

# IMPROVEMENT OF NETWORK SECURITY AND PERFORMANCE USING MATRIX SPLITTER BEFORE ENCRYPTION IN DIGITAL IMAGE PROCESSING SYSTEM: A REVIEW

Deepti Agrawal<sup>1</sup> Nisha Charaya<sup>2</sup>

<sup>1</sup> P.G. Student Department of Computer Science & Engineering OM Institute of Engineering & Technology, Hisar, Haryana, India

<sup>2</sup>Academic In-Charge Department of Computer Science & Engineering OM Institute of Engineering & Technology, Hisar, Haryana, India

**ABSTRACT:** Nowadays it is very essential to improve the security and performance of network in digital image processing system. For this purpose the matrix splitter before encryption has been used in this paper. In computer science, the digital image processing is a procedure used to perform image processing on digital graphics. Here the Encryption and Decryption are used to secure the processing. The Encryption algorithms are applied to encrypt the data. The Research work has determined the review of Socket and Port programming. The user defined port is set to initialize the connection. The performance comparison has been made with both transmission techniques. This comparison has been made on the base of some factors. These factors that are considered here such as speed, security along with overall performance Thus there are several existing cryptographic techniques. DES, AES, and RSA are cryptographic techniques. These techniques have been reviewed by the research. This research has the capability of providing security and makes comparison with existing mechanisms. The proposed work is also concentrated on Threats to security, Nature of attacks, and Delay in pre-processing. It also focused on Delay during the process of encryption and decryption, Image Quality.

**KEYWORDS:** Port No, DES, AES, RSA, Encryption, Decryption

## I. INTRODUCTION

Digital image processing has been considered a process. In this process the computer algorithms are used in the field of computer science. It is applied to perform the image processing on digital graphics. Digital image processing has been considered a subcategory of digital signal processing. It has numerous features in analog image processing. It provides us a huge package of algorithms. These algorithms are useful on input data. It has the efficiency to minimize the challenges. These challenges may be the build-up of noise and signal distortion. These issues grow up when the image processing take is executed. The images are defined over two dimensions. There is the possibility that these dimensions either two or more. The digital image processing is modelled as systems. These systems have many dimensional.

## II. NETWORK SECURITY

The phase "Network security" is showing the meaning of itself. This phase meaning is the security of network It has been considered an activity. It is created in order to protect the uses and integration of network along with data. The Hardware equipments as well as software equipments have same importance in the security of network. An efficient network security system is capable to manage the complete network. It carries an objective. The objective is that it

observes all threats. It avoids the network to enter or spread in the network.

### Encryption

The encryption is a process. This procedure encoded the message or information by a specific manner. After the encryption of data, merely the authority obtain person can achieve the data. In encryption, the plaintext is the simple message or information. Encryption algorithms are used to encrypt the plain text. The cipher is an encryption algorithm. It secures the data by converting it into cipher text. It can be understand only after the decryption. Normally the pseudo-random encryption key is applied to resolve the technical challenges. The pseudo-random encryption key has been created with the use of an algorithm. According to principle, it is impossible to do the decryption of data without possessing the key. On other side, it has been proved that the capable computational resources with skills are required to create an efficient encryption system. Only an authorized recipient will have the capacity of decryption of data. The decryption will be with the key. On the other hand not authorized clients will not.

Decryption is working similar with small changes. Thus, the key is applied for decryption of block of information. After that the information will work again with initialization vector. The plain text is decrypted form of the cipher text.

**Encryption algorithm**

1. Take the secret graphic (gray image) having size 256×256.
2. Formulate the sequence of prime numbers. Based on the sequence of prime numbers, shuffle of graphic has been made.
3. After that the scrambling of image has been done using pseudorandom generator.
4. Change the resultant graphic right or left key times. After that it is necessary to alter it into binary.
5. Execute bitwise complement in every pixel. It should be performed prior to that shuffle each bit in every pixel
6. Use the Cipher Block Chaining mode at this step. After that it is altered into decimal form.
7. After performing all the phases, the graphic will be called encrypted graphic.

**Decryption algorithm**

1. Find the encrypted graphic. It is shifted in opposite side of encryption procedure.
2. Use the Cipher Block Chaining mode. The private and public keys are also used here. After alter each pixel into binary.
3. Have bitwise complemented of each pixel. After that the procedure of shuffling has been made as the transmitting procedure. To Descramble the graphic, the pseudorandom generator with prime numbers are used
4. At last, the real graphic has been got.

