Analysis of Computer Image Processing Technology in Web Design

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Abstract: Computer image processing technology plays an important role in web design, which can effectively increase the attractiveness and artistic sense of web pages. This paper analyzes the role of images in web design, discusses the development of current computer image processing technology, and analyzes the fusion of the two, and proposes the application of computer image processing technology in web design.

1. INTRODUCTION

Web page design is generated under the background of the gradual development of network technology and computer technology. This is a simple programming technique. In the process of webpage design and programming, the most commonly used is computer image processing technology. Its purpose is to convey certain information to the audience through images, texts, videos, etc. [1]. Web design must be artistic and influential. Web pages designed to be able to appeal to the characteristics of the crowd. Therefore, we must attach great importance to the application of computer image processing technology in web design. Web design grows with the growth of market demand, especially the growing demand for commercial web pages, which places higher demands on web page design.

The image occupies a large proportion in the web design. For the user, the image is also one of the most attractive factors. The role of images in web design mainly includes two aspects: (1) visual attraction function. Compared with texts, for web page viewers, the images will be more intuitive, they can attract the attention of the viewers, stimulate the browsing interest of the web pages, and increase the website browsing rate. Because of this, this intuitive function of the image plays a crucial role in the design of the entire web page, and it can enhance the artistic feeling of the overall web design. According to the survey report, whether viewers are interested in web pages, images are the most important influencing factors. (2) Information guidance function. The basic purpose of web design is to meet the different needs of different users, so that users can quickly find the information they need on the web page. The image is just able to meet the user's needs, to ensure that users quickly find the information they need, to provide users with convenience, saving the user's time. At the same time, it is also possible to increase the attractiveness of web pages through images, thereby ensuring the website's page views [2].

2. COMMON TECHNIQUES USED IN COMPUTER IMAGE PROCESSING

Computer image technology is relatively mature at present, and computer image processing technology is used in many fields. The following are overviews of several commonly used image processing technologies, including: image recognition technology, image enhancement technology, image compression technology, and image denoising technology.
2.1. Image Recognition Technology

Image recognition technology is one of the important goals of computer processing images. The symbol obtained by the computer is the basis of the image file, represents a data image with a specific meaning, has a function of image combination, and is not only a computer file with random distribution characteristics of the computer, but the combination of the images can obtain useful information. For example, fingerprint recognition, face recognition, license plate number recognition, and the like are commonly used computer image processing technologies and all relate to an image recognition mode and refer to a process in which a computer processes a computer image by reading a data file. Commonly used recognition modes include recognition modes such as structural pattern recognition, fuzzy recognition, and statistical recognition.

2.2. Image Enhancement Technology

In image processing, information enhancement technology is mainly used to highlight the important information in the image, and the unimportant information is weakened, creating conditions to facilitate the later image processing. In the process of image collection, a variety of factors will affect the image collection effect. For example, the camera has a lower resolution and the lighting conditions such as lighting are relatively poor, resulting in a lower pixel image. When processing using image enhancement technology, the processing work includes: enhancing the edges and colors of the image. After the image enhancement processing is completed, the picture quality of the picture can be improved and the visual effect of the picture can be enhanced.

According to the different processing space, image enhancement methods can be divided into two major categories based on transform domain and image domain. For each different image processing object, it can be divided into pixel-based and template-based groups. Among them, template-based image processing mainly enhances in a small area of the image. With pixel-based enhancement, other pixels do not affect the pixel when processing a single pixel [3].

In the image enhancement method, the spatial image enhancement algorithm refers to a method of directly enhancing pixels, and the formula can be expressed as:

$$g(x, y) = EH[f(x, y)]$$ (1)

Where f(.) represents the original image, g(.) represents the enhanced image, and EH represents the enhancement operation. If EH is performed on each (x, y), EH represents a point operation; if EH is mainly operated on a neighborhood of (x, y), EH represents a template operation.

