

The Application of Computer Image Processing Technology in Painting Creation

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Abstract — With computers and networks digital technology matures, digital design and digital painting is gradually integrated into many aspects of human life. Although compared to the traditional art forms, digital design and digital painting is in a growth period, for most people, yet it is more familiar with digital technology as an important scientific and technological developments of the century, it appears bound to the development of the visual arts have some impact. This paper presents an Image-based Rendering (IBR) painting method, which cannot rely on a priori knowledge of the user, and a color image is automatically converted to an image with painting effect. Image-based rendering is a new method of drawing computer graphics and image processing combining the need to establish geometric model, simply from the input image to obtain the required information through the viewpoint interpolation, image deformation method, reconstruction the desired effect. Computer art creation provides a practical platform, through this platform, we can communicate Arts and Sciences, contact tradition and the future, to promote the idea of continuous improvement and development of art, the digital creation and development to a brighter future.

Keywords - Image Processing; Painting Creation; Image-based Rendering

I. INTRODUCTION

With the rapid development of science and technology, people's information communication has undergone tremendous change, traditional media design models and tools has been an unprecedented challenge. With digital design to emerge in many areas, more and more artists began seeing how digital design and painting software and traditional design, combining the art of painting as one of the research topics of contemporary art [1-2]. This paper analyzes the development of digital design and digital painting profile at home and abroad, as well as the theoretical foundation in computer graphics drawing technique, and then analyze the relationship between digital art and traditional art design between clarifies the digital design to bring new art concept . Media Features arts and computer graphics computer graphic arts background information age which determines its different from traditional media art artistic thinking. Different media materials and technical background, the artist will require different ways of thinking [3]. Digital art design thinking and design approach influenced by digital technology, has become a symbol of the digital information age, mode of production. Digital Design brings new concept to promote the art digital and traditional design, combining the art of painting to explore and try.

The strong impact of digital technology in the field of art to traditional culture and art has injected new vigor and vitality, but also compared to the traditional arts, digital design and digital painting flourish can set a variety of art forms of its previous director the maps, text, images, sound financial and integration, emphasizing the interaction [4-5]. Digital design and digital painting created visual effects has more strong modern, gives a fresh, wonderful art experience

to the development of society, economy and culture and the arts have had a strong role in promoting. NPR (Non-Photorealistic Rendering, NPR) from the mid-1990s began to gradually become a hot research topic in computer graphics, it is a research field of computer technology and the combination of the art of painting, refers to the use of computer-generated does not have Photo-realism (Photorealistic Rendering, PR), and graphics technology has painted style. The goal is not to figure authenticity, but mainly in the graphic representation of artistic qualities, simulation works of art. NPR technology allows artists to emphasize certain details while ignoring other details, so artists can take advantage of NPR style painting simulation technology to generate images of different styles of art [6].

From the current digital technology and design, the trend of combining painting paper discusses the application of painting in computer image processing technology. Digital design and digital painting in Design, will be fully developed to make art in the digital age. Digital design and digital painting to make the building a multidimensional display environment, the creation of ideological, aesthetic effect of the texture of the material, and that these can be carried out on the computer integration and coordination, exchange of reconstruction, both can stimulate inspiration, to deepen and optimize creative theme, but can also increase the efficiency and accuracy of creation. Computer technology into the design will open up the image of perception, the formation of new visual tension, improve the quality of works of art, aptly demonstrate its connotation, and constantly create both innovative and contemporary works of art there. This paper further explores the digital technology functions in order of antiquity. Mature and other computer graphics, digital image processing and artificial intelligence techniques, you can make the ancient digitized virtual to reproduce and repair,

storage, color restoration, etc., for the protection of ancient relics, rehabilitation and research provides new means and methods in an entirely new way for the protection provides theoretical and experimental basis.

