

# Research on Visual Communication Optimization Method Based on Image Processing Technology

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**Abstract.** Visual communication as the focus of the development of new media industry, in the rapid development of social economy and science and technology, the emergence of digital multimedia continues to challenge, and enrich the traditional visual communication methods, expand the contemporary visual communication design concept and application technology, guide visual communication from static and flat to dynamic and integrated. After understanding the current concept and development status of visual communication and image processing technology, this paper mainly studies ship image optimization system based on visual communication technology according to the application direction of computer image processing technology in visual communication system. The final experimental results show that the ship image optimization can effectively reduce the peak signal-to-noise ratio and ensure the clarity of the final image.

**Keywords:** Image processing technology; Visual communication; Animation design; Map imaging technology; Three-dimensional spatial imaging technology.

## 1. Introduction

In the continuous development of modern society, computer technology plays an important role in daily life and practical work, among which graphics and image processing technology, as a basic component of the computer field, has been widely used in the current society, and the resulting works can bring great visual impact to people. In essence, computer graphics image processing technology refers to the use of concept or mathematical description to represent the geometric data of the object, the use of computers to modify, store, display and other basic operations. Nowadays, the common computer graphics image processing technologies include image restoration, image enhancement, image coding, image digitization, etc., which can use computers to combine graphics with color, dynamic and static. The selection and development of materials and software technology are crucial. The novel design materials and advanced software technology can make the graphics and image processing technology achieve excellent results during the application period. Visual communication refers to the effective communication between people using the way of looking, which is an effective way of visual language expression. For people in different regions and different cultures, the use of visual and media to convey information or cultural exchanges can effectively overcome the barriers of language barrier and different characters, and obtain understanding through visual consensus such as pictures, patterns and graphics. In the visual communication design, points, lines and surfaces will be regarded as the basis for conversion operations, and visual media performance will be transmitted to the audience, truly reflecting the characteristics of The Times and rich connotations.[1-3]

The concept of visual communication design first appeared in the World Design Conference in Tokyo, Japan, in the 1960s, which includes printed propaganda, newspapers, magazines, posters and other communication media, mainly refers to the effective transmission of images and graphic communication content. After the evolution of commercial art, industrial art, printing art, decoration design, graphic design and other stages, visual communication design has gradually developed into

a design method using visual media as the carrier and visual symbols to express and convey information. In the era of new media, the media industry has a new development model, the field of visual communication design is also constantly expanding, and the direction of visual communication design has undergone great changes. A series of innovative developments have made visual communication design realize effective innovation, which not only meets the development needs of the public, but also speeds up the pace of innovation and development of the media industry. A comparative analysis of traditional media and new media shows that the former mainly uses TV, radio and newspaper as the main media, while the latter uses mobile technology data terminal, digital information technology, knowledge economy products, computers, mobile phones and other smart devices as the main basis. Under the development trend of economic globalization, digital media technology has the characteristics of virtualization, fragmentation, and extensive, and has begun to develop steadily in the direction of personalization, diversification, and diversification. As a theoretical and technical means accompanied by the new media era, visual communication technology, due to its unique media and technology, has produced a broader integration trend with information technology and digital data mode under the background of the new media era, enabling more audiences to obtain diversified information. Therefore, it is necessary to continue to study relevant technical theories in the future. Truly meet people's needs for information dissemination. Therefore, this paper mainly studies the visual communication optimization method with image processing technology as the core, and focuses on the visual communication technology and related images in the ship security monitoring system, so as to verify the application advantages of image processing technology in the visual communication design system.[4-6]

## **2. Methods**

### **2.1 Animation Design**

Animation, as one of the more common spiritual entertainment channels for human beings, can not only get a happy feeling through watching animation videos, but also present certain educational significance. Nowadays, most animation designs use graphics and image processing technology and computer equipment for design optimization, and finally present beautiful animation works to the audience. From the perspective of practical application of graphics, image processing technology can further improve the efficiency and quality of animation works, help designers grasp more design inspiration, quickly complete the information dissemination of animation works, and constantly enrich the spiritual world of human beings.[7-9]

### **2.2 Map image technology**

In the rapid development of computer technology, communication technology and space technology, electronic image map has been widely used. How to use image map to solve the problems raised by the public is the main topic of comprehensive research by researchers. Due to the large geographical area of our country, many people cannot master the local walking route after coming to a strange city for vacation or business reasons, so they can convert the original map information into recognizable content with the help of computer graphics and image processing technology, which can not only solve the low accuracy of traditional hand-drawn maps, but also visually present the real scene of the local area. In order to provide convenient conditions for human real life. Nowadays, the design of the more common electronic image map system will follow the

following principles: First, the system content should start from the user's point of view, and fully show the basic characteristics of serving the public; Secondly, because the electronic image map system is mainly for the general public, the combination of practicality and technology is the basic requirement of system research and production; Finally, the electronic image map system has regional characteristics, and the functional design and data selection should be considered according to the geographical environment of different regions to ensure that the overall structure design is convenient, flexible and easy to operate.