When using squares as neighborhoods, it is easiest to enhance. If the smallest square is a single pixel, it is a point operation. In this case, the value of $f(\cdot)$ at (x, y) determines the value of $g(\cdot)$. Assuming that s and t represent the grey values of $f(\cdot)$ and $g(\cdot)$ at position (x, y) respectively, Equation (1) can be written as:

$$t = EH(s)$$ (2)

In order to analyze and process the image quickly and efficiently, the image space transform processing is first performed for the intended effect of the image processing, which lays the foundation for the subsequent image processing work. After some processing measures are taken, the image is finally returned to the original space. The common spatial transformation mainly uses the frequency domain space, and the corresponding enhancement expression in the frequency domain space is expressed as:

$$g(x, y) = F^{-1}[EH[F[f(x, y)]]]$$ (3)

In the discussion of image enhancement processing, the image transformation is considered from the whole. In actual operation, only a certain part of the image needs to be enhanced. Thus, the image enhancement technology is divided into global processing and local image enhancement. deal with. In addition, the above operations and processing are mainly directed to grayscale images. In recent years, the use of color images has become more widespread, and enhancement processing methods for color images have also been rapidly developed. According to different processing objects, the image enhancement processing method is further divided into grayscale image processing and color image processing [4]. Researches on the processing and implementation methods of grayscale images and color
images mainly focus on the airspace transform and frequency domain methods. Some of the more classic image enhancement methods are more common in the real-world processing measures, and various types of processing methods also have their own limitations.

2.3. Image Compression Technology
The data image pixels obtained by digitization technology are large, and the still image pixel range is generally between 500×500 and 1000×1000 pixels. When a dynamic image is acquired, there will be a greater amount of data. Therefore, to improve the transmission efficiency of the image, it is necessary to adopt relevant compression techniques to compress the image and then transmit the image data, which can improve the efficiency of image transmission and greatly reduce the system overhead. In methods commonly used in image compression techniques, such as approximate processing, distortion-free processing, and transform compression, JPEG and MJPEG standard compression are widely used. In the compression processing of the dynamic image, an approximate method is often used, which results in partial distortion of the compressed image. In the static image compression processing, an undistorted method is commonly used to obtain a higher resolution image [5].

Transform compression is one of the commonly used image compression techniques and is often used in JPEG image compression processing. The image data described on the spatial domain is subjected to transform processing such as Fourier transform, cosine transform, Walsh transform, etc., and then the image is described in the corresponding transform domain. Through the transform process, the correlation of the image is reduced in the transform domain. The two-dimensional filtered image processing and entropy encoding in the frequency domain are used to further reduce the compression and encoding bit rate of the image. The principle of transform compression technology is shown in Figure 1 below.

![Figure 1 principle of transform compression processing technology](image)

Here, G represents the input source image, G' represents the decoded image, U represents the orthogonal transform processing of the image, and U' represents the two-dimensional orthogonal inverse transform processing of the image.

2.4. Image Noise Processing Technology
When the computer is used to collect image data, there will be many large decibel noises, mainly because the physical characteristics of the computer system will cause these noises. These noises generated are extremely unfavorable to the transmission of image information. Therefore, appropriate noise removal measures must be taken to ensure the image quality and display effect when designing web pages.

Since the wavelet noise removal method has the advantages of multi-resolution characteristics, low entropy, etc., the image denoising effect is better. Wavelet functions have important features such as tight support, symmetry, and orthogonality, but scalar wavelets can only possess certain characteristics, but cannot have these properties at the same time. After many years of research, these properties can be simultaneously present in a multiwavelet image processing system. Compared with a single wavelet, multiwavelets have advantages in signal processing.
3. APPLICATION OF COMPUTER IMAGE PROCESSING IN WEBPAGE DESIGN

In the process of webpage design, the realism and real effect of the image are the core of the computer image processing technology, so that the artistry and rationality of the overall design are further improved. The original images taken by many computers are difficult to meet this requirement. Therefore, it is necessary to adopt corresponding computer image processing technology for further processing. For the real sense presented in the image data, a processing strategy based on the volume and surface area measurement algorithm is adopted, and experiments show that good results can be obtained. The computer image processing flow based on the volume and surface area measurement algorithm is shown in Figure 3 below.

3.1. Computer Image Format Analysis

A variety of image formats are widely used in computers. The three image formats used in web design mainly include:

(1) GIF format: Graphics Interchange Format, the graphics exchange format, according to its technical characteristics, the use of lossless compression algorithm for image compression, the maximum support for image color is 256 colors. GIF features include: transparent processing capabilities; support for animation; interleaving processing features; Including cartoons, illustrations, sketches, and other image applications, this image format is best suited for Internet application image formats.

(2) JPEG format: Joint Photo-graphic Experts Group, the joint static graphics expert group, this type of image file has a high compression ratio, making the file data volume greatly reduced, to provide effective support for saving hard disk space. Due to the loss of image data during compression, this algorithm is lossy and non-professional users are unaware of this loss of data. Disadvantages of the JPEG format include: Transparency effects are not supported and animation effects cannot be applied. JPEG is generally not used in data transmission and is used less when performing network transmission.
of image data. It is used in image digitization and image scanning.

