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Algorithm for Automatic Generation of Oil Painting Guidance in Colleges and Art Culture Video Based on Intelligent Brush

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Abstract:This paper proposes a computer-generated algorithm for college oil painting style guidance and art culture video automatic generation with intelligent brushes. This paper proposes to use the tensor eigenvector value of the smart brush as the brush direction to draw multiple layers of input video frames to effectively simulate the fluid feel of Van Gogh's oil paintings. At the same time, an improved local illumination model is proposed. mapping technology to enhance the paint layering of drawn video frames. Firstly, the multispectral PCA spectral reconstruction algorithm is used to reconstruct the spectral reflectance of the oil painting surface, and then the image information and color information of the oil painting are reproduced; secondly, the combination of physical BRDF and multispectral images is used to reproduce the spatial information and color information of oil painting samples.

Keywords: Oil Painting Guidance, Art Culture Video, Automatic Generation, Intelligent Brush

1. INTRODUCTION

Traditional oil painting creation expresses the creator's creativity by observing reality. With the acceleration of the process of world cultural integration [1], computer graphics art is rapidly integrated into the lives of ordinary people, bringing a new aesthetic experience to the audience [2]. Today's computer technology has developed into a technical means of oil painting creation. Many artists use digital cameras to capture photos and use computers as tools for creation and image processing [3], and the new generation of oil painters has begun to make useful explorations of this. The use of computer technology to assist in oil painting creation, the integration of traditional art and modern technology, diversifies the concept of creation [4], the release of the film "Love Van Gogh" has attracted the attention of the industry.

The film is a hand-painted oil painting feature film. In order to achieve a special animation effect [5], 125 painters from 15 countries made more than 1,000 oil paintings by freehand based on 120 original works of Van Gogh and 853 scenes shot by actors. 65000 frames of pictures [6]. In order to keep the style coherent, the painters made great efforts to change the tone according to Van Gogh's painting style, turning day into night [7], winter into summer, and finally brought a "stunning visual feast". While marveling at the animation special effects of "Love Van Gogh", we also reflect on the complexity and hardships of using traditional freehand drawing methods to design animation special effects [8]. The creative thinking is more open, and it has developed into a new form of digital art media. When the application environment changes from paper media to electronic media, text, as an important visual presentation element [9], requires more and more variability, and the variable range is also changed from the early circular dynamic interpretation to the control of variables with greater degrees of freedom [10].

As early as the mid-1980s, the MIT Visual Programming Languages Research Group (VLW) [11], founded by graphic designer and educator Muriel Cooper, began to explore the potential of computer programming techniques in the field of graphic design and created the Computer-generated cascading and morphing typeface designs [12]. Nowadays, in order to improve the screen reading performance, the technology of variable font (Variable Font)[13] design has developed rapidly. Xun Meng, its practical application is getting more and more people's attention. The usual NPR methods are roughly divided into 2 categories [14]: one is to use physical methods to simulate the raw materials of painting. Nowadays, the protection and restoration of cultural heritage left by ancestors are more and more important in countries around the world. Some cultural relics or artworks are unique and Precious, the conditions for storage and exhibition are very strict [15].

With the development of digital image technology, digital libraries and digital museums have emerged as the times require [16]. Digital images are beginning to be used not only in advanced scientific fields, but also in people's daily lives. With the rapid development of my country's economy and the continuous improvement of people's living standards [17], the investment in children's education is also increasing. In order to stimulate children's interest in learning and improve their initiative, parents often send their children to various early education training courses [18]. Art and calligraphy are a focus of early childhood education training. However, due to the limitation of venues, the limited level of teachers, and the time it takes for parents to send children to study [19], the cost of early childhood education has increased significantly. The time for children to study has also been shortened, and after the children go home from school [20], parents cannot give their children book and painting guidance due to lack of professional knowledge; some parents let their children watch some early-teaching books and painting videos at home [21], but the children will not be able to watch the electronic screen for a long time. It affects children's vision development, destroys the normal function of the nervous system, and then causes a series of problems such [22] as memory loss, headache, and poor sleep. Create with existing professional image processing software [23].

The most widely used ones are Adobe's Photoshop series and Corel's Painter series. Using the above software can quickly realize the rapid conversion of real photos to oil painting style. With the support of interactive technology, elements with variable data, such as wind, temperature, distance, etc., can participate in the transformation of text graphic design, thereby increasing third-party factors, and the connection between human interaction and Chinese characters is the key to transformation Results provide strong evidence beyond cultural roots while adding randomness to results.

2. THE PROPOSED METHODOLOGY

2.1 The Intelligent Brush

With the deepening of the research, the current research focus has shifted from the stylized rendering of a single still image to the direction of how to perform stylized rendering of oil paintings on the input video in real time. The traditional non-real-time video oil painting rendering algorithm mainly renders video frames frame by frame according to the time series, but due to the certain spatial and temporal correlation between adjacent video frames, such processing methods will produce serious frame discontinuities. Chinese characters Graphical design is a return to the figurative form of modern Chinese characters. It transmits information more comprehensively and displays the emotional expression of Chinese characters under the subjective consciousness of people through the creative combination of Chinese characters and graphics; it is necessary to change the font structure, focus, literal, Zihuai, Zhonggong, Yin-Yang line, serif and sans-serif and other attributes to complete the visual communication, personality style, recognition and form beauty of the text and other needs.

