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Text Encryption and Decryption using Algebraic Matrix Approach

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ABSTRACT

Cryptographic algorithms provide security of data against attacks during encryption and decryption. However, they are computationally intensive process which consume large amount of CPU time and space at time of encryption and decryption. The goal of this paper is to study the encryption and decryption algorithm and to find space complexity of the encrypted and decrypted data by using of algorithm. In this paper, we encrypt and decrypt the message using key with the help of cyclic square matrix provides the approach applicable for any number of words having a greater number of characters and longest word. Also, we discussed about the time complexity of the algorithm. The proposed algorithm is simple but difficult to break the process.

1.INTRODUCTION

In network security, cryptography has a long history by provides a way to store confidential information or send it to recipient across insecure networks (i.e. the Internet) so that transmitted information cannot be viewed or read by anyone except the intended sender and receiver, where the cryptosystem is a set of algorithms applied with secured secret keys to convert the original message to encrypted message and convert it back in the intended recipient side to the original message [1]. The first model proposed by Shannon on the cryptosystem is shown in figure 1 [2].In computer systems, the algorithm consists set of complex mathematical formulas that indicated rules of conversion of plain text to cipher text and vice versa combined with the secured key. However, algorithmic procedure for encryption and decryption use the same key (i.e. sender, and receiver). And in other encryption and decryption algorithms they use different keys which must be related. The major issue is to design any algorithmic procedure for encryption and decryption to improve the secure level. Therefore, this paper aims to propose a new algorithm to improve the secure level and increase the performance by minimizing a significant amount of delay time to maintain the security of the information [3]

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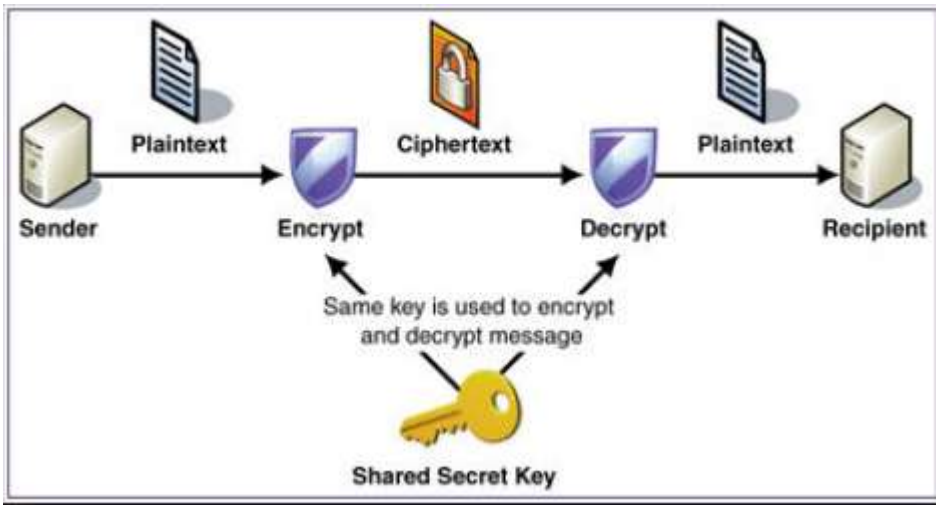

Figure 1: Cryptosystem

This paper is structured as follows: Proposed Algorithm, Basics of Applying algorithm and Encryption Mand Decryption is done to one of the longest word using the proposed algorithm and conclusion.

2. Proposed Algorithm to Encrypt and Decrypt message

2.1. Steps to Encrypt the message :

1. Assign the value of alphabets as A =-1, B =-2, ..., M =-13 and N=13, O=12, ..., Z=1.
2. Get the message for Encryption. Let the message be W1,W2, ..., Wn where n is a number of words in the message.
3. Use Step 1, assign each character in W1,W2, ..., Wn to digits separated by spaces between characters and words.
4. Draw Cyclic Square Matrix with characters in Wi for each i =1, 2, ... n
5. Calculate the number of characters in a word, η(Wi) for each i =1, 2, ..., n

$$\text{Calculate } E(\eta(w_i)) = \begin{cases} k_i = \dfrac{j+1}{2} \text{ if } \eta(w_i) = j \text{ is odd}, k = 1,2,...n \ \& \ i, j = 1,2,.. \\ k_i = \dfrac{j}{2} \text{ if } \eta(w_i) = j \text{ is even}, k = 1,2,...n \ \& \ i, j = 1,2,.. \end{cases}$$

6.

