Implementation of an Approach Towards sharing of Secret Digital Image in Cloud Environment by Using Meaningful Secret Sharing Technique

Miss. Avanti M. Ganorkar[1], Prof. Vijay B. Gadicha[2]
Department of Computer Science & Engineering
P. R. Pote (Patil) Welfare & Education Trust's college of Engineering & Management, Amravati
Amravati, India

Abstract- *Cloud computing offers enormous benefits of shared resources to its users, especially for image space to store up personal digital images / photos. Existing system uses the method to secure the image by overlapping the cover images and save at the cloud, which enhance image security and privacy over cloud computing environment.*

The proposed system uses the secret sharing method for image by adding the checksum value to the encrypted image by using mobile mac address and store at the cloud as well as on image. When user want that image and try to decrypt the image, firstly user need to calculate checksum value by the same mac address if the stored checksum value and calculated checksum value is same and valid then only the secret image decrypted at the receiver side. It enables to add security parameter and only valid user can decrypt the image. It will also enable the information to check for image manipulation after the encryption.

Keywords- cloud computing, image privacy, secret sharing, visual quality.

I. INTRODUCTION

Due to the rapid advance of computer networking and digital technology, transmitting digital multi-media data, such as digital images, over the Internet is convenient and popular. However, some digital images, such as military and commercial images, are confidential and must be protected from being illegally accessed. Another issue is that these important, confidential images may be destroyed intentionally or be lost accidentally if they are held by only one person. These concerns have led to an interest in secret image sharing . Such sharing is made feasible by the use of the basic secret sharing scheme that protects and distributes a secret content, such as the cryptographic key, among a group of participants [4].

Steganography is the method of concealing a file, message, image, or video within another file, message, image, or video. The container (cover file) may be a digital image, audio file, or video file. Generally, the hidden messages appear to be (or be part of) something else: images, articles, shopping lists, or some other cover text. Whereas cryptography is the practice of protecting the contents of a message alone, steganography is concerned with concealing the fact that a secret message is being sent as well as concealing the contents of the message. Cloud computing offers enormous benefits of shared resources to its users, especially for image space to store up personal digital images. But, it also faces with some problems about security and privacy concerns. In order to enhance image security and privacy over cloud computing environment. For this reason, secret sharing technique is used camouflage the existence of confidential images.

In modern world, data security has become an important issue in many disciplines such as digital copyrights, online transactions and military communication. Steganography is concealing the secret message so that the very existence of it is not detectable. Steganography is different from watermarking that the aim is to protect the digitalized attributes of multimedia content while the aim in steganography is to send a secret message via the coverage of career signal. One dedicated career for this secure connection can be an image. After embedding process, a final image is obtained which is known as stego-image. In order to extract the secret embedded data, a secret key must be known [11]. The main purpose in steganography is to use the most capacity of the cover media in a way that its statistical properties have the minimum changes. In other words there should be a balance between these two terms and they can be used as evaluation factors of a steganographic technique. On the contrary, the steganalysis task is to detect the existence of hidden data. Steganalysis tries to identify the weaknesses of a steganographic method. Therefore, in order to counter it one has to improve the security. Without the correct key, illegal attackers cannot acquire the original data. However, encryption and decryption procedures are time-consuming processes, and they are thus not suitable for high-volume multimedia data, digital images, and videos [4].

II. LITERATURE SURVEY

Cloud computing is one of the popular methods for the users to host and deliver services over the Internet by dynamically providing computing resources. Cloud computing eliminates the overhead of planning ahead for acquiring different resources. The National Institute of Standards and Technology (NIST)[1] defines cloud computing as "a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction". The key characteristics of cloud computing are [7]:

- On-demand self-service: The users have access and the power to change cloud services online. User can add, delete, or change storage networks and software as needed.
- Broad network access: User can access cloud services using their Smartphone, tablets, laptops, or desktop computers. These devices can be used, wherever they are connected with online access point.
- Resource pooling: The cloud computing enables users to enter and use data within the software, hosted in the cloud at any time, and from any location.
- Elasticity: The cloud computing is flexible and scalable according to the user's needs. User can easily add or remove other users, resources or software features.
- Measured service: Cloud provider can measure storage levels, processing, the number of user accounts and the user are billed accordingly.
- Pricing: Cloud computing cost is based on amount of resources used by the user. Cloud computing is transparent to capture for accurate billing information.
- Quality of service: Cloud computing guarantees, best performance, adequate resources and on round-the clock availability service for the users [11].

