

## Digital Image Encryption Technology and Its Security Analysis

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**Abstract:** with the rapid development of computer network, the advanced level of multimedia technology is constantly improving. Digital image information security has become one of the problems that must be solved at present. However, as far as the encryption technology in the world is concerned, the encryption technology of digital image is relatively few, and there are great problems. This paper mainly discusses the development and current situation of digital image encryption technology, and deeply studies the information security problems related to digital image encryption according to its application in China, which can be used as a reference.

### 1. Introduction

At present, driver layer encryption and digital image are one of the most popular multimedia modes in China. It has a lot of political and economic problems, but in some distinctive industries, such as military business and medical requirements, it needs high confidentiality requirements. In order to better realize the packet header of a digital image, we generally use two-dimensional code to convert the image, encrypt it with traditional encryption algorithm, and analyze the encryption of traditional text information, which has a certain practice for image and video. And space, can also be compressed. These features make the image construct a more perfect secure encryption algorithm. Since the early 1990s, more and more researchers have based on this model. Among many encryption algorithms, this paper mainly analyzes the current situation and development of digital image. For digital image algorithm technology, a large number of its applications in different industries in China are analyzed, and the corresponding application solutions are put forward. Measures and optimization solutions.

### 2. Transparent Encryption and Decryption Technology of Driving Layer

#### 2.1 Working Principle of Transparent Encryption and Decryption Technology of Driving Layer

Driver encryption technology is a file system (filter) driver (IFS) technology based on windows, which works in the kernel layer of windows. Often install its driver, such as the driver of printer USB flash disk. File system driver is a virtual driver that treats files as a device. When an application operates on a suffix file, the file driver will monitor the operation of the program and change its operation mode, so as to achieve the effect of transparent encryption.

#### 2.2 Principle of Electronic Data Encryption in the Driver Layer

the driver encryption technology has nothing to do with the application program. It works at the lower layer of Windows API function. When the API function reads a specified type of file, the system automatically decrypts the file; When entering the write operation, the plaintext is automatically encrypted. Because it works in the kernel layer protected by windows, it runs faster and the encryption and decryption operation is more stable. However, in order to achieve the purpose of file confidentiality, driver encryption must also deal with user layer applications. Inform the system which programs are legal and which programs are illegal. The transparent encryption technology in the driver layer works in the kernel layer. Driver encryption technology has many advantages, but it is very difficult to develop because it involves many processing at the bottom of

windows. If the conflicts with other drivers and application whitelists are not handled well, it will be difficult to become a good transparent encryption product.

### **2.3 Encryption and Decryption Algorithm:**

The encryption key and encryption algorithm make the encryption process possible. Moreover, based on the application of these keys, two types of encryption methods are mainly used: “symmetric encryption” and “asymmetric encryption”. Both methods use different mathematical algorithms (i.e. the encryption algorithms we just mentioned) to encrypt the data. The list of common encryption algorithms includes RSA, ECC, 3DES, AES, etc.

Encryption type 1: symmetric encryption

Symmetric encryption algorithm is used to encrypt sensitive data and other information. Common algorithms include:

Des (data encryption standard): data encryption standard, which is fast and suitable for encrypting a large amount of data.

3DES (Triple DES): Based on DES, a piece of data is encrypted three times with three different keys, with higher strength.

AES (Advanced Encryption Standard): Advanced Encryption Standard, which is the next generation encryption algorithm standard with high speed and high security level;

Encryption type 2: asymmetric algorithm

RSA: invented by RSA company, it is a public key algorithm that supports variable length keys, and the length of file blocks that need to be encrypted is also variable;

DSA (digital signature algorithm): digital signature algorithm, which is a standard DSS (digital signature standard);

ECC (elliptic curves cryptography): elliptic curve cryptography.

### **2.4 Development and Current Situation of Digital Image Encryption Technology**

The early classical cryptography theory is the predecessor of digital image encryption technology. Cryptography is mainly a subject of converting plaintext into ciphertext. It also includes the process and method of reversibly converting cryptography into plaintext. Cryptography has a strong comprehensiveness. With the continuous improvement of the practice of coding and decryption, and with the application of modern science and technology, it further strengthens the relationship between computer science, acoustics and mathematics. The realization of digital and text decryption is the theoretical basis of digital image encryption technology. However, traditional cryptography is limited by access, usually in binary stream, resulting in low visual effect of digital image. Its digital image is large and requires real-time encryption, which is obviously impossible to achieve by classical encryption methods. Computer image learning only takes graphics and images as the core content, and lacks image security. Therefore, most researchers begin to pay attention to digital image encryption technology.

