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MATHEMATICAL MODEL OF CRYPTOGRAPHICAL HISTORICAL CODE ALGORITHMS TO DATA SECURITY

Abstract*: This article focuses on the cryptanalysis of cryptology, focusing on the following issues:*

Evaluate the durability of encrypted cryptograms using Encryption Techniques for Multi-Alternative Encryption. Analyze the interrelationships between existing encryption tools and learn how they are used in continuous encryption algorithms.

Key words*: Cryptology, cipher, ciphergram, Enigma, cryptanalysis, cryptography, tolerance level, keys, reflections, hash function, symmetric and asymmetric cipher algorithms.*

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Introduction

In order to be able to obtain accurate results in science, it is necessary to build a mathematical model of the object under study. In direct cryptography, the mathematical modeling of ciphertext, plaintext, and keywords can be helpful in solving a number of problems. In particular, the concept of the algebraic model of the cipher system was introduced by K. Shannon [1].

As you know, in cryptography, data is encrypted by linear decryption. In this case, the decryption is based on the decryption, and the decryption is called decryption.

Encryption consists of a set of multi-line decryption, in which data decryption is performed using keys. There is no value link between the key set and the lock set. Key selection naturally identifies the collection of all possible text sets from any set of open source texts. For any arbitrary argument, the calculation of this function is performed in the encryption rule, and the selected key is encrypted. The decryption value is determined by the function that collects all possible open texts from all possible sets of encrypted texts (based on the selected key). This process is performed in cryptography as an encryption rule, and the decryption key is selected in the selected quality [2].

Let X, Y, K be the finite sets of possible values, ciphers, and equations, and let Ek: X Y be the encryption rule with the K key. The set {Ek: k K} is denoted by, and the set {Ek (x): x X} is denoted by Ek (x).

Dk: Ek (X) X - k K key encryption rule where D {Dk: k K} set.

If k is K k = (ksh, kd), then ksh is the encryption key, kd is the decryption key (), then Ek is the encryption function, and Dkesad is the encryption function.

The cipher satisfies the following conditions:

1. For any x and k K let Dk (Ek (x)) = x be equal;
2. Y = Ek (X).

refers to a set of packages. [2].

In general, a cipher is a set of all possible encrypted texts (i.e., encrypted open texts), all possible keys (i.e., an object used for encryption), and all possible encrypted texts (characters generated by encryption).

In view of the above, it is worth noting the following:

Condition 1 meets the single-value encryption requirement;

The 2nd conditional y Y means that the element x X and k K can be represented in the form of a gamoscale Ek (x).

In general, it would be wrong to say that "for any k K i y Ek (X) the equation Ek (Dk (y)) = y holds." Otherwise, Dk is a function that does not change, and the function can change during the encryption process. Condition 1 shows that the function has the property of reciprocity. In other words, if the condition is met, then the following inequality holds for:

Produces a mathematical model that describes the basic properties of the original ciphers. Given the above, the original cipher can be equated with an algebraic model.

Endiesa, the probability model of the cipher can be entered, let the priority distribution of the probabilities be determined in the P and K sets. If the probability for an arbitrary and the probability for an arbitrary larva are determined, then the following equations hold [2]:

In cases where it is necessary to know the distributions P (X) and P (K), the probability model is used. It consists of a set of five, condition 1, 2, definition 1 and two probability divisions:

Probability properties of passwords are used for cryptanalysis and are used to decrypt passwords.

In most cases, the sets Y and X consist of combinations of individual levels of cards and sets, and in some natural LvaL1 equations.

will take place.

Here, A and V sets are usually called open-text or alphabetical fonts, or a sequence of open text and ciphertext letters.

Main Part

Here is a symmetric group to replace the set. Optional K key is defined by the following formulas in the alphabetical encryption and decryption rules for plaintext and ciphertext:

Here's how to put one together for use with your gates.