7. Choose ki th (i =1, 2, ..., n) column along the word Wi
8. Set Am = (aij), i=1 and j, m =1, 2, ..., η(Wi)
9. Construct diagonal matrix, D(Am), m = 1, 2, ..., i with Am values along diagonals and find D(Am) – η(Wi)Iη(Wi) for all i =1, 2, ..., n and m = 1, 2, ..., i
10. The key is D(Am) –η(Wi) Iη(Wi)) for all i =1, 2, ..., n and m = 1, 2, ..., i separated by commas.

2.2. Steps to Decrypt the message:

1. Get the decryption key D(Am) –η(Wi) Iη(Wi)) for all i =1, 2, ..., n and m = 1,

2. Assign $B_i = D(A_m) - \eta(W_i)\ I_{\eta(Wi)}$ for all i =1, 2, ..., n and m = 1,
3. Compute $E(\eta(B_i)) = \begin{cases} k_i = \dfrac{j+1}{2} \text{ if } \eta(B_i) = j \text{ is odd}, k = 1,2,..., n \ \& \ i, j = 1,2,.. \\ k_i = \dfrac{j}{2} \text{ if } \eta(B_i) = j \text{ is even}, k = 1,2,..., n \ \& \ i, j = 1,2,.. \end{cases}$ $C_i = D(B_i) + \eta(B_i)\ I_{\eta(Bi))}$ for all i =1, 2, ..., n

4. Compute The value ki implies the first digit of Bi is the ki th character of the ith word of the decryption key.

5. Align Ci , i = 1, 2, ... , n in cyclic order along the value ki th order and rephrase to the order from 1st to ith digits.

6. Use Step 1 in the Encryption algorithm and assign digits to each character.

7. The decrypted value is obtained.

3. Preliminaries

Associate each number to each alphabet as mentioned below

A	B	C	D	E	F	G	H	I	J	K	L	M
-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
13	12	11	10	9	8	7	6	5	4	3	2	1

3.1. Basics:

Consider the message: GOOD MORNING

3.1.1. Encryption:

Word 1 (W1) Word 2 (W2)

G O O D M O R N I N G

-7 12 12 -4 -13 12 9 13 -9 13 -7

Now frame the cyclic square matrix for both Word 1 and Word 2 as below,

W1

-7	12	12	-4
12	12	-4	-7
12	-4	-7	12
-4	-7	12	12

W2

-13	12	9	13	-9	13	-7
12	9	13	-9	13	-7	-13
9	13	-9	13	-7	-13	12
13	-9	13	-7	-13	12	9
-9	13	-7	-13	12	9	13
13	-7	-13	12	9	13	-9
-7	-13	12	9	13	-9	13

Then for W1 and W2, η(W1) = 4, E(η(W1)) =4/2 =2 and η(W2) = 7, E(η(W2)) =(7+1)/2=4

E(η(W1)) =2 implies that 2nd column values along the word W1

E(η(W2)) = 4 implies that 4th column values along the word W2

So, assign each columns values as matrices to A1 and A2.

Thus A1 = (12 12 -4 -7) and A2 = (13 -9 13 -7 -13 12 9)

Compute D(A1) – 4I4 =D(8 8 -8 11) and D(A2) – 7I7 =D(6 -16 6 -14 -20 5 2)

where D(A1) and D(A2) are diagonal matrices with values of A1and A2 along diagonal in the matrices respectively.

Hence the encrypted key is 8 8 -8 11 , 6 -16 6 -14 -20 5 2

3.1.2. Decryption:

The encrypted Key is 8 8 -8 11 , 6 -16 6 -14 -20 5 2 (Separated by comma are words.)

And on split up, B1= 8 8 -8 11 and B2= 6 -16 6 -14 -20 5 2

Compute,

C1= D(B1)+4I4 =D(12 12 -4 -7) and

C2= D(B2)+7I7 =D(13 -9 13 -7 -13 12 9)

Then η(B1) = 4, E(η(B1)) =4/2 =2 and η(B2) = 7, E(η(B2)) =(7+1)/2 = 4
Thus η(B1) = 2 implies that the first digit of B1 is the 2nd character of the first word of the decrypted key and η(B2) = 4 implies that the first digit of B2 is the 4th character of the second word of the decrypted key.

