

Research Article

Digital Media Art Display Design and Research under the Research of 3D Point Cloud Data Acquisition Technology Based on Sequence Images

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The main purpose of this paper is to analyze and study the digital media art (DMAT) display design through the acquisition technology of 3D point cloud data of sequence images. This paper integrates digital media art to the display design, making the display design more colorful and promoting the development of the display design. The main method adopted in this paper is the 3D reconstruction technology based on sequence diagram, which includes image segmentation method and sequence feature extraction method. Through experiments, it is found that 3D point cloud data acquisition technology based on sequence images can effectively combine DMAT and display design, so that both can develop healthily. In the era of digital media, new thinking on display design, including how display designers should deal with and maximize the development potential of digital media in the face of new technologies and future viewing models. Research into DMAT and display design will have a huge impact on display art. It can be seen from the data in of this article that the development percentage of digital media art 2018 ranges from 9.8% to 15%. The range of the development percentage of digital media art 2021 is 17%-36%. It can be seen how the development of DMAT is very rapid, so it is urgent to study the display design of digital media.

1. Introduction

In recent years, with the continuous development of digital technology, the application scope of DMAT is also expanding. Artists no longer simply communicate their artistic ideas and content to the audience, but create an artistic environment that engages the audience and mobilizes other feelings of the audience. DMAT can improve the overall quality of the artwork, better convey the author's artistic perspective, and greatly improve the communication effect.

Entering the twenty-first century, digital new media art has become the most common design method in the contemporary exhibition industry. Advanced digital technology has made the modern display industry more modern, and the display methods have also changed from single to richer. The traditional display of static pictures, cultural relics, and

text can no longer amplify the amount of information the audience can get and cannot satisfy the audience's viewing experience. Therefore, digital display design requires practitioners to master the characteristics and advantages of print communication, video, electronic, and new media communication and organically combine traditional media and new media to achieve an optimal combination.

The innovations of this paper are as follows: (1) this paper introduces the theoretical knowledge of sequence image and 3D point cloud data acquisition technology and uses 3D reconstruction algorithm to analyze how 3D point cloud data acquisition technology plays a role in DMAT display design. (2) This paper analyzes the traditional display design and the display design based on digital media art. Through experiments, it is found that the application of DMAT to the display design is more effective.

2. Literature Review

With the economic development in recent years, people have ushered in the era of digital development. Peicheva and Milenkova believe that more effective ways to engage, encourage, and motivate students need to be identified if students are to adapt to the challenges of a digital society. Although the scholar found the importance of the digital society, he did not explain how to make students adapt to the challenges of the digital society [1]. Ceranoglu found that with the increasing use of digital media among teenagers, there are concerns that the use of digital media can adversely affect students. It may affect students' sleep and academic and cognitive skills. However, the scholar did not propose corresponding solutions to the problems he was worried about [2]. Dalope and Woods find that family dynamics are increasingly influenced by digital media. They describe three frameworks to help clinicians understand and cope with this impact, then integrate these theories into clinicians and help them come up with corresponding strategies. Although the scholar knows that digital media will affect the family, he only sees the bad side and does not see the benefits brought by digital media, and he does not explain in detail what the three frameworks he proposes are [3]. Savina et al. found that the growing popularity of digital media has had a significant impact on child development over the past few decades. Digital media has changed not only the way young people learn but also the way they social-emotional skills. They discuss the impact of digital media use on adolescents' physical and mental health, attention, and cognition, with a particular focus on the impact of digital media on adolescents' socio-emotional functioning. Although the scholar has always emphasized the need to pay attention to the impact of digital media on young people, they did not specify what these impacts are [4]. Romer and Moreno found that digital media provided more opportunities for the marketing of risky products. They briefly address teens' social media buying of addictive substances and gambling and offer suggestions for addressing them. The scholars mentioned that teenagers purchased risky products through social networking sites and mentioned the adverse effects of digital media, but they did not have specific data to illustrate the actual cases of these purchases of risky products [5]. Oklobdija and Popesku found that new information technologies, especially the development of the Internet, have led to many changes in the way tourism is marketed. In this context, digital marketing is gradually taking the lead in modern tourism marketing strategies. As the world becomes more connected, keeping up with the development and trends of the times is crucial for travel companies and organizations. The digital revolution has changed the way media works, and their aim was to show the role and importance of digital marketing in modern tourism. The scholars found that digital media can promote the development of tourism, but did not specify how to promote the development of tourism [6]. In order to effectively solve the problem of low target detection rate caused by dynamic background, Fan et al. propose a sequence image target detection algorithm based on spatiotemporal motion