(3) PNG format: Portable Network Graphics, belongs to portable network graphics, and is closely related to the network technology image file format. PNG has the advantages of the above two image formats. It can be used in high-definition true-color images. True colors can contain up to 10 million kinds of colors and can be used normally in normal 256 images. Compression algorithms are used in image files and are suitable for network communications. Nowadays, the Internet has been widely used. The PNG format has developed into the current mainstream image file format.

3.2. **Optimization Of Image Processing**

In the web design, it is difficult to meet the requirement of the webpage for designing the original image of the website. The original image must be processed by the designer and select the appropriate image processing technology so that the image meets the needs of the webpage display. Most web designers can skillfully use professional image processing software. Common image processing software includes Photoshop and Fireworks. Web designers are proficient in the use of these two software, which helps optimize the display of images on web pages to achieve the desired image display effect. The pixel size of the picture should be adapted to the display requirements of the computer. At present, the 1280*800 pixel is a frequently used pixel format in the background design of a web page. This format has a high degree of matching with the current mainstream display.

3.3. **Perform A Variety Of Image Style Combinations**

Computer image processing technology is very important in webpage design. In the webpage design process, the choice of image format is very important. According to the design criteria, select the appropriate image to ensure that the image can meet the needs of webpage design. Photographs, screenshots, and simple images are used in the actual image processing. Different images will produce different visual effects [2]. In general, photographic images are more intuitive and realistic, and can lead the user to a specific situation. Users are more willing to accept this type of image. After the photographic images are processed, the images and texts can be effectively integrated in the web pages, satisfying the needs of the viewers from the point of view of aesthetic requirements, and obtaining good visual effects. Such a web design scheme is currently popular. If the photographic images used are relatively single, it is very easy to make the web pages appear tedious and it is difficult to highlight the main body of the web pages. Using a variety of images for combination becomes the best choice for web page designers. In the illustration method, an illustration application is applied near the webpage text so that the textual information can be better expressed.

3.4. **Controlling The Need For Picture Size In Web Design**

Taking into account the limited length and width of computer screens, it is necessary to limit the images in the webpage design. The image design should be controlled within the range of the length and width of the computer screen; the definition factor must be fully considered in the webpage design, and the image size must be designed. Associated with sharpness, if a series of image processing techniques are used to amplify the image, it will result in a decrease in its sharpness to a certain extent. If the definition of the picture is too high, the loading speed of the web page will be greatly reduced, which will affect the viewer's experience. Find a balance between the size of the picture and the clarity, so that the picture size can be guaranteed to improve the browser loading speed.

3.5. **Enhancing The Role Of Images In Web Pages**

Different forms of images have different roles in web design. Different forms of images have different web design effects. In web design, displaying the image in the form of a chart can make the image more prominent. In addition, images can be displayed in the form of backgrounds to enrich the content of web pages. When necessary, with appropriate text or other information, personalized and diversified features are presented throughout the web design, which greatly increases the attractiveness of the web pages to the user, so as to obtain more views. When processing computer images, tools such as Photoshop and
Color Edge are often used \cite{5}. The comprehensive use of these software enables the web designer's needs to be met, so that the personalized features of web page design can be reflected.

3.6. *Optimizing The Need For Image Positioning In Web Design*

Different images have different roles in web design. With the help of various forms of images, web pages can present different styles. Forms, backgrounds, navigation and other methods can be used to represent the picture. The content of the page can also be directly displayed. In webpage design, if you need images as background, you need to combine the content of the webpage you want to design, use image data comprehensively, and set other types of data such as text, so that the webpage's sense of hierarchy will be improved and the webpage will be stimulated to the viewers. Attractive. By applying some lines or small-size pictures in web design, replacing the single connection logo and combining dynamic and static, the aesthetics of the web page will be improved.

4. CONCLUSION

So far, the development of Internet technology and related industries is very fast, and its system structure is very large. Web page design is only the basic unit of the Internet system. To design high-quality, high-quality web pages, the support of professional creativity is indispensable, and it is also inseparable from various computer image processing technologies. Because the image can increase the viewer's interest in the web page, it guides the viewer to select the information. In the webpage design process, techniques such as denoising, enhancement and compression technology processing are applied, and various image forms are comprehensively applied to control the size of images in the web page. The role of the image in the web page is continuously enhanced, so that the attractiveness and artistry of the web page are improved.

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