studied "*A view on latest audio steganography techniques*" It was discovered that Steganography was suggested to enforce data security as a new alternative method. Recently, new and flexible techniques for steganographic audio were suggested. A great audio technology Steganographic is designed to include and extract data in an undetectable, resilient and secure manner.**25**

(Nasreen, Jalewal, & Sutradhar, 2015) studied "*A Study on Video Steganographic Techniques*" And the assumption that a secure video steganography system may be measured is to presume that the opposing party understands the method used but is still unable to discover proof of the concealed message. Video steganography algorithm seeks to substitute secret media bits for the superfluous bits of the cover medium.**26**

(Arora, Bansal, & Dagar, 2018) studied "*Comparative study of image steganography techniques*" And that has been found In the current situation, communication is the world's most fundamental need for an invidual. Individually, the data they send across the network desire confidentiality. Two methods are commonly used to exchange information in a secure and effective way. Cryptography and steganography are these methods. To make the text legible, cryptography is employed. **27**

(J. Surana, Sonsale, Joshi, Sharma, & Choudhary, 2017) studied "*Steganography Techniques*" and found that And that has been found Communication in the world nowadays is the fundamental need of any developing sector. Everyone wants their data to be secret and secure. We utilise numerous safe paths such as the internet or the telephone to transmit and share information ions in our everyday lives, but at some level it is not secure. Two methods may be used to exchange information in a disguised way. Cryptography and steganography are these methods.**28**

(Kamble, Waghamode, Gaikwad, & Hogade, 2013) studied "*Steganography Techniques: A Review*" And Steganography discovered that it is helpful to hide data from the carrier file like picture, music, video, etc. and that the transmission of data safely from sender to recipient. Another method used to

safeguard information is cryptography. The combination of encryption and steganography techniques allows the user to send information that is disguised in a single view in the file. This will make the transmission of data more secure.**29**

(Saini, Joshi, & Allawadhi, 2017) studied "*A Review of Video Steganography Techniques*" and found that And Steganography discovered that information hiding in a cover medium is a process. The sheer presence of the message is hidden from steganographic methods. The name Steganography is comprised of two Greek terms 'stegno means' covered and 'writing,' meaning hidden writing. In concealing information, however, text or secret messages are hidden in another media file such as images, texts, sounds or video.**30**

(Khare & Raghuwanshi, 2014) studied "*A Review of Video Steganography Methods*"And the Internet was the means for transferring information at extremely fast speed from one location to another. But transferring information via the internet is not truly secure. Steganography is used to maintain privacy and to prevent an unauthorised person from receiving secret information.**31**

(H. Sharma, Kumar Sharma, & Chauhan, 2015) studied "Steganography Techniques Using Cryptography-A Review Paper" and found that And discovered that encryption and steganography are two key safety methods. Both techniques for information security are well recognised and extensively utilised. One of the reasons why attackers succeed in intrusion is because they have the chance to read and understand the majority of the system's information.**32**

(Chugh, 2013) studied "*Image Steganography Techniques: A Review Article*" and found that And it has been discovered that users have to transmit, exchange or receive sensitive information most of the time on the Internet. As computer technologies and the internet evolve rapidly, information security is considered one of the most essential aspects in information and communication technology.**33**

(Sidqi & Al-Ani, 2019) studied "*Image Steganography: Review Study*" And Steganography has been discovered to be the science and art of clandestine communication. It enables the covert transfer of information and disguises the presence of a message on material such as video, audio or picture for the purposes of protecting information sent from intruders and undesired beneficiaries.**34**

(Kadhim, Premaratne, Vial, & Halloran, 2019) studied "*Comprehensive Survey of Image Steganography: Techniques, Evaluations, and Trends in Future Research*" and discovered that it has become an integral part of our everyday lives to store secret and/or private information, whether for work or personal well-being. Therefore, numerous researchers have gained full attention in the safe storage and transfer of secret information.**35**

