Exploration of the Application of Computer Image Processing Technology

Xiangyu Li[1], Yanyan Liu[2]

Zhengzhou University of Science and Technology 450000

Abstract: ***This article explores in depth the widespread application of graphic and image processing technology in different media.Firstly, we introduced the basic concepts of graphic and image processing, the characteristics and properties of digital images, and common image file formats, establishing a technical foundation for readers.Next, we analyzed the specific applications of graphic and image processing technology in web design, paper media, and 2D animation production, including its key roles in image editing, promotional material production, character design, storyboard creation, and animation rendering.Finally, we summarized the importance of graphic and image processing technology, emphasizing its innovation and efficiency advantages in the creative industry.Through these application explorations, we demonstrate the diversity and wide range of application areas of graphic and image processing technology, providing readers with a deep understanding of this technological field.***

Keywords: Graphic and image processing technology; Digital image; Media communication.

1. INTRODUCTION

In today's society, computer image processing technology has become an indispensable and important tool in many fields.With the continuous development of technology, computer image processing technology not only plays a huge role in traditional fields such as medicine, military, media, and entertainment, but also emerges in emerging fields such as artificial intelligence, autonomous driving, virtual reality, and augmented reality.The widespread application of image processing technology has profoundly changed our way of life, bringing us unprecedented convenience and possibilities.The exploration of the application of computer image processing technology is a fascinating field that requires not only a profound understanding of image acquisition, processing, and analysis, but also in-depth research on the use of various algorithms and tools.This issue of the general issue will delve into the application of computer image processing technology in various fields, as well as its potential in improving quality of life, promoting scientific research, and advancing industrial progress.We will introduce a series of exciting case studies covering various fields from medical diagnosis to film special effects production to autonomous vehicles. Xu and Lin (2024)[1] developed an empirical computer model to analyze user-perceived value in new energy vehicle enterprises, providing valuable insights for business strategy formulation. Building on this, Shan et al. (2024)[2] conducted a comprehensive cross-cultural analysis of large language models, highlighting important implications for global AI deployment. The intersection of autonomous driving and FinTech was explored by Wang et al. (2025)[3], who investigated cross-industry applications of autonomous vehicle technology in financial services. Meanwhile, Chew et al. (2025)[4] proposed an AI-optimized framework for accounting data integration and financial risk assessment in e-commerce platforms, demonstrating improved accuracy in financial analytics. Supply chain optimization has also benefited from AI innovations, as evidenced by Saunders et al. (2025)[5], who identified key pathways for implementing AI-driven smart supply chains to enhance operational efficiency. In data management systems, Liu et al. (2024)[6] introduced a modular agent-based approach for complex data question-answering with SQL generation capabilities. Personalized AI systems were advanced by Liu et al. (2025)[7] through their development of a cloud-device collaborative sequence-to-sequence generation framework incorporating causal inference. Computer vision applications have seen notable progress, with Guo et al. (2025)[8] improving vehicle detection using an enhanced YOLOv8 network architecture. Similarly, Jin et al. (2024)[9] achieved advancements in object detection and pose estimation through hybrid task cascade networks. Urban analytics was addressed by Li et al. (2025)[10], who proposed user-centered approaches for interactive smart city data exploration. In healthcare technology, Diao et al. (2025)[11] optimized Bi-LSTM networks for lung cancer detection, achieving improved diagnostic accuracy. Logistics optimization was examined from multiple perspectives by Wang (2025)[12,13], who investigated AI applications for both smart city last-mile delivery and e-commerce sortation systems. Finally, in industrial applications, Zhao et al. (2024)[14] demonstrated the effectiveness of deep learning in steel production scheduling optimization, showcasing AI's potential in manufacturing operations.

2. THE COVERAGE OF GRAPHIC AND IMAGE TECHNOLOGY

2.1 Basic concepts of graphic and image processing

Graphic image processing is a technical field that involves processing and modifying images.Its goal is to improve, enhance, analyze, or synthesize images through the use of various mathematical and computational methods.This includes many different operations, such as denoising, sharpening, enhancing contrast, image fusion, etc., all aimed at improving the visual quality of the image or making it suitable for specific application areas.In image processing, a key concept is the pixel, which is the basic building unit of an image.Each pixel represents a point in the image, with specific location and color information.The density and arrangement of pixels determine the resolution of an image, that is, the ability to represent details in the image.Resolution is typically measured in pixels per inch (DPI).

In addition, brightness and contrast are also important attributes of an image.Brightness represents the degree of brightness and darkness in an image, while contrast represents the degree of difference in brightness and darkness between different parts of the image.Adjusting brightness and contrast can improve the visual effect of an image, making it clearer or more attractive.