Steganography refers to the method of writing hidden messages in a manner that no one other person but sender and receiver would be able to securely understand and communicate the information hidden in the means of communications (e.g., images)[10]. The steganography is a channel of communication through which secret data can be transmitted in total secrecy to avoid misuse of data steganography covers secret data into some kind of medium like images, audio or video and transmits them in total secrecy from sender to receiver to avoid suspicious attacks. To provide the mean of trust management between data parties over the cloud computing environment. The two methods achieve the required goal through providing three levels of authentication, from data owner to the destinations, from the data owner to the cloud service provider and finally from the destination to data owner. For the first approach, the idea of the spatial watermarking techniques is used. While in the second approach, a hybrid model based on the idea of the spatial and the transform techniques are used [9].

F. Eljamal and N. Hikal describes the watermarking technique in 2013 to provide the mean of trust management between data parties over the cloud computing environment [1].

Saravankumar and Arun introduced ASCII-BCD based steganography technique in 2014 which provides an interoperable security services over the cloud [6].

H. Reza, and M. Sonawane describe Steganography technique in 2016 which provides an additional layer of security, namely, confidentiality of data [2].

Al-Khanjari and Alani introduced Cryptography and steganography in 2017 cryptography algorithm LEOPARD required less execution time as compared to AES algorithm [10].

III. SYSTEM DESIGN

Modularized Description

The different modules of the proposed system is given below:

1) Secret Image System Login :

User Login:

This module allows user to login to the system. This contains username and password with the simple database entries for the secret image system. The separate login is allocated to the different users.

Admin Login:

This module provide authentication to the various user. Every time when user Login to the system the user first ask authentication after that ,user will able to upload or download the file.

2. Hide Secret image in Cover Image :

This module firstly select the secret image, then this RGB image firstly transformed into YCbCr color image. Then

several cover images are used to create n shares. Each share carries with a portion of the secret image.

After performing chroma subsampling secret image is hidden into the cover image. During the recovery, Here utilizes t shares in order to reconstruct that secret image. However, it will not reveal the secret color image when holding t− 1 or less shares.

3. Calculate Checksum :

Encrypted image updated by the client added checksum value before uploading to the cloud. While accessing or fetching the image from the client side first checksum value calculated with the CRC 32. This checksum value generated by using the client user id if image modified by any other user the checksum value change and identified by the authorized user.

IV. PROPOSED WORK

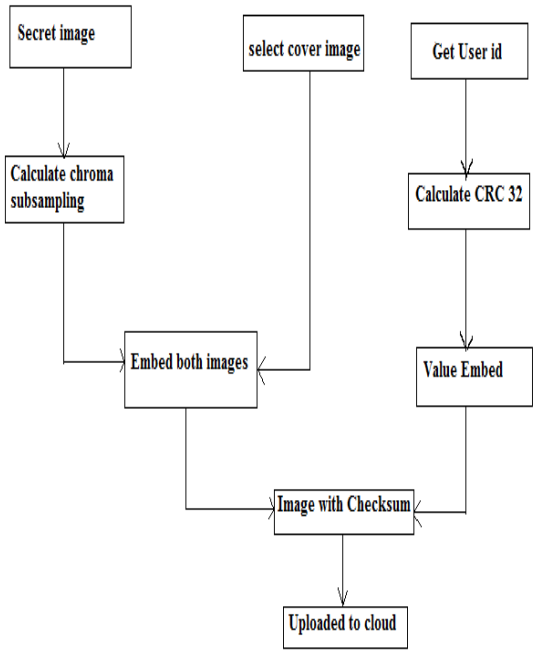

Fig4.1 Process of Uploading the image on cloud.

From above figure 4.1 here the process of uploading the image on cloud takes place .First the secret image is selected and a secret RGB color image is first transformed into YCbCr color space in which chrominance components are condensed for saving storage capacity. Then, several cover images are used to create n shares. Encrypted image updated by the client added checksum value before uploading to the cloud.

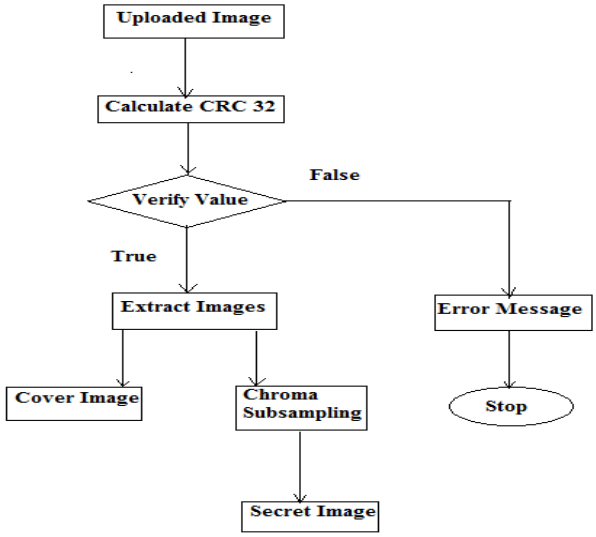

Fig 4.2 Process of downloading the image from the cloud.

