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ENCRYPT AND DECRYPT THE MESSAGE USING FIBONACCI PRIMES WITH ASCII CODE MODULO 256

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ABSTRACT

In present world requires privacy and security of data and thus there is a need of study of algorithms for sending confidential messages without the worry of a leak by encryption and decryption methods. There are many algorithms already available to transmit data securely to a person by a person with close to no chance of insecurity. As all the transmission is computerized there are various theories going around and new theories coming up every other day. We will be introducing the application of Fibonacci primes as a method to secure any type of files / data for transmission and we propose the use of Fibonacci primes for data encryption and decryption.

1. INTRODUCTION

Cryptography plays a vital role in securing digital communication. One unique approach to encryption involves using **Fibonacci prime numbers** in conjunction with **ASCII code transformations** and **modulo 256 arithmetic** to encode and decode messages. This method leverages **Fibonacci prime numbers**, which are special prime numbers found in the Fibonacci sequence, to manipulate the ASCII values of characters. By applying **modulo 256**, we ensure that the transformed values remain within the valid ASCII range. The encryption and decryption processes are carefully designed to be **reversible**, ensuring that the original message can be recovered precisely.

Concepts Used in the Encryption and Decryption Process

Fibonacci Prime Numbers: A Fibonacci prime is a number in the Fibonacci sequence that is also prime. Examples include 2, 3, 5, 13, etc.

ASCII Code Representation: Each character in the message is converted into its corresponding ASCII value.

Modulo 256 Arithmetic: Since ASCII values range from 0 to 255, modular arithmetic ensures the values wrap around correctly.

Key-Based Transformation: Fibonacci primes are used as a key sequence to alter the ASCII values.

Encryption Process- Convert each character of the plaintext message into its ASCII value.

Modify the ASCII values using a sequence of Fibonacci prime numbers as a key.

Apply modulo 256 to keep the values within a valid range.

Convert the modified ASCII values back into characters to form the ciphertext.

Decryption Process- Convert each character of the encrypted message back into ASCII.

Reverse the transformation using the same Fibonacci prime sequence.

Apply modulo 256 arithmetic to retrieve the original ASCII values.

Convert the values back to characters to reconstruct the plaintext.

2. WORKING PROCEDURE

2.1 ENCRYPTION ALGORITHM

Step-1: Convert the plaintext into its ASCII Codes

Step-2: Generate Fibonacci prime numbers

Step-3: Apply Encryption Formula

Encryption ASCII = (Original ASCII + Fibonacci prime) mod 256

1. Consider the Plaintext is" GEOMETRY"

ASCII Code for letter in the Plaintext

ASCII Code for

G - 71 E - 69 O - 79 M - 77

E - 69 T - 84 R - 82 Y - 89

2. Fibonacci Primes are: **2, 3, 5, 13, 89, 233, 1597, 28657**

G → (71+2) =73 mod 256 73(I)⟹

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E → (69+3) =72 mod 256 72(H)
O → (79+5) =84 mod 256 84(T)
M → (77+13) =90 mod 256 90(Z)
E → (69+89) =158 mod 256 158(×)
T → (84+233) =317 mod 256 61(=)
R → (82+1597) =1679 mod 256 143(Å)
Y → (89 +28657) =28746 mod 256 74(J)

Then the message **GEOMETRY** Encrypted to ciphertext as

IHTZ × = Å J

2.2 DECRYPTION ALGORITHM

Step-1: Convert the Ciphertext into its ASCII Codes

Step-2: Generate Fibonacci prime numbers

Step-3: Apply Decryption Formula

Decryption ASCII = (Encrypted ASCII - Fibonacci prime) mod 256

1. Consider the Ciphertext is" IHTZ × = Å **J**"

ASCII Code for letter in the Ciphertext

ASCII Code for

I - 73 H - 72 T - 84 Z - 90

X - 158 = - 61 Å - 143 J - 74

2. Fibonacci Primes are: **2, 3, 5, 13, 89, 233, 1597, 28657**

I →(73-2)= 71mod 256 we get 71(G)
H→(72-3) = 69 mod 256 we get 69(E)
T→(84-5) = 79 mod 256 we get 79(O
Z→(90-13) = 77 mod 256 we get 77(M)
×→(158-89) = 69 mod 256 we get 69(E
= →(61-233) = -172 mod 256 we get 84(T)
Å →(143-1597) = -1454 mod 256 we get 82(R)
J →(74-28657) = -28583 mod 256 we get 89(Y)

Hence the decrypted ciphertext **IHTZ × = Å J** has encrypted to the original plain text **GEOMETRY**

3. CONCLUSION

The encryption and decryption method using **Fibonacci prime numbers**, **ASCII codes**, and **modulo 256 arithmetic** provides a unique and effective approach to securing textual data. By leveraging **mathematical properties** of Fibonacci primes, this technique ensures that messages are transformed in a way that is both structured and reversible.

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