In general, to replace a cipher, Kesa represents a set of actions that make the set more valuable than the set. Encryption and decryption rules are defined for X, y Yvak K (kgateskari). The essence of modern cryptoalgorithms today is to replace them. From the above mathematical formulations, the following can be concluded.

The reflections may be different, but they are interrelated. Encryption for any location will eventually appear in the following tables. For bi-alphabetical substitution algorithms:

Table 1. Mathematical model of univariate encryption algorithms.

$x_i \in A$	x_1	x_2	x_3	....	x_{n-1}	x_n
$E: x_i \to y_i$	y_1	y_2	y_3	....	y_{n-1}	y_n

I mean, it looks like.

The allocation algorithm for a multivariate substitution function is as follows:

Table 2. Mathematical model for the general application of placeholder encryption methods based on various laws.

$x_i \in A$	x_1	x_2	x_3	....	x_{n-1}	x_n
$E: x_i \to y_i^1$	y_1^1	y_2^1	y_3^1	....	y_{n-1}^1	y_n^1
$E: x_i \to y_i^2$	y_1^2	y_2^2	y_3^2	....	y_{n-1}^2	y_n^2
....	...	...	...	....	...	...
$E: x_i \to y_i^k$	y_1^k	y_2^k	y_3^k	....	y_{n-1}^k	y_n^k

The following new passwords are required:
- convenient and easy to use;
- reliable;
- the encryption and decryption process should not take long;

and so on.

Shrubs are still relevant today. Kirkgoff argued that ensuring the confidentiality of information should not be limited to the length of the key, but should also be considered in the operation of the algorithm. It has developed special requirements for military encryption devices. These are:

- Encryption of the encryption device should not cause inconvenience to other users involved in the network;

- I need to ensure the stability of the encryption device.

It is unknown at this time what he will do after leaving the post. During the war, the secret keys should be encrypted so that they can be stored in the same way.

Kirkgoffs says it's easier to keep secrets because it's natural to lose them during a war. Given that the process of changing the keys does not take much time and does not take much time to open the keys, it is easier to send them to users who are protected by a robust algorithm. During the Second World War, Enigmas encryption was one of the means of encryption issued and used directly by cryptograms.

Enigmas encryption is a technical tool that does not require the user to be specially trained. This convenience allows me to use it in emergencies as well.

Enigma encryption is one of the first electromechanical devices used to encrypt confidential data.

The light indicates the letter of the cipher. In our example, the letter "A" is changed to "G", and the next step is to change the letter "A" to "S".

The switching panel has an additional key function in Enigmas Encryption. In the switchboard, the letters of 26 talotinalfavit can be linked in 13 tajuft.

If we use the 3-tarot enigmas encryption tool in mathematical language, then Ye is the equation for encryption.

$$\boldsymbol{E = PRMLUL^{-1}M^{-1}R^{-1}P^{-1}} \quad (5)$$

here,

R is the switching panel, U is the reflector, L, M, R are the rotors on the left, middle and right.

After pressing the letter button, the position of the right rotor will change to i, and the result will be as follows.

$$\boldsymbol{\rho^i R \rho^{-i}} \quad (6)$$

where, r is the cyclic substitution.

In the same way, if we denote the change in the position of the right-hand rotors by j, k, then;

$$\boldsymbol{E = P(\rho^i R \rho^{-i})(\rho^j M \rho^{-j})(\rho^k L \rho^{-k}) U (\rho^k L^{-1} \rho^{-k}) * (\rho^j M^{-1} \rho^{-j})(\rho^i R^{-1} \rho^{-i}) P^{-1}} (7)$$

equality.

One of the main goals of this section is to study the cryptographic analysis of cryptograms and the separation of cryptographic analysis methods based on cryptographic methods based on cryptographic methods. In view of the main purpose of this study, the cryptographic tolerance of Enigmashfrvs has been examined below and some conclusions have been drawn.

Conclusion

In conclusion, it should be noted that the assessment of the cryptographic tolerance of the Enigma encryption tool, which is based on the methods of substitution encryption, is given in Table 3 below.