From above figure 4.2 while accessing or fetching the image from the client side first checksum value calculated with the CRC 32. This checksum value generated by using the client user id if image modified by any other user the checksum value change and identified by the authorized user

- **Stepwise Workflow of the proposed system:**

Step 1: Input a Secret Image.

Step 2: Calculate Chroma Subsampling of the Secret Digital Data.

Step 3: take Cover image as a container which is used for hiding the digital databy using data hiding algorithm.

Step 4: Embed both the images such as secret image is hidden into the cover image, which makes stego-image.

Step 5: Calculate the checksum value of the secret image before uploading to the network.

Step 6: Repeat the same procedure while downloading the image from the network.

Step 7: while recovering the digital secret image**,** using the same checksum value the secret image get separated from the cover image.

Step 8: If the checksum value matches then and only then the image get separated from the cover image.

Step 9: If error is found there image can not be separated, If matches get the original image.

V. RESULT ANALYSIS

In secret sharing technique of digital image, quality of an image can be subjective. It can be different for person to person, so because of this reason it is compulsory to establish some parameters to get the quality of an image. Following are the matrix used to inquire the quality of images:

A. Peak signal-to noise ratio (PSNR):

Peak-signal-to-noise-ratio (PSNR) is used to evaluate the quality of the reconstructed image. PSNR is measured in decibels (dB) and is given by:

PSNR = 10 log 10 (R2 / MSE)

Where R = 255 for an 8-bit /class 8 image and R = 1 for a double-precision image. The higher the PSNR value, the better the reconstructed image.

B. Mean square error (MSE):

It is the cumulative squared error between the compressed and the original image.

$MSE = (1 / mn) \sum^{m-1}_{0} \sum^{n-1}_{0} II\ f\ (i , j) -\ g(I, j)\ II^2$

Where f= matrix data of original image,
g = matrix data of degraded image,
m = no of rows of pixels of an image,
i = index of that row,
n = no of columns of pixels of an image,
j = index of that column.
So, quality of image will be better when value of PSNR is higher and value of MSE is minimum.

As the system is performing Image enhancement that are extracted from low quality degraded video, it is necessary to take PSNR and MSE values. Here, result obtained by different existing techniques that is performing image enhancement and the proposed methods are taken. The results for five different images for all the techniques along with proposed method is taken respectively and the analysis result is shown in tables and graphs below.

C) Entropy calculation:

Entropy is used to measure the randomness of image. It is defined by the following equation:

Entropy= − Pi li=1 log2(Pi)
Where **,** Pi is the probability of getting a particular intensity l is the total intensity values.

- **Comparative Analysis**

Parameters	Lena	Autumn	Neptune
MSE	0.0839691	0.0385403	0.0831168
PSNR	58.8896	62.2717	58.9339
Entropy	7.44642	7.65937	7.52104

Table 4.1: Comparison of different Parameter of Existing work

Here the comparative analysis of Proposed model with the existing methods is performed along with the facilities by proposed model that overcomes some of the limitation of existing solutions available are given in the below table.

Parameters	Lena	Autumn	Neptune
MSE	0.0212	0.0231	0.0204
PSNR	66.01	64.81	65.09
Entropy	7.4404	7.6014	7.6409

Table 4.1: Comparison of different Parameter of Proposed work

The comparision of the Existing work and Proposed Work shows that the Proposed work is more efficient than the existing work. Generally, the higher the value of PSNR, the lower the degradation will be, and vice versa.

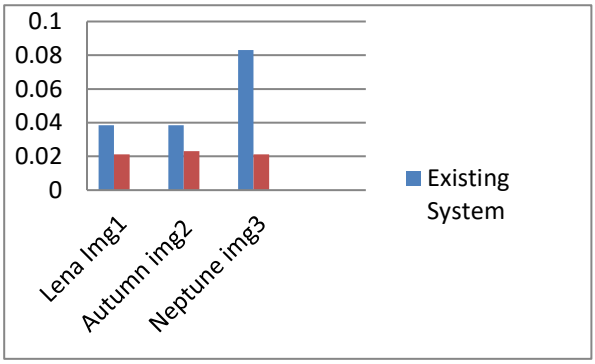

Fig 4.1 MSE Representation graph of comparative analysis

VI. APPLICATION AND ADVANTAGES

Application

1. In social media images can be protected by using secret sharing technique.
2. It can be used for manufacturing real time apps.
3. The proposed system may use as security tool to any cloud based application.

Advantages

1. This provides security and confidentiality.
2. Checksum is used for accuracy.
3. Implementation cost are less expensive.

VII. CONCLUSION

This paper introduced the concept of cloud computing, challenging security issues, various existing security frameworks and finally some solutions that increase the security in the Cloud computing environment. Cloud computing is a transformative technology that can change the nature of computing so often, specifically for business purposes. It offers on-demand network access for configurable computing resources like servers, networks, storage, applications, and different cloud services that can be rapidly installed and uninstalled with minimal management effort.

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