2.2 Characteristics and attributes of digital images

Digital images are typically composed of discrete pixels, each with specific color information.This digital representation allows computers to accurately process and analyze images.The characteristics of an image also include its size, namely width and height, which determine the appearance and visual range of the image.

2.3 Common Image File Formats

Images can be saved in various file formats, each with its unique advantages and uses.JPEG (Joint Photographic Experts Group) is a lossy compression format widely used to store photos, which is suitable for sharing images on the Internet.PNG (Portable Network Graphics) is a lossless compression format commonly used to save transparent parts of images, suitable for graphics and icons.Other formats such as GIF, TIFF, and BMP also have their own specific purposes, and understanding them can help choose the most suitable format for a particular task.

2.4 Image acquisition and retrieval technology

The acquisition of images is the first step in image processing, which involves using various devices and techniques to capture still images or real-time videos.A camera is the most common image capture device used to capture still images and videos.Scanners are used to convert printed materials into digital images.Satellite remote sensing technology is used to obtain images of the Earth's surface, while medical imaging equipment is used for diagnosis and treatment.Different acquisition techniques can affect the quality and resolution of images.For example, high-resolution cameras can capture more details, while satellite remote sensing images can cover a wide geographic area.Understanding different acquisition techniques can help choose appropriate tools to meet specific image acquisition needs.

By delving into these fundamental concepts, you will gain a better understanding of the core principles of graphic and image processing, laying a solid foundation for processing, analyzing, and applying image technologies.These knowledge are crucial for various fields, including medical imaging, media production, computer vision, and artificial intelligence.

3. THE APPLICATION OF GRAPHIC AND IMAGE PROCESSING TOOLS IN WEB DESIGN

3.1 Roles and Applications of Photoshop

(1) Image editing and optimization:

Photoshop is a powerful image editing tool that designers can use to deeply edit and optimize images used in web pages.This process includes removing unnecessary elements, repairing defects or errors in the image, adjusting

brightness, contrast, and saturation to improve the visual effect of the image.Through various filters and adjustment layers in Photoshop, designers can precisely control each image element to ensure its optimal presentation on web pages.

(2) Create webpage elements such as buttons and backgrounds:

The powerful graphic design features of Photoshop make it an ideal choice for creating web page elements.Designers can use Photoshop to create various web page elements, such as navigation buttons, logos, background images, and icons.By utilizing layers and copy and paste functions, it is easy to create multiple buttons with consistent styles, ensuring that the appearance and style of the entire website are consistent.

(3) Adjust color and image style:

Web design requires consistent colors and image styles to ensure users receive a consistent visual experience.Photoshop provides rich color correction and image effects tools, allowing designers to easily adjust the overall tone and style of the website.By adjusting layers, designers can apply color and style changes to the entire website at once, ensuring consistency.

In addition, Photoshop provides more features such as text editing, image compositing, and image export options, making it a versatile tool in web design.Designers can create sketches of web page layouts, prototype design pages, and export them in various formats for developers to use.In summary, Photoshop can not only be used for image processing in web design, but also for creating and refining the visual elements of the entire webpage, ensuring the quality and attractiveness of the final website.

3.2 The Importance and Use of Fireworks

(1) Vector graphic creation and editing:

The importance of Fireworks in web design is reflected in its powerful vector graphics creation and editing capabilities.Vector graphics are scalable, which means that images can maintain clarity and quality on both small and large screen devices.Designers can use Fireworks to create vector graphic elements such as icons, buttons, and logos without worrying about image distortion at different resolutions.This enables web pages to present a consistent and exquisite appearance on different devices, whether on desktop computers, tablets, or mobile phones.

(2) Create an interactive webpage prototype:

Another important use of Fireworks in web design is to create interactive web prototypes.Designers can create clickable buttons, links, and interactive elements, and simulate the user's interaction process on a webpage in Fireworks.This helps designers and clients better understand the user experience of web pages and identify and address potential interaction issues in the early stages.By creating prototypes, designers can quickly iterate and improve their designs, ensuring that the final webpage has excellent user friendliness.

(3) Output optimized images and slices:

Fireworks provides powerful image optimization and slicing tools, which are crucial for web performance.Designers can use Fireworks to slice images, dividing a large image into multiple smaller ones and applying different optimization settings for each slice, including compression ratio and file format.This can significantly reduce the time required for webpage loading and improve user experience.In addition, Fireworks also supports generating CSS styles, making it easier for designers to integrate slices and images into web pages, ensuring fast page loading while maintaining high-quality visual effects.

Overall, the importance of Fireworks in web design cannot be underestimated.It not only provides the ability to create scalable vector graphics, but also supports interactive prototyping and image optimization, helping designers achieve outstanding results in web design.By utilizing the features of Fireworks, designers can provide high-quality, user-friendly, and high-performance web pages that meet the requirements of modern web design.