**III. LITERATURE REVIEW**

Infinitely the developed information methodology has affected the methods in image processing field. Along with this, it also influenced the presentation of survey processing settings. The progress has changes from mainframe system to PC. Today the client has the capability to perform the multiple works with processing methods. This performance may be ringed from small size to huge size statistical operations. Structure of Research and technique has been compiled with the use of ADDIE model. A number of researches are there in the sector of image processing with security. In which most of them have been mention below.

In 2012, Sangeet Saha [1] wrote on a brief experience on journey through hardware developments for image processing and its applications on cryptography. The significance of embedded applications on image as well as video processing has been taking a huge size in this research. The communication and cryptography domain are also mentioned here. Up gradation of graphical data for betterment of human perception is like deploring, de-noising in a lot of fields. These fields may be satellite imaging, medical imaging etc. These have been discussed in this research t. particularly they have like to express their experience on significance of computer vision. It has been considered as one of domains. Here the hardware used

algorithms executes better as compare to employ through software.

In 2019, Sukhjinder singh[2] did comparative study and implementation of image processing techniques using Matlab. Graphic increment objectives are the progressing of graphic quality. It has been done for better visualization. The review provides three ways to enhance the picture. These methods may be - GHE, LHE & DSIHE. These methods are capable to grow up the visual quality of graphics. This review has implemented and examined the effect of above defined methods. These methods are dependent on objective and subjective graphics quality parameters. These graphics quality parameters are PSNR, NAE, SC, and AE & MOS. These are used to estimate the quality of gray scale. A comparative evaluation is also defined here.

In 2012, Pinaki Pratim[3] studied the Image Edge Detection Using Gradients. This paper has provided a review on graphics edge detection. They have used the gradients. In the process of image processing; the edge detection has been considered the most general operations. Edge/borders create the outline of an object. Along with this it has been considered a border between an object and background. To capture an accurate edge is essential. It is important to analyze the basic properties. These Basic properties are connected to an image. These may be rea, perimeter and shape. The Software needed is MATLAB 7.0

In 2000, Mie Sato[4] wrote on gradient magnitude based region growing algorithm for accurate segmentation. This paper has expressed the unwanted partial-volume –effect. This effect situates on border of high intensity region and low intensity region. This effect creates sure border that determined the complex job. An innovative review for segmentation has been needed. It has been required to remove the adverse influence on border. It has been considered unnecessary .specially it is unwanted by volume rendering perception. A gradient has been considered helpful to enhance the border. Its reason is that it highlights the separation between voxel values. With the evaluation of gradient magnitude, efficient contrast can be visible. This sufficient contrast must be defined on boundary region. This contrast has been considered very essential. It is necessary to enlarge the accuracy of segmentation techinque. The Experiments has been performed on border region segmentation.

In 1998, Stoyan Donchev[5]discussed the adaptive threshold-gradient method for segmentation of areas and objects of grey scale image. Application of technique has been presented for several aspects. This aspect may be evaluation of tri dimensional scenes. This evaluation is with arbitrary location of illuminating source. This aspect has been used for coding of graphic homogenizing sectors. It also applied to evaluate the printed documents with not regular background and poor quality. Along with these it is capable for decreasing the number of intensity levels and deleting the data redundancy, etc.

In 2008 Chi Chang-Yana [6] did study on methods of noise reduction in a stripped image. By their evaluation it has been come to know that they have used the image spectrum. Image spectrum separation is capable to assist us. These help us in choosing separate technique. It minimizes the noise reduction. It has been done at the time of image data is decreased minimum. This paper also provided few technique of noise reduction. It also illustrated the taken one test graphics as an example. The images are influenced with notable striping. So the noise decrement techniques of this stripped image have been chiefly reviewed here. The Gray Value Substitution and Wavelet Transformation have been considered efficient. These are applicable to do strip noise decrement. After that, MSR & PSNR has been evaluated to analyze the processed graphics. The output is showing that used techniques are appropriate in processing the noise.

