International Journal of Advanced Technology in Engineering and Science
Vol. No.5, Issue No. 07, July 2017
www.ijates.com
ijates
ISSN 2348 - 7550

Secure Image Steganography using DNA sequence based on DNA Cryptography

Akash K. Pardhi[1], Prof. Ram Joshi[2]

[1]Student, [2]Prof., Department of CE, Indira College of Engineering and Management, Parandwadi, Pune Savitribai Phule Pune University Pune (India)

ABSTRACT

The information could be accessed by the unauthorized user for malicious purpose. It needs the secure transmission of confidential data which gets a great deal of attention. Therefore, it is necessary to apply effective encryption/decryption methods to enhance data security. The rapid development in information technology. On other hand to secured and convenient data transmission over internet, steganography is one of leading technologies being used around the globe for long time. With inclusion of newer cover media and stronger algorithms we can deal with the latest attacks. DNA steganography is one such name.In Implementation of DNA algorithm and Image Steganography for Data Security,first we encrypt data with the help of DNA algorithm and then we select secrete image which we want to transfer with data and that secrete image is also used to hide encrypted data. Second we hide data and secrete image by cover image with the help of ImageSteganography. DNA encoding is one of the most secure encryption and decryption technique. By using DNA algorithm we perform encryption and decryption operation.

Keywords: Image Steganography, DNA algorithm ,DNA sequence, DNA components, PSNR.

I. INTRODUCTION

The rapid development in information technology needs the secure transmission of confidential data which gets a great deal of attention. The information could be accessed by the unauthorized user for malicious purpose. Therefore, it is necessary to apply effective encryption/decryption methods to enhance data security. On other hand to secured and convenient data transmission over internet, steganography is one of leading technologies being used around the globe for long time. With inclusion of newer cover media and stronger algorithms we can deal with the latest attacks. DNA steganography is one such name.The advantage of steganography over cryptography alone is that the intended secret message does not attract attention to itself as an object of scrutiny. Plainly visible encrypted messages—no matter how unbreakable—arouse interest, and may in themselves be incriminating in countries where encryption is illegal. Thus, whereas In Implementation of DNA algorithm and Image Steganography for Data Security first we encrypt data with the help of DNA algorithm and then we select secrete image which we want to transfer with data and that secrete image is also used to hide encrypted data. 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. we hide data and secrete image by cover image with the help of Image Steganography. DNA encoding is one of the most secure encryption and decryption technique.

II. LITERATURE SURVEY

Nikita Jain, , Meenakshi S Arya, Jai Sisodia and NukulSehga(2011) have developed DNA Encoding Based Feature Extraction for Biometric Watermarking[3].The author represents secure the digital code of a watermark (whichis an offline handwritten signature) by using the characteristics of DNA. The watermarked image is embedded into the image as binary information and further encrypted as DNA sequences and these DNA sequences (after being grouped as tri - nucleotide sequences called codons) then attached to particular proteins or amino acids to enhance redundancy of our secret data. Similarly during decryption the DNA coded data is converted into binary by using base conversion and this binary information is then used to reform the hidden data

Nazanin Sadat Kazazi, Mohammad Reza Najaf Torkaman, Pourya Nikfard, Mohammad Reza Abbasy and S. Farzaneh Tabatabaiee(2011) have represent Improving Hybrid Cryptosystems with DNA Steganography[1].The author proposes new cryptography protocol based on DNA steganography to reduce the usage of public cryptography to exchange session key. In this protocol session key between sender and receiver is hidden by DNA data hiding technique. Therefore, the attackers are not aware of transmission of session key through unsecure channel.