Due to the wide application of digital images, both at home and abroad are committed to the in-depth research of encryption technology. More and more research institutions, companies and universities pour in one after another. The publication of relevant reports and papers is the best explanation for password publishing and Information Security Publishing. The current digital image encryption algorithm basically uses the existing cryptographic system to encrypt some digital image files. Under the security guarantee of modern cryptographic system, the confidentiality and encryption effect are very close. Since cryptographic design is embodied in nonlinear transformation, with the further research of nonlinear science, it will play a role in promoting the development of cryptography, but we should strengthen the effective combination of the two. We need to do more. The technology based on biometric recognition theory also began to improve. We always believe that the in-depth study of encryption technology will affect the future development trend of digital image encryption technology.

## **3. Specific Application of Digital Image Encryption Technology in China**

Due to different encryption algorithms, image encryption technology includes two symmetric and asymmetric encryption technologies. The former refers in the computer network system that the reception of image information is completely consistent with the key or function used by the transmitter. Introducing symmetric encryption technology into computer network system and organizing the reception of image information through the sender's PR in advance is the core of information security technology. The national key infrastructure must be developed independently, and it is impossible to introduce foreign encryption technology. At present, China's digital image encryption technology is still relatively backward, which is far from the high level of foreign regions. Therefore, China can only create its own algorithm and study a complete standard system in combination with the development status of the national economy, so as to solve the possible difficulties in the future.

#### **4. Research on Information Security in Digital Image Encryption**

Image encryption technology is based on advanced image encryption algorithm. It has strong privacy and is the biggest highlight of this technology. If it can be applied to computer network, the security and reliability of computer network system will appear. enterIt's a big step. With the development of modern science and technology, the research on image encryption technology needs to be further optimized and improved. With the rapid development of computer network, the advanced level of multimedia technology is constantly improving. Digital image information security has become one of the problems that must be solved at present. In recent years, digital image technology has solved the problem caused by too large storage space, so it has been greatly sought after in information expression. Among the international research topics, how to ensure the security of digital image information has always maintained a high research hotspot. The research on hiding algorithm and camouflage algorithm in digital image information security can be divided into the following aspects:

##### **4.1 Digital Image**

There are two main methods, one is to modify the transformation domain parameters of the digital image, the other is to replace the spatial domain of the digital image, which will produce some messy images without regularity, and protect the authenticity of the content' Scholars' life mode, malfibrous transformation and Arnold little are all based on digital transformation skills, and have been warmly pursued in the pre-processing and post-processing of digital image information security processing. It has made great contributions to protecting image information security.

##### **4.2 Digital Image Information Hiding**

The information hidden in digital image information is no different from classical password. It is a kind of digital image information hidden in public images, which gives full play to the confusion advantage of public images, avoids the detection of attackers and reduces attacks. Frequency, so that the digital image information can be guaranteed.

##### **4.3 Digital Image Watermarking Technology**

Digital image watermarking technology embeds the relevant information of the copyright owner in a special way. Once a copyright dispute arises, the digital watermark can be extracted by using the corresponding algorithm to verify the copyright property, so that the legitimate rights and interests of the copyright owner of electronic publications are not troubled by illegal piracy.

##### **4.4 Digital Images**

Digital images are stored by dispersing confidential information, so as to hide all parts of confidential information. After this treatment, the illegal attacker must get more time and energy to obtain all the contents, and can resist the owner of the confidential information, so as to significantly improve the confidentiality of the information.

## **5. Conclusion**

At this stage, China's economy is developing rapidly and the information industry is constantly improving, but it also brings some new problems. For example, the problem of digital image information security is caused by the rapid development of computer network. In recent years, digital image technology has solved the traditional storage problem. Although digital image has many advantages, how to ensure digital image information has become an international research topic, including mathematics, cryptography and computer, which is used to calculate the main topic between digital image information security technology and other disciplines. This paper analyzes the problems existing in digital image encryption technology, and puts forward corresponding solutions according to the current situation of digital image encryption technology, hoping to provide some theoretical basis for the development of digital image encryption technology in China.

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