features. They proposed an improved background filtering algorithm, which made full use of the gradient difference between the spatial domain and the background pixels to obtain a differential image. Although the scholar mentioned a specific solution, there is no experiment to prove whether his method is really effective [7]. Jian et al. found that with the rapid development of cloud computing, cloud storage has been accepted by more and more organizations and individuals. However, once local control over the data is lost, users urgently need to verify that the cloud service provider is storing their data securely. Therefore, he proposes an efficient public auditing protocol that enables data dynamics to be supported more efficiently than existing technologies. The scholars mentioned that they proposed an effective protocol, but there was no experimental data to prove whether their conclusion was really reliable and the authenticity of this protocol cannot be guaranteed [8].

3. 3D Reconstruction-Related Algorithms

With the rapid development of computer technology, 3D reconstruction, as an important branch in the field of computer vision and computer imaging, has attracted more and more researchers' attention [9]. 3D reconstruction based on sequence images is a simple, fast, and effective 3D reconstruction method. 3D reconstruction refers to the mathematical process and computer technology of using 2D projection to restore the 3D information (shape, etc.) of an object, including data acquisition, preprocessing, point cloud stitching, and feature analysis.

In computer vision, 3D reconstruction based on sequence images generally refers to first obtaining 2D image information of objects from different perspectives through cameras and other equipment. These images are then properly processed and analysed, and finally, the spatial geometric information of the original three-dimensional object is restored [10].

3.1. Image Sequence Segmentation Method Subheadings

3.1.1. Color Histogram. The color histogram is that when the features in the image cannot take all possible values, there will be some zero values in the statistical histogram. The appearance of these zero values will affect the calculation of the similarity measure, so that the similarity measure cannot correctly reflect the color difference between images.

The most basic representation of color features is the color histogram that reflects the distribution of color components in the image [11]. Its function expression is as

$$P(k) = \frac{n_k}{N} (k = 0, 1, \dots, L - 1). \quad (1)$$

Among them, k represents the feature value of the image, L is the number of possible values of the feature and is the number of pixels with the feature value k in the image, and N is the total number of image pixels.

In the initial feature extraction, the most common method is the grayscale histogram, as shown in Figure 1.

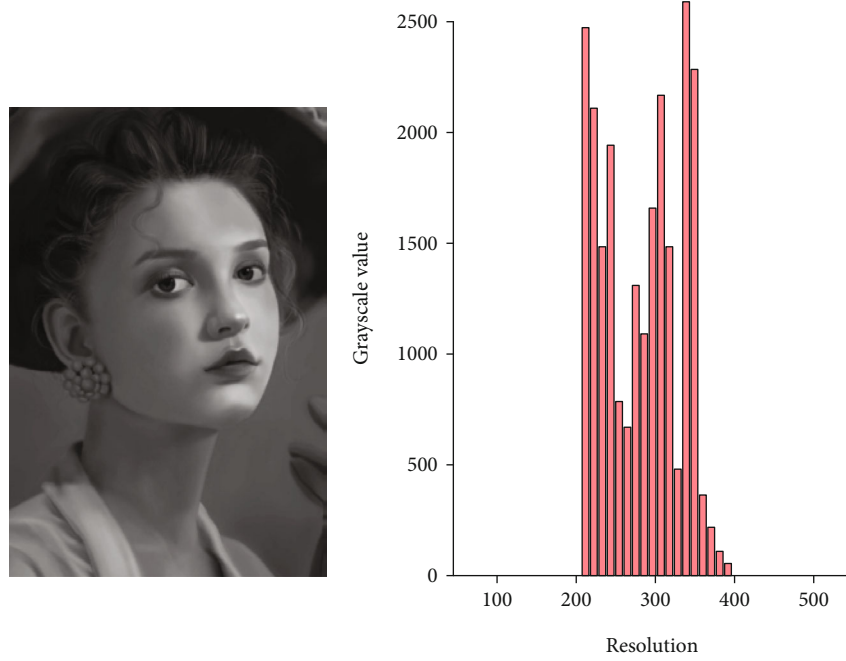


FIGURE 1: Grayscale histogram.