In 2003 Gross[7] wrote on An Image Pre-processing Algorithm for Illumination Invariant Face Recognition. Presentation of face verification system has dependence on several situations. One of several problematic circumstances is fluctuating illumination condition. Comparison of fourteen normalization algorithms, which are dependent on histogram normalization, has been made. It observed illumination properties. Human perception theory that is using three verification mechanisms has been observed. Results that are extracted from experiments are representing that illumination pre processing mechanism have enhanced verification rate significantly. It has been found significant in face verification system.

In 2018, Maity[8] did research on impulsive noise in images: a brief review. Noise might be raised at the time of image capturing and transmission. Removal of noise has been found significant operation during processing of image. Results of noise removal influence the image quality. Many mechanisms are popular for noise removal while processing of colour image.

#### IV. OBJECTIVE

The research objective has been mentioned below:

- Proposed research would reduce the probability of data loss as the transmission has been made from multiple paths.
- The objective of research is to improve the overall performance and security of network using matrix splitter with the help of digital image processing.
- To provide more secure and reliable mechanism to secure the graphical data due to transmission over network. There would not be complete loss of data because information has been transferred from two different paths.
- To maximize the security and minimize the limitation of traditional security techniques as proposed work would increase the security of matrix using encryption mechanism after splitting digital information in two matrixes.
- Another objective is to make appropriate use of parallel computing at the time of securing graphical

contents because the graphical content are available in form of matrix. This matrix would be split using proposed mechanism.

- This research would opt to minimize chances of loss of data at the time of transmission as data is transmitted from multiple paths in proposed work.
- The objective is to minimize time consumption. This time consumption would be reduced during overall procedure of graphical image processing along with secure information transmission. Less time would be taken because both matrixes are transmitted in same time instance on different path.

#### V. PROBLEM FORMULATION

The Research work has determined the review of Socket and Port programming. The user defined port is set to initialize the connection. The receiver would receive the data after the procedure of setting of port number. The port numbers are common on both sides. These sides are sender side and receiver side. Two separate techniques have been used to perform transmission. The transmission may be UDP based and TCP based. The performance comparison has been made with both transmission techniques. This comparison has been made on the base of some factors. These factors that are considered here such as speed, security along with overall performance. Along with these, the Networking rules have been determined to do information sharing. Here the concept of cryptography is useful to integrate security at the time of graphical contents sharing. Thus there are several existing cryptographic techniques. DES, AES, and RSA are cryptographic techniques. These techniques have been reviewed by the research. This research has the capability of providing security and makes comparison with existing mechanisms. The proposed work is also concentrated on Threats to security, Nature of attacks, and Delay in pre-processing. It also focused on Delay during the process of encryption and decryption, Image Quality.

#### VI. CONCLUSION

The Proposed mechanism is more secure and reliable to secure the information present in the form of graphic. The security of data is provided at the time of transmission over network. Present work is increasing the protection of data. It is capable to decrease the limitation of already present security techniques. This research is capable to overcome the time consumption at the time of graphical image processing with security of transmission. The proposed work has been utilized the parallel computing while securing the graphical contents. To secure the content, the contents are splitted in two separate matrixes. This research has been proved useful to reduce the probability of information loss at the time of transmission.

#### VII. FUTURE SCOPE

Proposed research would reduce the probability of data loss as the transmission has been made from multiple paths. It would improve the overall performance and security of

network using matrix splitter with the help of digital image processing. It would provide more secure and reliable mechanism to secure the graphical data due to transmission over network. It would maximize the security and minimize the limitation of traditional security techniques as proposed work would increase the security of matrix using encryption mechanism after splitting digital information in two matrixes. It would opt to minimize chances of loss of data at the time of transmission as data is transmitted from multiple paths in proposed work. It would minimize time consumption. This time consumption would be reduced during overall procedure of graphical image processing along with secure information transmission. .