II. THEORETICAL BASIS OF COMPUTER IMAGE PAINTING TECHNIQUE

Computer graphics technology is the foundation upon which a computer image of artistic creation. It is the first to have computer hardware and software technology for support, more direct impact on the generation and processing speed and image quality. The computer system is a CPU (Central Processing Unit, namely operation and controller), a memory, a display and input and output devices and other components, the replacement rate is even based on a geometric progression rate of increase. Image technology can be simply summarized as vector graphics and pixel bitmap technology, vector graphics technology is calculated by a mathematical formula to get the point, line, surface, body, and then to describe the graphics technology, it is suitable for construction, industrial products accurate calculation of standard graphics requirements in the field of application of this technique generated graphics have the advantage of possession of less hardware resources, arbitrarily expanded or reduced without affecting image quality. Pixel bitmap image based on color science to solve another technique, also known as bitmap images or draw pictures. It is called pixels (picture elements) composed of a single point [7-9]. These points can be different arrangements and staining pattern to form. Image input through the input device to the computer, or directly generate digital images via computer software, digital information is actually exist, the screen each pixel are given a specific value, that is, when you change the picture on the monitor, in fact, That is for each digital picture changes accordingly. Now, with advances in computer graphics technology, virtual reality technology is its image any traditional media cannot match.

The computer's color system, there are several models coexist: bitmap mode, grayscale, duotone mode, HSB (ie hue, saturation, brightness) mode, RGB (red, green, blue) light colors mode, CHMK (ie cyan, magenta, yellow, black) printing mode, lab (ie brightness, green and blue yellow red shaft axis) mode, index-color mode, the multi-channel mode, and 8/16-bit mode, and the image description of each mode and the principles of color reproduction and the number of colors that can be displayed is different, the color mode is decided to display and print the electronic image color model (color model is simply a mathematical algorithm used to represent colors), namely a pair of electronic images what kind of a way to display or print the output on your computer [10]. At the same richness of color and complexity also depends on the level of intensity of the display device provided by a display 32 of the display that can display a combination of 4,294,967,396 colors, while the eyes of ordinary people only separated 1200-1400 million different color depth and hue, therefore, a computer image color richness imagined [11].

Through digital technology, we can easily achieve the kind of imitation and verisimilitude. But the use of computer art and design staff will have such a profound experience, using computer art design differs from traditional media art, stripped of blossoms brush ink Hearty. Computer graphics technology is equivalent to the equation beautifully, mechanical and precise, the same environment, using the same command, will produce the same result. Thus in computer graphics technology behind the powerful, there is also a limit, which is behind the artist's ideas and concepts, using the computer algorithm must obey the rules, in order to create their own works, or else be subject to the creation of a computer, no longer is falling into the trappings of a similar digital effects, perhaps precisely because of this unique and quite different from the traditional art media, computer graphic arts constitute a distinct personality, and now the use of computer graphics technology for art and design in two ways:

1) It is to follow an algorithm that can be programmed directly using the programming language design, such as computer fractal image; the second is to use computer algorithms have been developed using a good image of professional software programming language design. Image Professional software is commonly used as a community art design creative way, programmers digitized image elements necessary programming design and production of a range of different areas of the graphic image of professional software.

2) An image with the previous programming standpoint is different, it looks to mimic traditional art tools to learn and use as a principle, a set of imaging systems, resulting in a variety of applications in different fields of professional software; such as Photoshop plane software series , Corel Draw, Painter, etc; 3-D animation series 3DSMAX, Maya, Softimage and so on; the video series After Effect, Combustion, Premiere, etc; page production series software Front page, Dream Weaver et al., which also spawned a variety of computer Graphic arts.

III. THE CHARACTERISTICS AND APPLICATION OF PHOTOSHOP

By world-renowned software company develops, Adobe Photoshop is one of the most prominent, the most famous and the most commonly used image processing software, has been widely used. It combines the image changes, creative production, input and output, the scanned image is one that can be input and output functions in various formats, support for various color modes at the same time, convenient to select the various functions and other image and image editing , color adjustment, by the most graphic designer. Some applications are based ps Figure 1.



