System Design and Realization of Computer Image Processing Technology in Comic Creation

Na Yang1,*

1 Jilin Animation Institute Comic Institute, Jilin, China, 130000

*Corresponding author e-mail: yangna@jlai.edu.cn

Abstract. As an important branch of computer technology, computer graphics and image processing technology has been widely used in visual communication systems. Works designed with graphics and image processing technology have a strong impact on people's vision. The birth of this technology has enriched creators' creative means and improved innovation. Through the research on the related content of computer graphics and image processing technology, and make the designer's work more perfect.

Keywords: Image Processing Technology, Visual Communication System, Computer, Graphics

1. Introduction
Comic art design is also a comprehensive utilization of the space environment of comics. It satisfies people's functional use and visual aesthetic needs through art design [1-4]. With the development of computer image processing technology, the application of graphics and image processing technology in comic art design can improve the artificial intelligence and real-time processing capabilities of comic art design [5-8]. Research on the art design system based on image processing technology has broad application prospects [9-10]. This article analyzes the related content of computer graphics and image processing technology, and analyzes its application in the visual communication system in comic creation.

2. Image processing algorithm design
Taking Photoshop as an example, the process of image processing is generally shown in Figure 1.
2.1. Image brightness balance repair processing

The use of image processing technology to improve the design of the art design system requires the design of image processing algorithms first. Image processing mainly includes image noise reduction processing, image fusion processing and image edge contour feature extraction processing [7]. The grid division method of the art design image is adopted by the grid matrix division method. The block division method mainly adopts the rectangular block and the lasso block method. According to the artistic design, the image to be divided is divided according to the affine invariant moments. For several sub-blocks, the number of image sub-blocks is also

\[
\left(\frac{M}{16} + 1\right) \times \left(\frac{N}{16} + 1\right).
\]

In the artistically designed rectangular block model shown in Figure 1, the Jacobian iterative algorithm is used to perform image brightness equalization and restoration. Input the coefficient matrix An×n of the Jacobian transformation of the image, and the adjacent element vector is bn×1. The fusion error is ε, the initial solution vector is xn×1, and the edge pixel point of the center of the environmental art design image area restoration and positioning is taken as φ=θ. Let λ=σ/β, 

\[
F = \sqrt{U^2 + V^2},
\]

the conductivity equation of the best matching block area is:

\[
h(x, y) = \frac{1}{2\pi \sigma^2} \exp \left[ -\frac{1}{2} \left( \frac{x'^2}{\sigma^2} + \frac{y'^2}{\sigma^2} \right) \right] \cdot \exp \left[ 2\pi Fx' \right]
\]

(1)
Select the ht with the minimum error rate εt, determine the visual effect of artistic design in image restoration by the position of ψ0', calculate the inter-class bit rate, take the center frequency F as the rotation invariant moment, and the first repaired block Ψp is the diffraction the center quantity, from σ ≈ \( \frac{\pi}{F} \), get \( F \approx \frac{\pi}{\sigma} \), extract the damaged edge \( \partial\Omega \) and all edge pixels, and use the following formula to express the distribution sequence of new edge pixels:

\[
\phi_n = \frac{\pi k}{N}, k = 0, 1, 2, \ldots, N - 1
\]

Using the confidence optimization method of pixel point y to obtain the best matching block window function of the image distribution is \( W_i = \sqrt{2} \sigma = \sqrt{2} \frac{\pi}{F} \), the priority coefficient adjustment formula of the block to be repaired is:

\[
\begin{bmatrix}
  x' \\
  y' \\
  1
\end{bmatrix} =
\begin{bmatrix}
  \cos(-\theta_i) & -\sin(-\theta_i) & 0 \\
  \sin(-\theta_i) & \cos(-\theta_i) & 0 \\
  0 & 0 & 1
\end{bmatrix}
\begin{bmatrix}
  x \\
  y \\
  1
\end{bmatrix}
\]

(3)

Where: x and y are the two-dimensional distribution coordinates of the original environmental art design image.

2.2. Image fusion and wavelet denoising processing

On the basis of the image brightness equalization processing in the art design, combined with the pixel point quantitative tracking method for image fusion and wavelet noise reduction processing [8], in the grid points of the art design image area distribution, it is assumed that the newly extracted art The image feature expression equation is:

\[
W^\parallel (x, y) = \frac{G^\parallel (x, y)}{\sum_{j=1}^{t} \sum_{j=1}^{t} G^\parallel (x, y) + \varepsilon}
\]

(4)

Where: Gij(x,y) is the central moment of the template distribution of the rectangular block with (xij,yij) as the fusion area, and the edge contour mark of the front-view art design image is marked by the pixel mark, and the extracted edge contour mark is obtained for:

\[
G^\parallel (x, y) = \exp \left( -\frac{(x-x^\parallel)^2 + (y-y^\parallel)^2}{2\sigma^2} \right)
\]

(5)

3. Application of computer graphics and image processing technology in visual communication system

3.1. Character animation production steps

When creating bones, there are two methods to create them, namely creating a bone system and using the Biped animation system to create biped bones. When performing character skinning, there are two skinning methods, namely physique skinning and skin skinning. Comparing the effects of the two, we can see that physique skinning has higher integrity. The process of muscle gravity adjustment can be divided into the following steps: envelope range, muscle bulge shape, tendon creation, bone line influence range and so on. In the production of character animation, there are mainly two methods.
One is to create an IK chain after creating a skeleton to formulate skeletal constraints, and to make character animation based on key frame animation, and the other is to make it through the footstep animation module of the Biped animation system. Figure 1 shows the skeleton equipment, animation and interactive control skin.

