Novel Research and Development Approaches in Heterogeneous Systems and Algorithms

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A Radical Image Steganography Method Predicated on Intensity and Edge Detection 173
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The internet has grown to be widely used by billions of individuals in our digital age. The internet is required for a variety of platforms, online apps, and standalone applications. Numerous methods, including cryptography, encryption/decryption, and data concealment algorithms, are developed for this goal. However, the employment of these methods was not very secure, making it simple for hackers to get the secret message. A new method called "steganography" was developed to offer the highest level of protection for sensitive data. Steganography's primary goal is to conceal the presence of concealed messages. Additionally, it seeks out concealed messages using factors like the kind of embedding method, the message's length, its content, or the carrier's secret key. At this point in the chapter, a single bit of data has been embedded into edge-based pixel positions with arbitrary bit positions. The authors have compared their method to three standard edge detection algorithms for a more comprehensive assessment. Different statistical measures also have been made for the uniqueness of the technique.

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A chaotic cryptographic method and bit shuffle methodology for image encryption and decoding have both been suggested. In order to evaluate the encryption's effectiveness and determine whether it met the desired standard, a number of performance analysis tools were also used. These included the number of pixel change rate (NPCR), the unified average changing intensity (UACI), the entropy analysis, which is a component of an encryption scheme that shows how random the image is, and the correlation coefficient. These results reveal the safety of the suggested cryptographic technique.

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Sleuthing images that conceal information has continuously been a stimulating and difficult problem in cyber security. Finding hidden data in nursing image is called steganalysis. In this chapter, the authors explore the method employed in the study. The investigational results are have included followed by a discussion with prospect analysis. Several 2×2 blocks are recycled to implant the data bits within the stego-image, and using the Arnold Map, four quadrants of the pixels of each block is selected to embed the data in nonlinear bit position. Different measures with the change of BPP (bits per pixel) are also

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ABSTRACT

A chaotic cryptographic method and bit shuffle methodology for image encryption and decoding have both been suggested. In order to evaluate the encryption's effectiveness and determine whether it met the desired standard, a number of performance analysis tools were also used. These included the number of pixel change rate (NPCR), the unified average changing intensity (UACI), the entropy analysis, which is a component of an encryption scheme that shows how random the image is, and the correlation coefficient. These results reveal the safety of the suggested cryptographic technique.

INTRODUCTION

Secure Cryptography: An Overview

Security is not only a word; it is a very important aspect in today's world especially for communication and data or information transmission. As the increase of online transmission not for only simple information but for economic data, the protection of this information becomes very crucial. To do so security techniques like cryptography becomes more and more important as well before. Information security has emerged as the most fascinating and interesting technological sector in the modern world in the informa-

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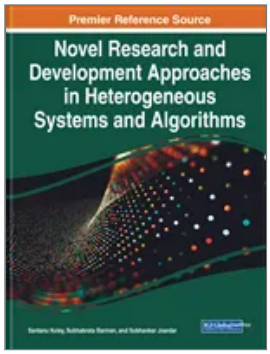

Secure Cryptography Using Chaotic Algorithm

Uday Kumar Banerjee, Anup Kumar Das, Rajdeep Ray, Chandan Koner

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Abstract

A chaotic cryptographic method and bit shuffle methodology for image encryption and decoding have both been suggested. In order to evaluate the encryption's effectiveness and determine whether it met the desired standard, a number of performance analysis tools were also used. These included the number of pixel change rate (NPCR), the unified average changing intensity (UACI), the entropy analysis, which is a component of an encryption scheme that shows how random the image is, and the correlation coefficient. These results reveal the safety of the suggested cryptographic technique.

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Introduction

Secure Cryptography: An Overview

Security is not only a word; it is a very important aspect in today’s world especially for communication and data or information transmission. As the increase of online transmission not for only simple information but for economic data, the protection of this information becomes very crucial. To do so security techniques like cryptography becomes more and more important as well before. Information security has emerged as the most fascinating and interesting technological sector in the modern world in the information age as a result of widespread computerization and their interaction via networks. Confidentiality, authentication, integrity, non-repudiation, access control, and availability are the guiding principles of every security mechanism. A crucial component of secure communications is cryptography, which was designed with the intention of providing secret communication since it shields information transmission from the impact of adversaries. The concept of security and its characteristics have come to the forefront due to the overabundance of digital content and the ossification of internet technology. For instance, telemedicine provides interactive healthcare in far-off places while transmitting patient health information and imaging data over an insecure connection. Second, the satellite image provides time-specific data that is useful for a variety of purposes, including environmental protection, meteorology, defence and remote sensing. The government, private detectives and criminal organizations may now closely monitor people and public behavior online thanks to the development of surveillance technology. The security of picture data during transmission and storage is a key factor in determining the quality of the service in the aforementioned applications. The word, cryptography came from ancient Greek which contains two words: “kryptos” means “hidden” or “vault” and “graphy” means “writing” or “study”. Cryptography is the study of secure communication between the sender and the receiver and it allow viewing the message to intended recipient without intervention of the adversary element.

The history of cryptography is really old. At the time of ancient Egyptian civilization around 2000 B.C. the hieroglyphic language makes complex by using cryptography picture and only the elite community knew the meaning then. At the time of Julius Caesar at 100 B.C. to 44 B.C. the modern-day cipher concept was found. Julius Caesar did not want that the message should read by the messenger or anyone so he changes the original letter by its next third letter and make a coded form of message which can only be understood by those who knew the decoding process. The modern day’s techniques come along lot of paths and it becomes a strong mechanism to protect information. Nowadays the different mathematical concepts with the help of different rule base calculation are used which are called cryptographic algorithm. By applying these algorithms different text, image, audio, video or other type of files can be encoded such a way that the original meaning of this file is hidden in a masking and cannot be understood easily.