According to the analysis of the system architecture diagram shown in Figure 1 below, the functional modules of the overall system design are mainly divided into the following contents: First, vector display. This module is mainly to superimpose and display all kinds of information on topographic maps, including airports, stations, roads, etc. Second, raster display. This module mainly shows the aviation impact; Third, attribute tags. This module mainly marks the relevant attributes of all kinds of usage information; Fourth, roam scaling. This module mainly carries out stepless scaling and roaming of vector and grid diagrams. Fifth, query display. This module mainly queries and retrieves the information of ground objects, and provides the query results to the user.

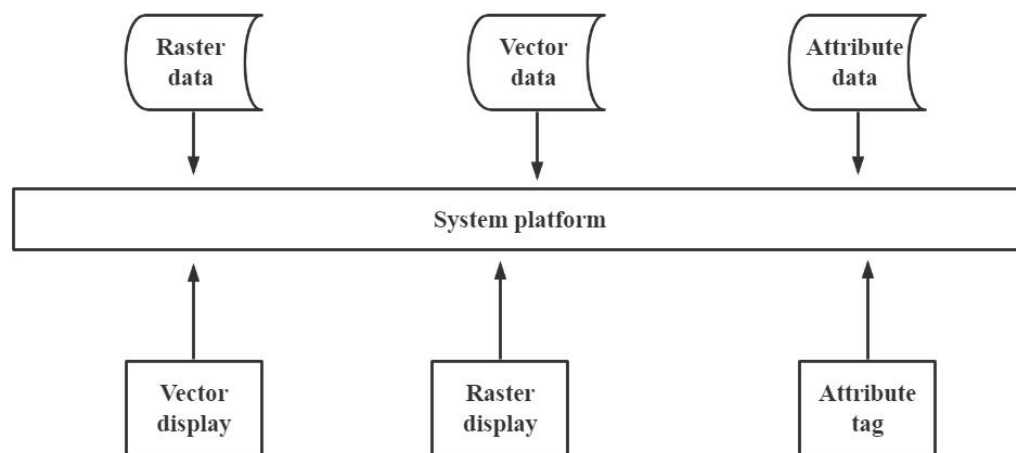


Figure 1 Architecture diagram of the electronic image map system

### 2.3 Three-dimensional spatial imaging technology

As computer graphics and image processing technology becomes more and more mature, more and more three-dimensional spatial imaging technologies appear in life and work. For example, television can be transformed from two-dimensional imaging to three-dimensional imaging through graphics and image processing technology, and computer screens can also be adjusted to three-dimensional imaging mode. For example, holographic technology, as an intuitive representation of three-dimensional spatial imaging technology, has the characteristics of three-dimensional authenticity and large amount of stored information. At present, it has experienced three stages of traditional optical holography, digital holography and computational holography, which help to preserve precious art materials and achieve good display results. In essence, holographic projection technology is the reverse display of holographic technology, will form a three-dimensional image on the air or a special three-dimensional lens, different from the traditional flat screen projection technology, is a real 3D image technology means. At present, in order to realize holographic projection, some scholars have proposed three-dimensional holographic imaging methods, three-dimensional holographic imaging devices and equipment based on laser in

the existing technical means, which are mainly used to solve the complex structural problems of three-dimensional holographic imaging in the existing technology and reduce the difficulty of realizing three-dimensional holographic imaging. According to the analysis of the flow chart of three-dimensional spatial imaging technology shown in FIG. 2 below, it can be seen that in the implementation process of this technology and method, the first data corresponding to the first polar coordinate and the second data corresponding to the second polar coordinate need to be obtained according to the image processing content waiting to be displayed. The first data contains the attitude information of the first scanning galvanometer component, the angular velocity information, the on-off information of the first laser beam, and the position information of the first pixel; the second data contains the attitude information of the second scanning galvanometer component, the angular velocity information, the on-off information of the second laser beam, and the position information of the second pixel.[10-13]