As shown in Figure 1, the grayscale histogram classifies the pixels in the image according to the grayscale levels and calculates the occurrence of each grayscale level in the entire image. The grayscale histogram is a function of the grayscale distribution, which is a statistic of the grayscale distribution in the image. The grayscale histogram is to count all the pixels in the digital image, according to the size of the grayscale value, to count the frequency of their occurrence.

3.1.2. Color Moment. Color moments are a simple and effective representation method for color features, because color information is mainly distributed in low-order moments. Therefore, the first-order moment, second-order moment, and third-order moment are sufficient to express the color distribution of an image, and color moments have been proved to be effective in expressing the color distribution in an image.

The color moment can be expressed by the following formula:

$$\mu_i = \frac{1}{n} \sum_{j=1}^n P_{i,j}. \quad (2)$$

Among them, such represents the i th color component of the j th pixel of the color image.

The simultaneous autoregressive model is to select a pixel and then describe the relationship between it and its surrounding pixels with a random vector. The intensity value of the random vector is described by the linear relationship between the central pixel and its surrounding pixels [12]. Autoregressive and Simultaneous Equations Traditional econometric methods are models based on theory to

describe the relationship of variables. However, theory is usually not enough to provide a strict description of the dynamic relationship between variables, as in

$$s(p) = \mu + \sum_{r \in F} \theta(r) s(p+r) + \varepsilon(p). \quad (3)$$

The central pixel of the image is p , and $s(p)$ is the intensity of the random variable, which is represented by the combination of p and surrounding neighborhood pixels.

The fixed global threshold segmentation algorithm is only suitable for images with large differences in gray level and concentrated distribution between the foreground and background regions of the target. Assuming that the original image is $f(a, b)$, the segmented image is $g(a, b)$, and T is a globally fixed segmentation threshold, then T can divide the image into two pixel clusters [13]. It is expressed as:

$$g(a, b) = \begin{cases} 1, & f(a, b) \geq T, \\ 0, & f(a, b) < T. \end{cases} \quad (4)$$

However, in real image processing, rarely, the target foreground and background of the image are uniformly distributed in two grayscale intervals, so multiple global fixed thresholds can be used for segmentation, such as

$$g(a, b) = \begin{cases} 1, & T_1 \leq f(a, b) \leq T_2, \\ 0, & \text{Other,} \end{cases} \quad (5)$$

where T_1 and T_2 are selected thresholds.

The gray value histogram of fixed global threshold segmentation is further divided into a single threshold gray

value histogram and a multithreshold gray value histogram, as shown in Figure 2.

As shown in Figure 2, the background contrast of different regions in the image is inconsistent, and a unified threshold cannot be used for segmentation, so the fixed global threshold segmentation algorithm is not applicable [14]. Therefore, different thresholds can be used for segmentation according to the local features of the image, and an adaptive global threshold segmentation method is proposed, as shown in

$$T = \frac{1}{2}(k_1 + k_2). \quad (6)$$

Repeat the steps until the difference of T obtained twice adjacently is zero, and the T at this time is even the adaptive global threshold ($k_1 + k_2$). The basic global threshold segmentation algorithm can solve some problems of the fixed global threshold segmentation algorithm, which makes the image segmentation more suitable for some images. This algorithm has certain adaptability and pertinence [15].

3.2. Camera Imaging System. The shooting process of the target object by the camera is actually to transform the 3D information of the object into the 2D space for representation. This change process is an expression of the imaging process of the object, and finally, a digital two-dimensional image is obtained. The transformation relationship of each coordinate point in the space is shown in

$$XYZ \longrightarrow xyz \longrightarrow xy \longrightarrow MN. \quad (7)$$

In Formula (7), XYZ is the three-dimensional coordinate system in the real world, which represents the representation of the three-dimensional coordinate point of the target in the objective world. One-to-one correspondence between the real three-dimensional target information in the space and the two-dimensional plane image after shooting. It is the process to be processed by camera imaging, and it is also an important basis for the entire reconstruction process [16].

The principle of the current image acquisition process is usually based on the imaging principle of the pinhole camera model. Therefore, the following mainly studies the imaging model principle of the camera and the conversion process between each coordinate system. The camera imaging coordinate system is shown in Figure 3.