3.2. Key points of animation production
The animation production process mainly includes four key points: First, edit and create key frames. For the production process, set key frames. Between key frames, 3DsMAX will interpolate. Ways to create key frames include motion panel, track view, track bar, and AutoKey button. The second is the tangent type. The tangent type and the controller are changed to achieve the purpose of interpolating between key frames. Bezier is the default displacement animation controller. When the controller comes into play, it will start to display and adjust and edit the trajectory. The third key item is the pivot point, which will affect the effect of zooming and rotating animation to a large extent. Finally, there are positive movements and links.

3.3. Character walking
Based on the files included in the 3DsMAX software, this article will carry out a comprehensive analysis of the production process of the character walking. Select File/Open, Feature_based/ik/ik_men in the menu bar. The view camera is adjusted according to the actual situation of the character walking, so as to achieve the purpose of effectively switching the camera view. Click the Zoom Extents All button to display all the views. Click the Animate animation recording button, determine the sliding time of the slider at the 15th frame, and record the animation setting process throughout. With the normal operation of the character, determine the maximum distance between its two legs, and complete the step of moving the center of gravity forward. Bone01 is an important means of controlling the character's center of gravity. Place his hands and feet in suitable positions. Move the slider time on frame 30. The foot that bears the center of gravity of the body is the foot that touches the ground first. Bend the character's knees to absorb the vibrations generated when landing. As the character moves, the center of the character changes continuously through the process of moving forward, raising the center of the body to the highest point. Switch both legs for support. As the center of the character moves forward, the heel that bears the weight will leave the ground first, and connect the sole of the foot to the body, and the character moves forward in a natural posture.

4. Software development and realization of comic creation art design system

4.1. System overall design description and development environment description
When designing the comic creation art design system in the MapInfo software development platform, when using the UDP protocol communication of the B/S architecture, it is necessary to link to establish the FTP in the Internet, and define a SOCKADDER_IN variable as the image processing control variable of the art design system. The comic creation art design system includes object domain, graphics rendering layer and graphics generation layer. The animation software conversion of artistic design is realized in the 3D image viewer, 3D graphics reconstruction is performed in the perception information service layer, and the object-oriented graphics processing software system is designed. According to the above analysis, the overall structure of the art design system based on image processing is obtained, as shown in Figure 2.
Figure 2. The overall structure of the art design system based on MapInfo

Analyze the development environment of the system design according to the overall structure model of the art design system, develop the art design system in the MapInfo mode, and design the network interface of the serial port, parallel port, and USB port to generate a high-fidelity 3D geometric model.

4.2. System software design

The software modules of the art design system designed in this paper mainly include program loading modules, data storage and reading and writing modules, bus transmission modules, and human-computer interaction modules. The design of each module is described as follows:

1) The program loads the module. The program loading module of the art design system has the function of program loading for image processing algorithms and control instructions. The MVC (Model View Controller) model is used to construct the control components of the graphics rendering system, and MySQL is used as the default system for program loading of the art design system. The boot loader (Boot Loader) loaded by the system program is mainly composed of the user application (Application) of the graph-oriented management module (Management Module). The system selects SuperViVi as the BootLoader, and uses the open source Linux kernel for algorithm reading and writing and image self-control. Adaptive processing, execute program loading and data update according to the following cross-compilation instructions.

2) Data storage and reading and writing module. The data storage and read-write module has the functions of data caching and information reading to realize the artistic design system, realizes script and server configuration, realizes the digital-to-analog conversion of the artistic design image data through the Grid DEM data conversion module, and creates the artistic design 3D model database. Use the Terrain menu module of Creator to build the Flash of the art design system, and use the batch module (Batch) to render the color, texture, and material properties of the graphics in the art design process and adaptively read the graphics and images. The graphics rendering process of the art design system based on MapInfo mainly includes three main processes: application (APP), culling (CULL) and drawing (DRAW). First, read the original graphics data from the buffer of the art design system, then read the data in the device controller, calculate the current viewpoint, then enter the rendering
loop of the next frame, and finally draw the polygon data. The data reading and storage process is as follows:

As shown in Figure 3.

**Figure 3.** Data reading and storage process of the art design system

3) Bus transmission and graphics loading module. The bus transmission module is the foundation of the entire art design system modeling and the key technology to realize the data transmission of the art design system. Use OpenFlight and VIX bus transmission technology to realize the data transmission of the art design system, and the Sink node of the bus transmission realizes the original record of the image processing code of the art design system, the auxiliary record of the auxiliary record database header level and the database construction history control record. And so on, realize the dynamic 3D reconstruction of artistic design objects in the Object Level structure module, and provide a hierarchical view for MultiGen. In the graphic drawing, the surface is transformed into a volume through Geometry Tools, which realizes the graphic conversion and three-dimensional reconstruction of artistic design.

4) The software integrated development design and human-computer interaction design of the art design system are completed in the embedded Linux architecture. Create a new directory file system, create the required device nodes in the / lib directory, and build the YAFFS image file of the human-computer interaction module.

5. **Conclusion**

With the people's life rhythm is accelerating, and people habitually use their eyes to quickly obtain the information they want to understand. The development of computer graphics and image processing technology and visual communication systems meets people's pursuit of visual effects. This article analyzes its application in the visual communication system through the research on the related content of computer graphics and image processing technology, in order to make up for the shortcomings in the visual communication system, and make the designer's work more perfect.

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