In computer language, no matter English or Chinese characters, it has no special form, meaning or other complex emotional expression. The classic algorithm of oil painting stylized drawing based on strokes was first proposed by Hertzmann. The main idea is to build a Gaussian pyramid from a static input image. The multi-layer reference image is obtained, and then the gradient information of the image is obtained by using filter functions such as Sobel in each layer, thereby establishing the starting point and direction of the brush, and then gradually realizing the drawing of the canvas from coarse to fine; multispectral imaging technology is a This kind of "atlas integration" technology can more accurately obtain the spectral information and image information on the surface of the painting artwork, and the collected artwork image also contains more and richer information, and the richer information assists the appropriate algorithm. More accurate reproduction of the colors of the artwork. The color reproduction technology based on BRDF is able to obtain the spatial texture information and lighting information of the surface of the painting artwork. These information can truly replicate the texture and texture of the painting artwork through the corresponding BRDF model, providing more information for the digital collection of artworks with the better, better foundation

2.2 The Oil Painting Guidance

To realize the automatic and rapid generation of Van Gogh-style oil paintings, it is necessary to define and simulate the brush model and streamline model. At the same time, it is necessary to generate the special paint layering sense that oil paintings have, and it is also necessary to make the generated videos highly correlated and consistent with Van Gogh's oil paintings in terms of color characteristics. This section will introduce the design and implementation principles of the algorithm in detail. After completing the test of program logic, the second step is the creative combination of visual linkage in ideograms, paying attention to the ingenious connection between real-time changes and vision in the process of people's behavior and participation in font design, and the richer perception behind the text. Allegorical expression; cleverly interpret the common physical phenomena in real life through the literal meaning of the text and its dynamic feedback, so that the experiencer can quickly understand the work and feel the interest of creating text with interactive actions.

The software uses H5's permanent local storage: localStorage and the lightweight database sqlite to store all kinds of user information, and uses the storage space of the mobile device itself to cache the pictures obtained from the network locally to ensure that users are not in the network environment. In good cases, browsing and selection can still be done. Brush models can be extracted from various oil paintings or post-production and processing by artists using image processing software such as Photoshop. A brush object contains the following properties: length, width, opacity, color, center point, and brush direction. The center point of the brush is the coordinate position of the random pen drop point in the current frame of the rendered video; the color of the brush is the color value of the brush drop point; the brush direction is composed of the direction of the feature vector of the structure tensor of the rendered video frame.

2.3 The Art and Culture Video Automatic Generation Algorithm

The Gaussian filter kernel function is used to process the reference image sequence, so as to obtain the reference layer sequence consistent with the original image size; for the starting point of the stroke, first establish a grid corresponding to the stroke radius, and then count the corresponding area in each grid. The sum of the pixel error between the reference image and the current canvas. If its value is greater than a threshold value given by the user, a stroke starting point needs to be established in the grid area. The center of the stroke starting point is the pixel value with the largest error in the grid area. Pixel Point. The style transfer algorithm based on artificial intelligence uses Caffe as the network platform and uses mainstream models to design special effects for style transfer animations.

Caffe is a deep learning framework, the full name of which is "Convolutional Architecture for Fast Feature Embedding". It is a clear, readable, fast and open source artificial intelligence network. Different from traditional style transfer algorithms such as texture synthesis, SVM (Support Vector Machine), histogram matching, and automatic sample collection, the style transfer algorithm used in this paper is based on deep learning theory. The intelligent plotter uses RaspberryPi as the computing control core, deploys Apache+PHP to monitor network requests, processes signals from the mobile terminal, and then calls the Python script file to schedule the L293D driver board through the GBIO port to control the stepper motor for painting teaching. The relationship between the figure and the bottom, the point, line and surface, and the relationship between the virtual and the real of Chinese characters belong to the attributes of graphics, while the strokes, structure, and ideographic properties of Chinese characters belong to the attributes of the characters. inheritance.

The early creative realization established the core structure of "behavior interaction + text data + graphic vision". After the

interaction process is basically perfected, combined with the attributes of Chinese characters, graphics and text, the visual expressiveness of the work needs to be continuously tested and adjusted in the later stage. Such as adding sound effects, improving dynamic fluency, improving material iteration of particle system, etc.

3. CONCLUSIONS

The automatic generation algorithm of art culture video based on intelligent brush can quickly and effectively generate a variety of picture styles, while creating unique and novel animation effects, it can greatly improve efficiency, save manpower and material resources, and provide strong technical support for animation creation from an artistic perspective. Expand the breadth and depth of animation special effects design. The algorithm model and parameters of the automatic generation of art and culture videos need to be optimized. The study found that the automatic generation of animation effects for art and culture videos is closely related to the conversion rate of style/content and model selection.

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