(Johri, Kumar, & Amba, 2015) studied "*Review Paper On Text And Audio Steganography Using GA*"And Steganography discovered that the secret information was utilised in the cover media to conceal the presence of the message in a manner that could not be seen. Here, we treat audio files as secret media and text messages. The hidden information is encoded in a cover medium, such that sound

cannot be detected by the HAS less than 20Hz or more than 20000Hz. LSB algorithm is often used to insert secret information into a cover medium.**36**

(Luo, Wang, Wang, & Liu, 2008) studied "*A review on blind detection for image steganography*" and found that Blind steganalysis methods revealed that when the steganography embedded algorithm is unknown, hidden messages are included in digital material. This article provides an investigation of blind digital picture steganalysis techniques. First, a fundamental framework is presented for image blind steganalysis including four parts: picture pretreatment, extraction of features, classification and design selection, and classification.**37**

(Hashim, Rahim, Johi, Taha, & Hamad, 2018) studied "*Performance evaluation measurement of image steganography techniques with analysis of LSB based on variation image formats*" And he discovered that Steganography is an essential branch of hiding information where secret material is concealed in carrier files as a picture to hide its existence in a carrier without any distortion. Steganography mechanisms have six kinds, fundamentally: Ste-ganography picture, audio steganography, steganography video, ste-ganography text, steganography of the DNA and protocol steganography.**38**

(Mohammed, 2018) studied "*Review paper on biometric data protection using Steganography techniques*" and discovered that it is a trending innovation to recognise people via biometric characteristics. In the past, because to its safety significance, more emphasis has been paid to biometric identification. Fingerprint is regarded as a feasible technique from the present biometric recognition. Methods such as steganography and watermarking are used to improve the safety of biometric information.**39**

(Bhattacherjee, Ganguly, & Chatterjee, 2019) Studied "*A review of Steganography techniques suitable for ECG signal*" They discovered that ECG gives P wave, QRS complex and T wave graph data. In the meanwhile, it becomes a problem to ensure privacy and transmit information through a secure route. Numerous methods in the area of security systems have been suggested under information encryption and information concealing to address the information security issues. **40**

(Sagar & Vinit, 2014) Studied "*Review on Steganography for Hiding Data"* And it noted that, since the emergence of the internet, information security has been one of the most essential aspects of information technology and communication. Cryptography was suggested as a communication secrecy strategy, and many various techniques for encrypting and decrypting data have been created to maintain information confidentiality. **41**

(Din, Mahmuddin, & Qasim, 2019) Studied "*Review on Steganography Methods in Multi-Media Domain*" And that has been found In principle, steganography's historical significance originates from the Greek terms steganos (secret) and graphics (written), while the former is linguistically comprehended while the latter practically is an art. However, combining both terms implies it is a method to hide and safeguard secret knowledge from parties who are likely to pursue material, destructive or political objectives. **42**

(Advancements, Gupta, Gupta, Sharma, & Gandotra, 2018) Studied "*Review on Various Techniques of Video Steganography*" And it noted that the data is a precious asset and should be safeguarded from intruders and hackers by any person or business. Global economic distribution has led to quick development in the internet where customers may transmit large volumes of data and receive them. **43**

(Yadav, 2011) Studied "*Information Security Using Blend of Steganography and Cryptography*" And it was discovered that those looking for the utmost in secret communication may combine encoding with steganography. Encrypted data is more difficult to distinguish from natural occurrences than plain text in the medium of the carrier. There are many techniques to encrypt data before concealing it in the media selected. **44**

(Sadek, Khalifa, & Mostafa, 2015) Studied "*Video steganography: a comprehensive review*" And noted that the digital information revolution has brought new difficulties to deliver a safe and secure communication. Whatever technique we pick, its degree of security is the most essential issue. A number of methods to information security issues such as cryptography and steganography have been explored. **45**