#### VIII. REFERENCE

- [1] Saha, Sangeet & Pal, Chandrajit & Paul, Rourab & Maity, Satyabrata & Sau, Suman. (2012), A brief experience on journey through hardware developments for image processing and its applications on Cryptography.
- [2] Singh, Sukhjinder & K Bansal, R & Bansal, Savina. (2019). Comparative Study and Implementation of Image Processing Techniques Using MATLAB.
- [3] Acharjya, P.P. & Das, R & Ghoshal, Dibyendu. (2012). A study on edge detection using the gradients. *Int J Sci Res Publ.* 2. 1-5.
- [4] Sato, Mie & Lakare, S & Wan, Ming & Kaufman, A & Nakajima, Masayuki. (2000). A gradient magnitude based region growing algorithm for accurate segmentation. *IEEE International Conference on Image Processing.* 3. 448 - 451 vol.3. 10.1109/ICIP.2000.899432.
- [5] Stoyan Donchev, "Adaptive Thresholding by Variational Method", *IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 7, NO. 3, MARCH 1998*
- [6] Chang-yana, Chi & Ji-xian, Zhang & Zheng-jun, Liu. (2008). Study on methods on noise reduction in a stripped image. *XXI ISPRS Congress, Youth Forum: 2008; Beijing.*
- [7] Gross, Ralph & Brajovic, Vladimir. (2003). An Image Preprocessing Algorithm for Illumination Invariant Face Recognition. 10-18. 10.1007/3-540-44887-X\_2.
- [8] Maity, Alenrex & Chatterjee, Rishav. (2018). Impulsive Noise in Images: A Brief Review. *Computer Vision Graphics and Image Processing.* Vol 4. 6-15. 10.19101/TIPCV.2017.39025..
- [9] Heijmans, H.J.A.M., *Morphological Image/graphic Operators.* Advances in Electronics & Electron Physics. 1994, Boston: Academic Press.
- [10] Hunt, R.W.G., *Reproduction of Colour in Photography, Printing & Television.*, Fourth ed. 1987, Tolworth, England: Fountain Press.
- [11] Freeman, H., *Boundary encoding & processing, in Picture Processing & Psychopictorics,* B.S. Lipkin & A. Rosenfeld, Editors. 1970, Academic Press: New York. p. 241-266.
- [12] Stockham, T.G., *Image/graphic Processing in Context of a Visual Model.* *Proc. IEEE,* 1972. 60:
- [13] Murch, G.M., *Visual & Auditory Perception.* 1973, New York: Bobbs-Merrill Company,
- [14] Frisby, J.P., *Seeing: Illusion, Brain & Mind.* 1980, Oxford, England: Oxford University
- [15] Blakemore, C. & F.W.C. Campbell, *On existence of neurons in human visual system selectively sensitive to orientation & size of retinal image/graphics.* *J. Physiology,* 1969.
- [16] Born, M. & E. Wolf, *Principles of Optics.* Sixth ed. 1980, Oxford: Pergamon Press.
- [17] Young, I.T., *Quantitative Microscopy.* *IEEE Engineering in Medicine & Biology,* 1996.
- [18] Dorst, L. & A.W.M. Smeulders, *Length estimators compared, in Pattern Recognition in Practice II,* E.S. Gelsema & L.N. Kanal, Editors. 1986, Elsevier Science: Amsterdam. p. 73-80.
- [19] Young, I.T., *Sampling density & quantitative microscopy.* *Analytical & Quantitative Cytology & Histology,* 1988. 10(4): p. 269-275.
- [20] Kulpa, Z., *Area & perimeter measurement of blobs in discrete binary pictures.* *Computer Vision, Graphics & Image/graphic Processing,* 1977. 6: p. 434-454.
- [21] Vossepoel, A.M. & A.W.M. Smeulders, *Vector code probabilities & metrication error in representation of straight lines of finite length.* *Computer Graphics & Image/graphic Processing,*
- [22] Photometrics Ltd., *Signal Processing & Noise, in Series 200 CCD Cameras Manual.* 1990:
- [23] Huang, T.S., G.J. Yang, & G.Y. Tang, *A Fast Two-Dimensional Median Filtering Algorithm.* *IEEE Transactions on Acoustics, Speech, & Signal Processing,* 1979. ASSP-27: p.
- [24] Groen, F.C.A., R.J. Ekkers, & R. De Vries, *Image/graphic processing with personal computers.* *Signal Processing,* 1988. 15: p. 279-291.
- [25] Verbeek, P.W., H.A. Vrooman, & L.J. Van Vliet, *Low-Level Image/graphic Processing by Max-Min Filters.* *Signal Processing,* 1988. 15: p. 249-258.
- [26] Young, I.T. & L.J. Van Vliet, *Recursive Implementation of Gaussian Filter.* *Signal Processing,* 1995. 44(2): p. 139-151.