As shown in Figure 3, the target information existing in the camera coordinate system is transformed into the image coordinate system. The two-dimensional plane information in the image coordinate system in the two-dimensional plane is converted to the pixel level, so as to obtain the target image in the pixel coordinate system [17].

The transformation process of the camera coordinate system will not be deformed, and the coordinates of the point corresponding to the camera coordinate system can

be obtained only by rotation, which is expressed as A_c , B_c , and Z_c , and the conversion relationship is as shown in

$$\begin{bmatrix} A_c \\ B_c \\ Z_c \end{bmatrix} = R \begin{bmatrix} A_w \\ B_w \\ Z_w \end{bmatrix} + T \Rightarrow \begin{bmatrix} A_c \\ B_c \\ Z_c \\ 1 \end{bmatrix} = \begin{bmatrix} R & T \\ 0 & 1 \end{bmatrix} \begin{bmatrix} A_w \\ B_w \\ Z_w \\ 1 \end{bmatrix}. \quad (8)$$

The imaging process of the real object in the camera is the transformation process from the coordinate point in the camera coordinate system to the coordinate point in the image coordinate system. In fact, it is the process from three-dimensional space to two-dimensional plane and the transformation process of the whole coordinate point representation. It is also an imaging process of photographic imaging [18].

Finally, the conversion relationship between the coordinate point of the space point Z_c in the camera coordinates and the coordinate point in the image physical coordinate system can be obtained, as shown in

$$Z_c \begin{bmatrix} a \\ b \\ 1 \end{bmatrix} = \begin{bmatrix} f & 0 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} A_c \\ B_c \\ Z_c \\ 1 \end{bmatrix}. \quad (9)$$

When the space point is transformed from the three-dimensional space to the two-dimensional plane, it is necessary to establish a two-dimensional plane coordinate system a, b that can be quantified and expressed in physical units.

This paper analyzes the 3D reconstruction using the original sequence image set and the 3D reconstruction using the segmented sequence image set, as shown in Table 1 and Table 2.

As shown in Table 1 and Table 2, the time spent, work efficiency, and accuracy of the two are compared. It can be clearly seen that using the segmented sequence image set for 3D reconstruction takes the minimum time of 17 min, compared with the minimum time spent using the original sequence image set for reconstruction of 156 min. It greatly shortens the time spent by the 3D reconstruction system and improves the efficiency of the 3D reconstruction system [19]. Moreover, the reconstruction efficiency of the original sequence image set is only 35.1%, and the work efficiency of using the segmented sequence image set for 3D reconstruction is up to 76.7%. It can be seen that using the segmented sequence image set for 3D reconstruction work efficiency has also been greatly improved.

3.3. Image Feature Point Extraction and Matching

3.3.1. Feature Point Extraction Algorithm—TWD Algorithm. In image processing, the so-called “feature point” mainly refers to the ability to represent the image or target in an identical or at least very similar invariant form in other