Let C1= 12 12 -4 -7

2^{nd} 3^{rd} 4^{th} 1^{St}

Rephrasing to the order from 1^{st} to 4^{th} , -7 12 12 -4 which is GOOD

Let C2= 13 -9 13 -7 -13 12 9

4^{th} 5^{th} 6^{th} 7^{th} 1^{st} 2^{nd} 3^{rd}

Rephrasing to the order from 1^{st} to 7^{th} , -13 12 9 13 -9 13 -7 which is MORNING.

4. Encryption and Decryption of the longest word:

One of the longest word containing 45 character in the English language is

PNEUMONOULTRAMICROSCOPICSILICOVOLCANOCONIOSIS

4.1. Applying Algorithm to the longest word :

4.1.1. Encryption:

1. Assign W1 as PNEUMONOULTRAMICROSCOPICSILICOVOLCANOCONIOSIS

2. Assign each character to digits,

P	N	E	U	M	O	N	O	U	L
11	13	-5	6	-13	12	13	12	6	-12
T	R	A	M	I	C	R	O	S	C
7	9	-1	-13	-9	-3	9	12	8	-3
O	P	I	C	S	I	L	I	C	O
12	11	-9	-3	8	-9	-12	-9	-3	12
V	O	L	C	A	N	O	C	O	N
5	12	-12	-3	-1	13	12	-3	12	13
I	O	S	I	S					
-9	12	8	-9	8					

3. Form Cycle Square Matrix: (45×45) [see Appendix 1(a) and 1(b)]

4. Then for W1, η(W1) = 45, E(η(W1)) =(45+1)/2 = 23

5. Thus E(η(W1)) =23 implies the 23nd column values along the word W1[See appendix 1(a)].

6. Let A1 = (aij), i = 23, j =1, 2, ..., 45

7. Compute D(A1) – 45I45 =D(-54-48-37-54-57-54-48-33-40-33-57-48-46-32-33-48-33-32-54-33-37-54-37-34-32-50-39-58-33-32-33-39-57-38-36-46-58-54-48-36-33-37-48-33-34)

8. The encrypted key is -54-48-37-54-57-54-48-33-40-33-57-48-46-32-33-48-33-32-54-33-37-54-37-34-32-50-39-58-33-32-33-39-57-38-36-46-58-54-48-36-33-37-48-33-34

4.1.2. Decryption:

1. Let B1 = D(A1) – 45I45 = -54-48-37-54-57-54-48-33-40-33-57-48-46-32-33-48-33-32-54-33-37-54 -37-34-32-50-39-58-33-32-33-39-57-38-36-46-58-54-48-36-33-37-48-33-34

2. Compute C1 = D(B1) + 45 I45 = -9 -3 8 -9 -12 -9 -3 12 5 12 -12 -3 -1 13 12 -3 12 13 -9 12 8 -9 8 11 13 -5 6 -13 12 13 12 6 -12 7 9 -1 -13 -9 -3 9 12 8 -3 12 11

3. E(η(B1)) =23 implies that the 23nd column values along the word W1

4. Thus C1 = 11 13 -5 6 -13 12 13 12 6 -12 7 9 -1 -13 -9 -3 9 12 8 -3 12 11 -9 -3 8 -9 -12 -9 -3 12 5 12-12 -3 -1 13 12 -3 12 13 -9 12 8 -9 8

Hence the Message is PNEUMONOULTRAMICROSCOPICSILICOVOLCANOCONIOSIS

5. Time Complexity of the Algorithm:
There are three major components of the proposed algorithm are framing Cycle Square Matrix, Addition, Multiplication and Subtraction. The proposed encryption and decryption algorithm is simple, easy and comfortable to be used by all range of target users. For checking of complexity of time, the application was

tested with longest word “PNEUMONOULTRAMICROSCOPICSILICOVOLCAN-OCONIOSIS” and the performance of the algorithm was rated by computing the time required for
encryption and decryption of the word. Time Complexity of the proposed algorithm depends on the framing Cycle Square Matrix, Addition and Subtraction. Considering the number of char acter in the word as ‘N’. On finding the cycle square matrix, it requires O(N2). On adding or subtraction the matrix with n2 values requires O(N2). Thus overall time complexity of the key generation algorithm will be O(N2). Also, the reliability of the algorithm was examined by the success rate of encryption and decryption. A successful execution means an encrypted word is understood by others; also successful execution means a decrypted file was obtained using a key and an encrypted file.