Figure 1. The applications of Photoshop.

Photoshop is one of the most typical and most authoritative tone function, which can be quickly and easily adjust the brightness of the color corrected image and adjust the color deviation, and also to meet the different color image in all aspects of the application. Image synthesis is each photo or image, by layer operation, select the application, and finally combined into a new image [3]. And Photoshop will be a very good drawing tools you can own ideas and select the external image fusion, designers need to combine the image. Special effects production is mainly dependent on the channel, tool in Photoshop, masks, filters and other comprehensive tools to complete.

IV. THE CHARACTERISTICS AND APPLICATION OF CORELDRAW

Drawing software's full name is graphic design graphics suite, which is the world's leading software companies, COREL Canada versatile graphics software. Without changing the thickness of the charts are accurate, it can be arbitrarily scaled graphics, and small store is that it features, so for designers vector animation and Web animation, page design, website design, bitmap editor to provide a lot of help [4]. Because of these advantages, it is widely used in CIS corporate image planning, print design, model diagrams, product packaging design, interior decoration design, typography, web design and other fields. Meanwhile, the graphic design of word processing features are not backward, which makes it widely used in choreography, brochures, newspapers, magazines and other word (s) processing technology. Some applications are based graphic design shown in Figure 2.



Figure 2. The applications of CorelDraw.

There are two applications in graphic design graphics, they are used for image editing and vector illustration, page layout. The perfect combination of the two applications for the majority of the user's computer graphic design to work to

bring a convenient tool, users can easily operate easily create a wide variety of real-time effects and bitmap image effects. Users can see the perfect graphic design software functionality and integrate existing design, graphic design and more creativity and flexibility.

V. THE CHARACTERISTICS AND APPLICATION OF ILLUSTRATOR

Illustrator is the Adobe product weight vector drawing software, the vector, layout, bitmap editor, image editing and drawing tools, and other elements, are widely used in advertising, graphic design, CI design, web design, illustration, product packaging design, logo design and other fields. Incomplete statistics, 97 percent of the world's designers using Illustrator software art and design. Adobe Illustrator, a professional graphic design, printing publications, multimedia and online image vector illustration software industry-standard, widely used, simple and convenient operation of graphic design software [5]. Some applications are based on Illustrator as shown in Figure 3.



Figure 3. The applications of Illustrator.

Because of its easy operation, the production of bright colors, lively, shape diversity, it has a strong visual impact characteristics. So the quality of illustrator is widely used animation to create a prototype, or made from a wide variety of original vector material, a large number of networks for a variety of media, graphic design, advertising and so on.

Computer graphics technology will become different categories of art homogenization of digital, can make the art and design of various categories of form a couple, so the computer image art become integrated multidisciplinary theoretical results, the overall quality of the image creation of the artist improve the requirements. In practice, the use of digital technology for creation and use of traditional tools for creation compared on a computer screen, creating more need a comprehensive overall concept, including the creation of procedures, and the degree of order and use the command effect. If the traditional art is a kind of sensibility to create more intuitive, it is the scientific design creative artistic sensibility based on computer graphics art. As the picture image texture effects of treatment, the object material awareness and choice, because the computer simulation of the objective world of materials has its own algorithms and rules, express the effect of the performance of the screen object, the texture of the performance of different materials are also resorting different.

How to seek the proper performance of which requires the creator of life, both perceptual and material accumulation, but also the need for the function of a computer simulation of material awareness, call the

appropriate performance of the screen material. Therefore, from the computer graphic arts creation process, the requirements of its rational classification cognitive thinking, so more emphasis on the creation of a computer image of a rational spirit than traditional art requires the artist to use a certain logical thinking on various relevant factors fully rational analysis and design, in order to create depth work.