Hayam Mousa, Kamel Moustafa, Waiel Abdel-Wahed and MohiyHadhoud(2011) have proposed Data Hiding Based on Contrast Mapping Using DNA Medium[2].The author applies reversible information hiding scheme on deoxyribo nucleic acid sequence by using the reversible contrast mapping technique. The reversible property makes the secret data hidden in anywhere in deoxyribo nucleic acid without altering the functionalities because the original deoxyribo nucleic acid sequence can be recovered exactly in our scheme. Suman Chakraborty and Prof. Samir Kumar Bandyopadhyay(2012) have represents Two Stages Data-Image Steganography Using DNA Sequence[5].The author introduces a method in which Secret information is hidden within the Cover image and Cover image is hidden within DNA sequence. The two steps steganography approachis used where Secret information has been hidden in more depth than general steganography approach. Due to approach munauthorized person may consider Cover image as Secret information. This is a great advantage with respected to security.

III. MATHEMATICAL MODEL

Overview of DNA

DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms. Nearly every cell in a person's body has the same DNA. Most DNA is located in the cell nucleus (where it is called nuclear DNA). The information in DNA is made up of four bases which combine to form chains. These bases include two purines (Adenine and Guanine) and two pyrimidines (Cytosine and Thymine).These are commonly referred to as A, G, C and T respectively.

- **DNA encoding** DNA encoding is a binary coding scheme by which we can represent the 4 nucleotides by 2bit/3bit equivalent codes. The number of possible coding patterns is 4! = 24. One such is- A = 0(00), T = 1(01), C = 2(10), G = 3(11) [3].
- **Codon**

Triplets of consecutive bases in a base sequence are called codons. There are 43 = 64 possible codons. Each codon

encode for one of the 20 amino acids, used in the proteins synthesis, except TAA, TAG and TGA, indicate codon

S={s, e, X, Y,Φ}

s = Start of the program

e = End of the program

Φ =DNA algorithm

IV. SYSTEM DIAGRAMS AND TABLES

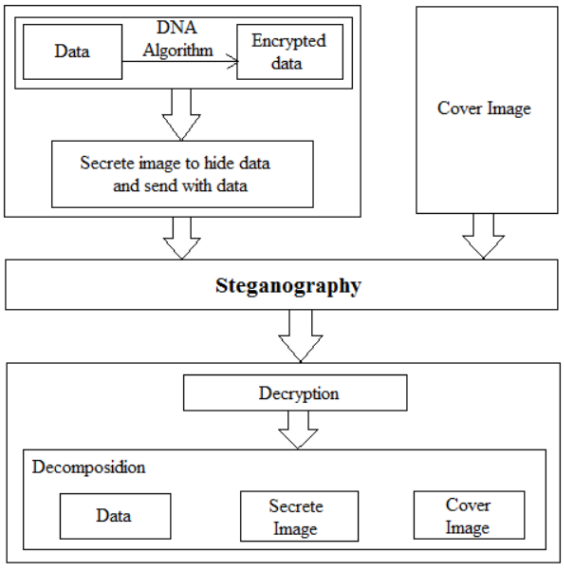

Fig -1 System architecture

Sr.	Alphabets	Codon	Sr.	Alphabets	Codon
1	A	ACTG	14	N	TAGC
2	B	TCAG	15	O	ATGC
3	C	GACT	16	P	TCGA
4	D	GCTA	17	Q	TGAC
5	E	GCAT	18	R	TGCA
6	F	AACG	19	S	GTCA
7	G	AAGC	20	T	GTAC
8	H	CAGT	21	U	GATC
9	I	CGAT	22	V	AGTC
10	J	CGTA	23	W	AGCT
11	K	CTAG	24	X	ACGT
12	L	CTGA	25	Y	ATCG
13	M	TACG	26	Z	CATG

Fig -2 DNA sequence

ENCRYPTION TIME			DECRYPTION TIME		
Data	**Size**	**Time(ms)**	**Data**	**Size**	**Time(ms)**
Image	1 759KB	7188972151722	Image	1 759KB	897381327973
Image	2 581KB	717797381321	Image	2 581KB	865997381327
Text File	4KB	338659593993	Text File	4KB	3548923456

Table 1- Encryption and Decryption time

V. CONCLUSION

We proposed the Secure Image Steganography using DNA sequence based on DNA Cryptography. we encrypt data with the help of DNA sequence and then we select secrete image which we want to transfer with data and that secrete image is also used to hide encrypted data. We hide data and secrete image by cover image with the help of Image Steganography. The advantage is that DNA has a huge storing capacity, but on the other hand practically using the implementations requires a lot of time. It is highly secured method.