6. Conclusion:

In this paper, we have proposed an efficient data encryption and data decryption algorithm to protect the message with the help of key passed between Sender and Receiver. Also Message with any number of words having any number of character can be encrypt and decrypt by Sender and Receiver. With data encryption, data owner can utilize the benefits of Message splitting to number of words such that to reduce storage and computational overheads. The encryption and decryption algorithms developed and described in this paper might not be comparable to well-known encryption algorithms but its simplicity and availability proves that tools can be developed without resorting to purchasing expensive software from the Marke

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Appendix

1. The first (45× 23) and second(45× 22) diagram indicates the cyclic square matrices of 45× 45.
a. 45× 23
b. 45× 22

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a.

11	13	-5	6	-13	12	13	12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9
13	-5	6	-13	12	13	12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3
-5	6	-13	12	13	12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8
6	-13	12	13	12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8	-9
-13	12	13	12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8	-9	-12
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13	12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8	-9	-12	-9	-3
12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8	-9	-12	-9	-3	12
6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8	-9	-12	-9	-3	12	5
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7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8	-9	-12	-9	-3	12	5	12	-12
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-9	-3	8	-9	-12	-9	-3	12	5	12	-12	-3	-1	13	12	-3	12	13	-9	12	8	-9	8
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b.

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6	-13	12	13	12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8	
-13	12	13	12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8	-9	
12	13	12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8	-9	-12	
13	12	6	-12	7	9	-1	-13	-9	-3	9	12	8	-3	12	11	-9	-3	8	-9	-12	-9	
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-9	-3	8	-9	-12	-9	-3	12	5	12	-12	-3	-1	13	12	-3	12	13	-9	12	8	-9	

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REFERENCES

1. Hill Cipher - Wikipedia (Concept & Math)
Hill cipher - Wikipedia
2. GeeksforGeeks – Hill Cipher Explained (with Code)
Hill Cipher - GeeksforGeeks
3. Crypto Math – Hill Cipher with Examples
Hill Cipher - Crypto Corner
4. Cybrary – 3x3 Hill Cipher with Inverse Matrix
Learn Hill Cipher with 3x3 Matrix Multiplicative Inverse Example | Cybrary
5. Math LibreTexts – Matrix Cryptography Applications
Matrix cryptography - Mathematics LibreTexts
6. A Generalized Approach to Hill Cipher using Lucas and Fibonacci Matrices arXiv
[2003.11936] Cryptography using generalized Fibonacci matrices with Affine-Hill cipher
7. A Secure Dynamic Key Hill Cipher using Matrix Transformation – arXiv
[1909.06781] A Vector Space Approach to Generate Dynamic Keys for Hill Cipher
8. A Modified Hill Cipher Algorithm Based on Matrix Operation – ResearchGate
(PDF) Implementation outcomes of Humanwide: integrated precision health in team-based family practice primary care
9. Matrix Inversion in Modular Arithmetic – MIT Notes PDF
D:/Work_Projects/_Strang/ila5/ILA_5th_edition/ila5.dvi

10. YouTube – Hill Cipher Encryption/Decryption
https://www.youtube.com/watch?v=fffgRyr6PQ8
11. YouTube – Step-by-Step Hill Cipher Inverse Calculation
Get 5X Glossier Hair Color At Home With The New Casting Creme Gloss With Glycolic Gloss Complex
12. Hill Cipher – Wikipedia, [Online]. Available: https://en.wikipedia.org/wiki/Hill_cipher
Journal of Physics: Conference Series, Volume 1000, National Conference on Mathematical Techniques and its Applications (NCMTA 18) 5–6 January 2018, Kattankulathur, India
13 Danzhi Wang, Zepeng Wu and Yansong Cui
Published under licence by IOP Publishing Ltd
IOP Conference Series: Earth and Environmental Science, Volume 234, 6th Annual 2018 International Conference on Geo-Spatial Knowledge and Intelligence14–16 December 2018, Hubei, China
14. Bahram Javidi, Artur Carnicer, Masahiro Yamaguchi, Takanori Nomura, Elisabet Pérez-Cabré, María S Millán, Naveen K Nishchal, Roberto Torroba, John Fredy Barrera, Wenqi HePublished 22 July 2016 • © 2016 IOP Publishing Ltd
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15. Zheyi Zhang, Jun Mou , Santo Banerjee and Yinghong Cao
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