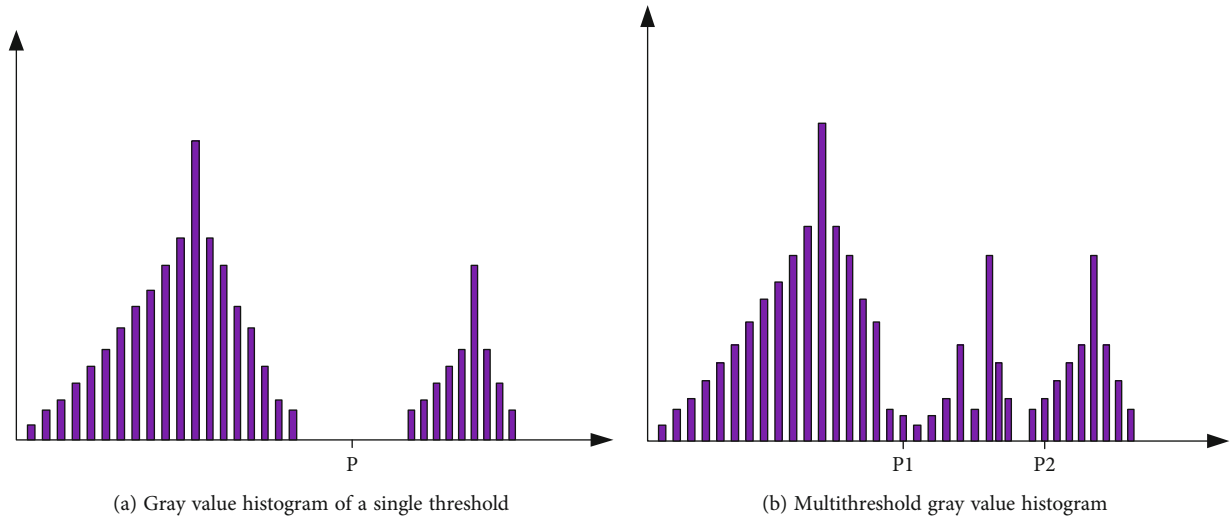


FIGURE 2: Fixed global threshold segmentation algorithm.

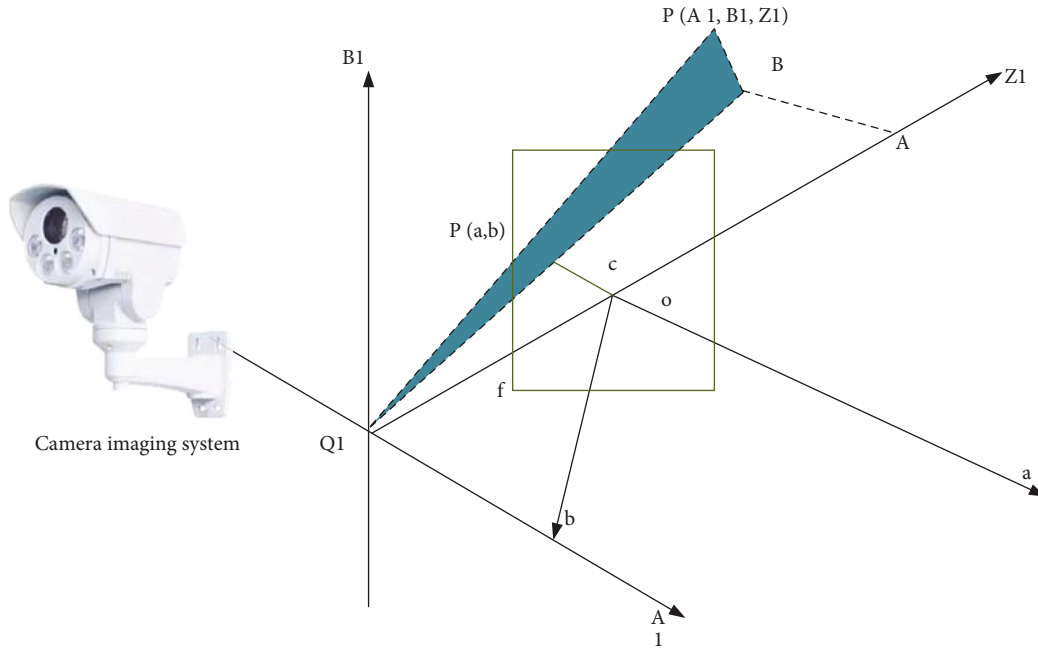


FIGURE 3: Camera imaging model.

TABLE 1: 3D reconstruction of the original sequence image set.

Sequence	Time spent (min)	Work efficiency	Accuracy
Sequence 1	165	35.1%	18.9%
Sequence 2	178	30.6%	16.8%
Sequence 3	192	25.5%	15.5%
Sequence 4	156	29.8%	19.3%
Sequence 5	189	28.6%	20.6%

similar images containing the same scene or target. Aiming at the problem that the traditional feature point extraction process only locates the feature points and ignores the edge direction information contained in the feature points.

Therefore, this paper proposes a template with edge direction (TWD) to locate feature points. In this algorithm, the feature point is defined as in the edge of the extracted image, the feature point is the position of the intersection of two or more pixel edges [20]. Its defined template is shown in Figure 4.

As shown in Figure 4, first, in this paper, the template is defined as a circle with a radius R , and the circular template is represented by 16 regions with the same size and area. For better description, each area is numbered and denoted by r , which represents each area in the template, respectively. In the circular template, the different areas where each pixel is located can be denoted as θ_{p,q_m} , and

TABLE 2: 3D reconstruction using the segmented sequence image set.