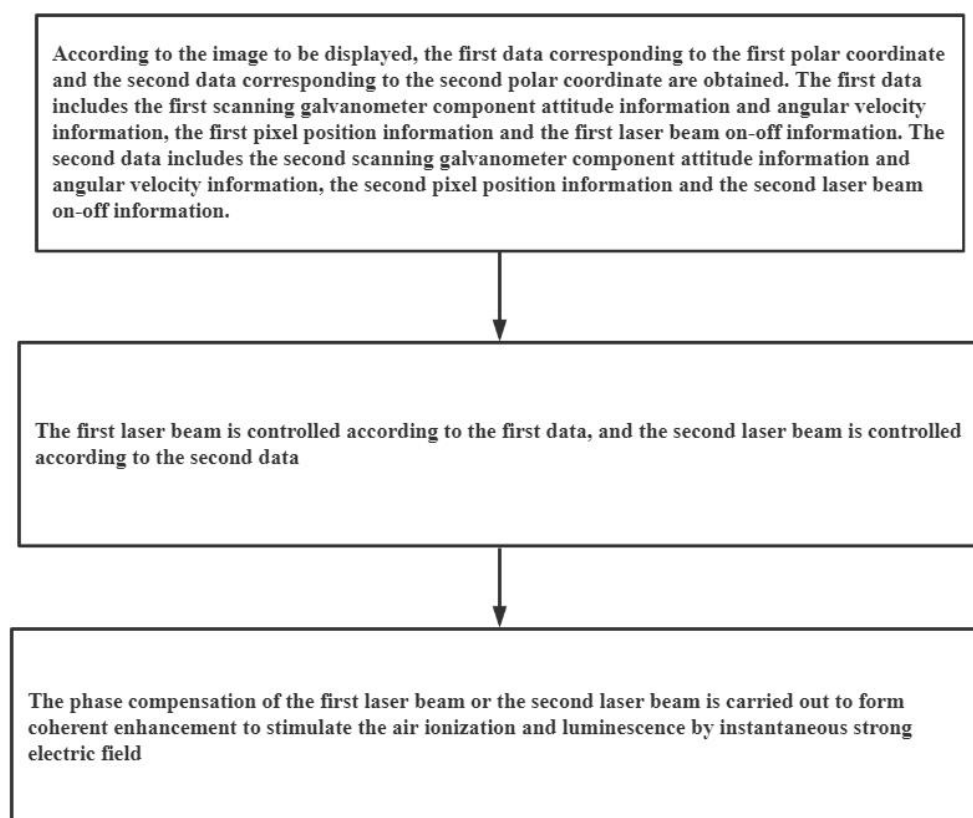


Figure 2 Flow chart of three-dimensional space imaging technology

### 3. Result analysis

#### 3.1 Ship image optimization model

In ship image recognition, it is necessary to build a multi-feature fusion target recognition framework, and identify various types of ship image information by selecting ship target detection to ensure the reliability and accuracy of imaging. The ship image target information can accurately show the different features of the ship image, reduce the sensitivity of noise, enhance the difference of features, and use the special information to accurately identify the ship target. As the main factor affecting the image quality of ship, the Marine background is continuously optimized after the introduction of Gaussian function to eliminate the ship image interference. In the ship image

optimization model, the optimization algorithm is used to determine the optimization target according to the image quality and size, and ensure that the model fully covers the abnormal data in the ship image. Under the condition that the value of adjacent pixels, image sharpness and number of pixel edge points are clearly defined, the image to be processed is divided into multiple super pixel blocks, and two thresholds are set. The image effect is optimized by using pixel segmentation scale and linear average fusion numerical value, so as to complete the image optimization design of local image feature points for effective processing. The detection method should use Gaussian scale space recognition.[13-15]

### 3.2 Simulation experiment

In the research experiment of this paper, traditional detection method and visual communication optimization technology are mainly selected, and the comparison results of the two are shown in Figure 3 below:

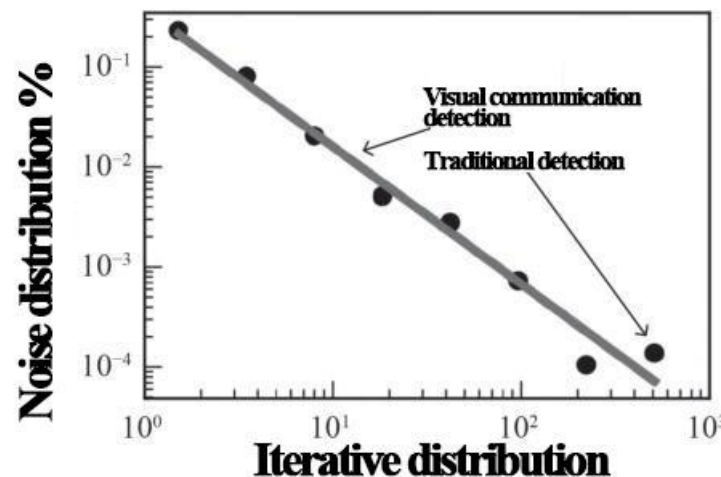


Figure 3. Comparison and effect diagram

According to the analysis of the above figure, it can be seen that the number of noise points in the ship image will increase with the increase of detection time, but in the detection method proposed in this paper, the number of noise points will remain below  $10^{-4}$  after 400s, and will not continue to increase. And the number of noise points of the traditional detection methods will continue to rise, and will increase indefinitely. Therefore, the visual communication optimization technology proposed in this paper can reduce the number of noise points and improve the image optimization effect. The feature point extraction results of the spatial angle recovery method and the transformation field recovery method and the actual image have large biased. When studying the peak SNR, it can be found that after the image optimization to two times, the difference of different resolutions is smaller, which proves that the optimization effect of this paper is better.

## 4. Conclusion

To sum up, the application of computer graphics image processing technology in visual communication design is reflected in many aspects, the common content is map image technology, advertising design, text design, animation design and so on. With the continuous development of social economy and science and technology, artificial intelligence and Internet of Things

technology are becoming more and more mature, and the future graphics and image processing technology has a high research value in the optimization of visual communication system.

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