VI. NON-PHOTOREALISTIC RENDERING IMAGE-BASED METHOD

Image-based rendering [[36] it is actually a realistic graphics rendering method, this method can not establish a geometric model to provide realistic scenes and animations. The advantage of this approach is that requires less computational resources, suitable for real-time implementation. Rendering time has nothing to do with the complexity of the scene, the image is readily accessible, can use real photos, you can use the image produced children how to draw.

The main method for image-based rendering have a viewpoint interpolation (view interpolation), image distortion and view morphing (image morphing and view morphing), all-optical function (plenoptic function), lumen Figure (lumigraph), the light field (lightfield) layered depth image (layered depth image), image-based visual convex hull see (image-based visualhull) and the like. Viewpoint interpolation method is the use of correspondence information between each reference image to reconstruct the desired view. In this method, a process based on pre-drawn geometry to establish correspondence between each reference image pixels, according to the order from the rear to the front of quadtree pre-compression flow field according to the depth value of the scene ((Z value) sorting, and using the reference image local neighborhood of New Perspective linear interpolation.

Image distortion (image morphing) is a commonly used image-based rendering techniques. Animation design, usually utilizing deformation techniques to produce a smooth transition between keyframes intermediate image, effectively morphing technology can generate three-dimensional world in a natural transformation between each object. However, when the image is distorted body shape or different viewpoint often leads to unnatural distortions, it is difficult to be amended by artificial means. If the image is distorted when considering the viewpoint changes and other three-dimensional effect is view morphing ((view morphing). More generally, the method without the three-dimensional shape information, only the image processing operations can be 3D projection of each object Transform (including three-dimensional rotation, translation, shear and wedging, etc.) to be integrated effect.

All-optical functions provide an accurate representation of problem-based image rendering technology, which describes all the radiant energy from the viewpoint of the observer can feel. Choose from any of the space in one point

of view V_x, V_y, V_z azimuth and elevation of a return, and the inner and the wavelength of the dynamic scene also

specify a time t , we can be all-optical function is expressed as:

$$P = P(\theta, \varphi, \lambda, V_x, V_y, V_z, t)$$

The term computer graphics, the all-optical function of all possible environmental mapping collection descriptions scene. In other words, it can function as a kind of all-optical representation of the scene. We can give to draw an image based on the following definition: given all-optical function of a set of discrete sample set, image-based rendering purpose of this function is to produce a continuous representation. This definition provides many avenues for further research, such as how to choose the best sampling point, how best to reconstruct from these sampling a continuous function, and so on. Lumen diagram describing a subset of the full function of all locations and all-optical directional light stream. If we assume that the air is clear, then, along a path through empty space radiation light a thing will remain unchanged. Further, if we will leave interest limited to a bound object light convex hull, then, just consider the value of all-optical function surrounded on a surface of the object. Therefore, all-optical functions formed by the this object can be reduced to a four-dimensional function. By means of a lumen map, you can quickly new property organisms image, regardless of the complexity of the child scene or object geometry or lighting. Light field method is not to match the depth of information or features, only to be combined with each of the reference image and re-sampling technique can produce a new view from any camera position. The key to this technique is that the input image is interpreted as a four-dimensional function (called a light field) two-dimensional slices. Light field function fully characterize the optical flow unobstructed through the space in a static scene with a fixed lighting of. Light field is no obstruction in the region of space in the optical radiation as a function of position and direction. In free space optical field is a four-dimensional function that creates the light field consists of a set of images, the equivalent of a two-dimensional slice of each insert dimensional light field representation.