Table 3. Cryptocurrency tolerance of Enigma.

Assignment of elements	General formula	Value	Complexity
Number of elements in the alphabet	$P_m=mP_{m-1}=m!$	$P_m=m!=26!$	2^{86}
Number of rotors	$A_{m!}^n=\dfrac{m!!}{(n!-m)!}$	$A_{m!}^n=\dfrac{26!!}{(26!-3)!}=26!(26!-1)(26!-2)$	2^{216}
Rotation of rotors	$R=m^n$	$R=m^n=26^3$	2^{14}
Switchboard	$C_m^k=\dfrac{m!}{k!(m-k)!}$	$C_m^k=\dfrac{26!}{2!(26-2)!}=\dfrac{26!}{2!24!}=25*13=325$	2^8

$\boldsymbol{E = m!(m!-1)(m!-2)\bullet m^{n} + (m-1) * \frac{m}{2}}$	2^{238}

The US-standard AES algorithm for data encryption has a complexity of 2128, 2192, 2256 in 128, 192, 256 bit. According to NIST experts, the AES encryption algorithm is 2256 times more complex than it is today. [4]

If other elements in the ASCII code are used as elements of the hyphens in the decryption algorithms, then the elements are 256! According to the Strlingformula,

$$n! = n^{n} e^{-n} \sqrt{2\pi n} \qquad (8)$$

it is impossible to select all the possible elements. It should be noted that the non-existent cryptographic algorithm RS4 was created on the basis of self-knowledge. In the RC4 encryption algorithm, we can assume that the Enigma encryption tool uses a single bit. The level of complexity of the RC4 encryption algorithm is estimated at 256! * 2562 (approximately 21700).

These explanations can be applied to quantum cryptography, which is expected to be implemented in the near future. Historical Enigma indicates the existence of a robust, symmetric cipher algorithm using mathematical representations of encryption.

References:

1. Stolings, V. (2017). *«Kriptografija i zashhita setej. Princip i praktika».* (p.669). Moskva - Sankt-Peterburg - Kiev. Izd. dom «Vil`jams». 2-e izdanie.
2. Shnajer, B. (2012). *«Prikladnaja kriptografija».* (p.815). Moskva: «Izdatel`stvo TRIUMF».
3. (n.d.). Retrieved from http://fikr.uz/posts/talim_fan_taraqqiyoti/9804.html.
4. (n.d.). Retrieved from http://vu.tuit.uz/?gokclectures/view/50/lecture/746.
5. (n.d.). Comparison of the effect of multimedia and booklet methods on quality of life of kidney transplant patients: A randomized clinical trial study.
6. Mansouri, P., Sayari, R., Dehghani, Z., & Hosseini, F.N. (2020). *International Journal of Community Based Nursing and Midwifery*, (1) , pp. 12-22.
7. (n.d.). Intelligent software defined network based digital video stabilization system using frame transparency threshold pattern stabilization method Kokila S., Ramesh S.
8. Sajfullaeva, R.R. (2019). Odnorodnye skazuemye v prostyh predlozhenijah. *Filologija masalasi*, №10, pp.24-30.
9. Sayfullaeva, R.R., & Abuzalova, M.Q. (2019). *Milliy Qadriyatlarni Ifodalovchi Ayrim Nomlar.* Zamonavij filologija tarakkijotida innovacijalarning roli. Halkaro ilmij konferencijasi. 15-17 nojabr`2019.
10. Sayfullaeva, R., & Abuzalova, M.K. (2020). Structural generality of Uzbek language clauses. *International Journal of Psychosocial Rehabilitation*, Vol. 24, Issue 06. ISSN: 1475-7192, pp.3011-3015.
11. Sadullaeva, N.A., Mamatova, F.B., & Sayfullaeva, R. (2020). Classification of Euphemism and its formation in the Uzbek language. *Journal of Critical Reviews*, ISSN- 23 94-5125 Vol 7, Issue 4, pp. 426-430.