VI. ACKNOWLEDGEMENTS

I would like to acknowledge the contributions of of my guide Prof. Ram Joshi, Indira collage of engineering and management , Pune. This work was supported by his guidance. It is emerging topic in domain of data security which will be good contribution.

REFERENCES

Journal Papers:

[1] Mohammad Reza Najaf Torkaman, PouryaNikfard, Nazanin Sadat Kazazi, Mohammad Reza Abbasy and S. FarzanehTabatabaiee,"Improving Hybrid Cryptosystems with DNA Steganography", DEIS 2011, pp. 42-52, 2011.

[2] H. Shiu, K. Ng, J.F. Fnag, R. Lee and C. Huang, "Data hiding methods based upon DNA sequences," Information of Sciences, vol. 180, no.11, pp. 2196-2208, 2010.

[3] HayamMousa, KamelMoustafa, Waiel Abdel-Wahed and MohiyHadhoud, "Data Hiding Based on Contrast Mapping Using DNA Medium",The International Arab Journal of Information Technology, Vol. 8, No. 2, pp. 147-154, 2011.

[4] Meenakshi S Arya, Nikita Jain, Jai Sisodia and NukulSehgal, "DNA Encoding Based Feature Extraction for Biometric Watermarking",International Conference on Image Information Processing (ICIIP 2011), 2011.

[5] Samir Kumar Bandyopadhyay and SumanChakraborty, "IMAGE STEGANOGRAPHY USING DNA SEQUENCE", Asian Journal OfComputer Science And Information Technology, vol. 1, No.2, pp. 50 52, 2011.

[6] SumanChakraborty and Prof. Samir Kumar Bandyopadhyay, "Two Stages Data-Image Steganography Using DNA Sequence". International Journal of Engineering Research and Development, Volume 2, Issue 7, PP. 69-72, August 2012.

[7] SumanChakraborty, Sudipta Roy and Prof. Samir K. Bandyopadhyay, "Image Steganography Using DNA Sequence and Sudoku Solution Matrix", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 2, Issue 2, February 2012.

[8] AmalKhalifa and Ahmed Atito, "High-Capacity DNA-based Steganography", The 8th Internationa.l Conference on INFOrmatics and Systems (INFOS2012), Bio-inspired Optimization Algonthms and Their Applications Track, May, 2012.

[9] Mohammad Reza Abbasy, PouryaNikfard, Ali Ordi and Mohammad Reza Najaf Torkaman, "DNA Base Data Hiding Algorithm",International Journal on New Computer Architectures and Their Applications (IJNCAA), vol. 2, No. 1, pp. 183-192, 2012.

[10] AkankshaAgrawal, AkanshaBhopale, Jaya Sharma, Meer Shizan Ali, DivyaGautam, "Implementation of DNA algorithm for secure voice communication", International Journal of Scientific & Engineering Research Volume 3, Issue 6, June-2012 1 ISSN 2229-5518.

Books:

[11] M.E.Jones,Albrecht Kossel, "A Biographical Sketch", Yale Journal of Biology and Medicine, Vol.26, Issue No. 1, pp. 80-97, 1953

[12] R.Gupta, AJain., "A New Image Encryption Algorithm Base on DNA Approach", International Journal of Computer Applications, Vol. 85, Issue No. [8, pp.27-31,20[4.

Proceedings Papers:

[13] Q.Gao,"A Few DNA Based Security Techniques", IEEE Long Island Systems Applications and Technolog Conference (LiSAT) 2011 " Farmingdale NY, pp. 1-5,2011.

[14] S. Zhu, S. Xu, S. Setia and S. Jajodia. Establishing pairwise keys for secure communication in ad hoc networks: a probabilistic approach.Proceedings of the 11th IEEE International Conference on NetworkProtocols (ICNP'03), Nov. 2003