Stack depth image generated by the viewpoint of a subject image scene view, it is characterized in that the line of sight along each comprising a plurality of pixel depth. It refers to the so-called pixel depth with depth information of the pixel, in this method, with a two-dimensional array of pixel values to store the stack depth. A laminated press pixel depth from front to back in order to store a plurality of pixels along a line of sight of depth. When using LDI draw, if the new viewpoint deviates from the original LDI viewpoint, we can show the surface of the first layer is not visible. The above method, the concept of all-optical function, lumens chart and other major light field in a certain sense in theory, in practical applications we will encounter many difficulties, because, even if it is for an object, to calculate the full light function, chart or lumens light field, must be sampled high density, that is, you must use the distribution in space close view photos. Most other image-based rendering method are subject to the same limitations. The most effective, the most promising approach might be based on geometry and image

based on the combination method, only a small amount of still images can be reconstructed and draw buildings scene, its modeling approach consists of two parts: one is the photography Modeling method, the shooting scene to restore the basic geometry.

Another part of the body is based on the difference, as the algorithm model, restore the actual scene and the basic model. During rendering, using texture mapping viewpoint concerning methods suitable texture can be extracted from multiple views of a scene and be combined to simulate basic geometric details on the model. On this basis, a view-dependent texture mapping method of high efficiency have been proposed. They were first on the scene visibility of pretreatment, for each polygon, determine which view you can see the polygon, and the establishment of a polygon view of the mappings, and then draw the scene with projective texture mapping method. Model recovered by the above method can be used geometry-based rendering system, it can also be used for image-based rendering system. This approach has achieved convincing results. The main limitation of this approach is that it is only suitable for building objects such basic structure is the rule. How to generate more complex scenarios, but also the need for more research.

VII. COMPUTER IMAGE PROCESSING TECHNOLOGY APPLICATION CASES IN THE DRAWING CREATION

Photoshop software color adjustment function, based on the need to change a part or the whole temperature changes, contrast, brightness, and other creative design sketches are constantly adjusting and repeatedly modified, as shown in FIG. This link is not only reflected in the image of the mood and aesthetic sublimation, is the ultimate goal of art is to promote a link, proper grasp of attention. Sketches throughout the design phase, Photoshop software continue to play a strong technological advantages, storage sketch showing step by step process full record, it is easy to modify. By using Photoshop software before many design ideas constantly become more perfect, and author of a deeper understanding of creative themes and content. This painting is not a traditional sketch rendering technology efficiency.



Figure 4. The painting creation case application based on computer image processing.

Materials already in the computer image combining, by repeating the review, the final choice of the best components

change, the successful completion of the work. This approach greatly reduces the writing test on the canvas, save a lot of time and effort. Art is the process of painting is a draft art is a kind of manual labor, and textured photographs background process is an iterative process. Therefore, the wise use of create a reasonable number of image processing techniques to create a service and bold new experimental techniques, expanding art form, rich aesthetic of great help.

VIII. CONCLUSION

Non-photorealistic rendering (NPR) is a new graphics rendering method developed in recent years, and its main purpose is not to generate a photo-like realism of the graphics, but that simulate a variety of artistic styles of painting. But previous systems require the user to have some professional art skills to draw a satisfactory ink style works. This paper presents a method for image-based paint, the color image can be directly entered into an ink works have, without requiring the user with relevant prior knowledge. This method first color image using Mean Shift smoothing and segmentation, and gray ink to form ink painting effect; then extract the edge of the divided regions; and finally use the edge of our own proposed diffusion algorithms to detect edge points diffusion starting, simulation of ink on rice paper diffusion effect, generating the final ink effect. This article will draw the image based rendering and painting combine thought, without user interaction intervention can facilitate the user does not have prior knowledge of Chinese ink painting and drawing skills can also achieve the effect of painting, quite interesting and popularity; fully Mean Shift algorithm takes advantage of the performance advantages of a color image smoothing and segmentation, by the image smoothing and segmentation effective performance of abstract painting, NPR features, and a simple grayscale performance ink effects ink; and achieve An effective diffusion algorithm based ink stroke edge, can successfully simulate the ink in ink on rice paper along the stroke boundary diffusion effect; experimental results show that this method of non-photorealistic rendering image-based rendering ideas and painting The method combined, can better the image into paintings.

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