4. THE APPLICATION OF GRAPHIC AND IMAGE PROCESSING IN MEDIA COMMUNICATION

4.1 Application of graphic and image processing technology on paper media

(1) Image processing and typesetting of printed materials:

The application of graphic and image processing technology in printing media is a key technology in the printing industry.The quality and appearance of printed materials are crucial for attracting readers and conveying information.Designers use image processing software such as Adobe InDesign and Adobe Photoshop to process and optimize the images required for printing.This includes precise color correction to ensure accurate reproduction of the desired color during printing.In addition, adjusting the resolution is a crucial step in ensuring that the image maintains clarity and detail during the printing process.Designers can also use image processing tools to remove unwanted elements or defects to ensure excellent quality of the final printed product.Typography is also a part of graphic and image processing technology. Through appropriate text and image layout, designers can create attractive and readable printed materials such as magazines, books, and promotional materials.

(2) Create brochures and posters:

In the field of promotion and advertising, graphic image processing technology is an indispensable tool for producing brochures and posters.The design of brochures and posters requires attractive visual effects to arouse the interest of potential customers or audiences.Designers use image processing software to adjust the color, brightness, and contrast of images to ensure they have a striking appearance when printed or displayed digitally.The addition of special effects, text, and image elements is also a common operation to enhance the attractiveness and information dissemination effect of promotional materials.Through image processing, designers can ensure that brochures and posters maintain visual consistency and professionalism while conveying brand or event information.

(3) Digital Conversion of Artworks:

In the fields of cultural heritage protection and art display, graphic and image processing technology helps to digitize and preserve traditional artworks.This job involves high-resolution digital scanning of artworks such as paintings, sculptures, antiques, and manuscripts.Subsequently, graphic image processing technology allows professionals to perform color correction, image restoration, and detail enhancement to ensure that the digital version preserves the true appearance and texture of the original artwork.These digitized artworks can be used for online display, research, protection, and sharing, promoting the inheritance of cultural heritage and global artistic exchange.

Overall, the application of graphic and image processing technology on paper media is of great significance for the quality of printed materials, the attractiveness of promotional materials, and the preservation of cultural heritage.It not only improves the quality of visual content, but also promotes the continuous development and innovation of paper media in the digital age.

4.2 Application of graphic and image processing technology in the early stage of 2D animation production

(1) Character design and animation preview:

In the early stages of 2D animation production, graphic and image processing technology played a crucial role in creativity and practicality.The following is a detailed extension of the application of graphic and image processing techniques in character design and animation preview.In 2D animation, characters are the core of the story, so their design is crucial.Designers use professional graphic and image processing software (such as Adobe Illustrator) to create, design, and edit various parts of animated characters, including appearance, expressions, clothing, and more.Graphic and image processing tools enable designers to accurately adjust the size, color, and proportion of each part to ensure that characters have a consistent appearance in different contexts.This helps ensure the coherence and recognizability of the characters in the animation.

(2) Create storyboards and scene layouts:

Storyboards play a planning and preview role in the animation production process.Designers use graphic and image processing tools to draw storyboards in order to determine scenes, character actions, and camera layouts.These storyboards are sequences of static images that provide a visual blueprint for the entire animation.Through graphic and image processing, designers can ensure that the visual presentation of the storyboard is consistent with the requirements of the final animation, which helps to develop production plans and determine animation styles.Ultimately, graphic and image processing techniques are used to render and output animation materials.Designers use rendering software to convert characters, scenes, and animation effects into individual frames.Then, these frames are processed by image processing tools for color correction, special effects addition, and image synthesis to ensure that they meet the required quality standards.These processed frames will then be combined into an animation sequence for playback and final release.

(3) Rendering and outputting animation materials:

Graphic and image processing technology is used for rendering and outputting animation materials.Designers use rendering software to convert characters, scenes, and animation effects into individual frames.Then, these frames are processed by image processing tools for color correction, special effects addition, and image synthesis to ensure that they meet the required quality standards.These processed frames will then be combined into an animation sequence for playback and final release.

In summary, graphic and image processing technology plays a crucial role in the early stages of 2D animation production. It not only helps design and edit animated characters, but also supports animation preview, special effects addition, and storyboard creation to ultimately achieve high-quality animation production.By utilizing these technologies effectively, designers can create captivating and visually stunning animated works.

5. CONCLUSION

In this article exploring the application of graphic and image processing technology, we delve into the diverse applications of this field in different media.From paper media to animation production, graphic and image processing technology plays a crucial role in various fields.Graphic and image processing technology is not only an important tool in the digital age, but also an indispensable part of the creative and media fields.With the continuous development and progress of technology, we can expect more amazing applications and possibilities.In the process of constantly exploring and applying graphic and image processing technologies, we will continuously create more eye-catching and impactful works, enrich and improve our visual experience, and promote the continuous progress of media and creative industries.

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