(Madlool, Faris, & Hussein, 2019) Studied "*A Review of Various Steganography Techniques in Cloud Computing*" In the past several years, cloud computing has become a trend in IT because it offers substantial cost savings and new business opportunities for both consumers and suppliers. "Cloud computing is a paradigm to offer easy on-demand network access to a shared pool of customizable computing resources that may be quickly provided and released with little administration effort or the involvement of service providers." **46**

(M. J. Surana, 2019) Studied "*Steganography Techniques*" And noticed that communication is the fundamental need of any developing region in today's globe. Everyone wants their communications information to be secret and secure. In our everyday lives, we utilise numerous safe paths for transmitting and share information, such the internet or the telephone, however at a certain level it is not safe. **47**

(Gupta, Kalal, & Waghmare, 2017) Studied "*A Survey of Video Steganography Techniques*" And that has been found Now for many days, the number of unauthorised assaults, security breaches and unwanted access is increasing. It is thus very essential that our data or data be protected or secured from hackers or unauthorised access. While the communication has been encrypted in cryptography, it may be readily deciphered and destroyed when communicating with other parties. **48**

(Taha, Mohd Rahim, Lafta, Hashim, & Alzuabidi, 2019) Studied "*Combination of Steganography and Cryptography: A short Survey*" and noticed that True, the advent and subsequent development of the Internet facilitated digital communication, but with an extra cost and this is the problem of information security over open networks. It is not certain to send and receive information through email or using online browsers since sensitive information, such as credit card information, may be intercepted. **49**

(Ge, Zi, Wang, Zhang, & Jo, 2016) Studied "*Multi-User Massive MIMO Communication Systems Based on Irregular Antenna Arrays*" It discovered that antenna array deployment areas typically have uneven surfaces in real mobile communication engineering applications. Massive communication systems with multi-input multi-output (MIMO) typically transmit wireless signals through antenna irregular arrays. **50**

(Dipalee Borse, 2015) Studied "*Review and Analysis of Multifarious Spatial Domain Steganography Techniques*" And noticed that the usage of the internet as media rapidly increases day by day. Information concealing methods may be used to prevent malicious alteration, use or erasure of confidential data. Information security is a safe procedure that protects accessibility, integrity and confidentiality of information. There are many methods for concealing data such as steganography, encryption and watermarking. **51**

(Samir & Bandyopadhyay, 2018) Studied "*Various Methods of Video Steganography*" And discovered Steganography to be the art and science of inserting concealed data in such a manner that no one recognises the presence of the message into the cover file, aside from the sender and intended receiver. Steganographing works by replacing pieces of unneeded or underused data with bits of various unseen information in normal computer files. **52**

(Verma, 2011) Studied "*Review of Steganography Techniques*" and noticed that The term steganography refers to "writing covered or concealed" The purpose of steganography is to deliver a message to a harmless carrier. Computer-based stenography allows for modifications to so-called digital carriers like as pictures or sounds. The modifications reflect the concealed message, but they do not change the carrier successfully. **53**

Conclusion

There are numerous Steganogarphy video methods. But the Neural Network technique (NN) is quickly developing since computer progress is based on AI. Steganography is the art and science of inserting concealed information such that nobody can identify the presence of the message into the cover-file apart from the sender and the intended receiver. Steganography functions by substituting unneeded or underused pieces of data with bits of other unseen information into normal computer files. The concealed information may be simple text, text, audio or even pictures. Secret messages are encoded in digital audio in a computerised Steganography system. The secret message is encoded in the binary sound sequence. Audio Existing The Steganography programme can integrate messages into audio files like WAV, AU and even MP3. Incorporating hidden messages into digital sound is generally more difficult than incorporating secrets into other medias, such as digital pictures, since human air is extremely sensitive to noise. These approaches vary from basic algorithms that use signal noise in order to insert information into more powerful methods that use complex signal processing techniques to conceal the message. **52**

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