Sequence	Time spent (min)	Work efficiency	Accuracy
Sequence 1	23	67.3%	86.3%
Sequence 2	26	68.8%	87.8%
Sequence 3	21	65.3%	85.2%
Sequence 4	17	79.5%	89.0%
Sequence 5	19	76.7%	90.2%

the angle between the template center pixel p and any pixel θ_{p,q_n^m} is denoted as

$$\theta_{p,q_n} = \left\{ \theta_{p,q_n^m}, \dots, \theta_{p,q_n^m} \right\} (0 \leq m \leq 15), \quad (10)$$

where n represents the number of pixels in the region r .

Use the calculated edge direction of the pixel to compare and analyze the defined information, where the similarity $S_p(m)$ is used to represent the relationship between the two as

$$S_p(m) = \max \cos \left(\Psi_{q_n} - \theta_{p,q_n^m} \right). \quad (11)$$

When $S_p(m)$ meets the given threshold, it means that the edge direction of this pixel is very close to the angle θ_{p,q_n^m} in the defined template. It indicates that there is an edge in the direction of the connection between the template center point and the calculated pixel point [21].

Based on the definition of the feature point as the position of the intersection of multiple or edges, the position of the feature point can be simplified to the position of the intersection of the edges. The schematic diagram of feature point detection is shown in Figure 5.

As shown in Figure 5, the feature point determination work can be carried out according to V_p . Feature point detection is the detection of feature points that are specifically defined or that can be specifically detected. At present, there are many detection methods, which are divided into three categories: corner detection based on grayscale images, corner detection based on binary images, and corner detection based on contour curves, where Q1 and Q2 are the numbers of any region in the template where the edge direction is located, respectively, then Formula (12) is satisfied:

$$V_p = \begin{cases} Q1, \\ \leq Q2. \end{cases} \quad (12)$$

According to the principles diagram of feature point extraction in this algorithm in Figure 5, it can be shown that when the edge V_p is in different template regions, the two edges will produce intersection points. At this point, this point is defined as a feature point. Therefore, when it is detected that the pixel point is the intersection of two edges, the points that are not feature points can be excluded by

using this principle, so as to achieve relatively accurate extraction of feature points.

3.3.2. *Comparison of Feature Extraction Algorithms.* Through the statistics of the number and extraction time of the feature points extracted by the Harris algorithm and the algorithm in this paper, the results obtained are shown in Table 3.

As shown in Table 3, the number of feature points extracted by the algorithm in this paper is much higher than that of the Harris algorithm. Define the repetition rate R to evaluate the result of the feature point extraction algorithm as

$$R = \begin{cases} N, \\ \min(N_1, N_2). \end{cases} \quad (13)$$

N is the repetition number of the feature points of the two images tested; N_1 and N_2 are the number of feature points extracted from the two images, respectively. Then, the results of the two algorithms are calculated from the aspects of rotation, scale change, and illumination change.

3.4. *3D Reconstruction System.* Image sequence analysis utilizes computer vision technology to detect motion and moving objects from image sequences and perform motion analysis, tracking, or recognition on them. Image sequence analysis has a wide range of applications in many aspects of the national economy and military. The 3D reconstruction process based on sequence images refers to obtaining the target image according to certain rules. In this paper, the internal and external parameters of the camera are obtained through the calibration of the shooting camera. Thereby, the three-dimensional model of the size plane of the projection matrix of the mutual conversion between the object image point and the space point is obtained. The process is shown in Figure 6.

As shown in Figure 6, the reconstruction process is to use the principle of epipolar geometry to calculate the coordinates of the spatial point corresponding to the target image point and to form the spatial point cloud of the target object surface. Then, the point cloud is converted from point to surface by triangulation according to a certain topology structure, and finally, the surface reconstruction of the target is obtained.

3D reconstruction is actually a process of mapping a 2D texture image source to the surface of the reconstructed 3D mesh model, then the mapping function can be defined mathematically as

$$(u, v) = f(a, b, z). \quad (14)$$

Among them, (u, v) is the coordinate of the coordinate point in the texture image, which is actual the same as the image coordinate defined. (a, b, z) represents the coordinates of the three-dimensional space point obtained by the calculation, and the texture value information corresponding to each image point can be obtained by using the texture function.

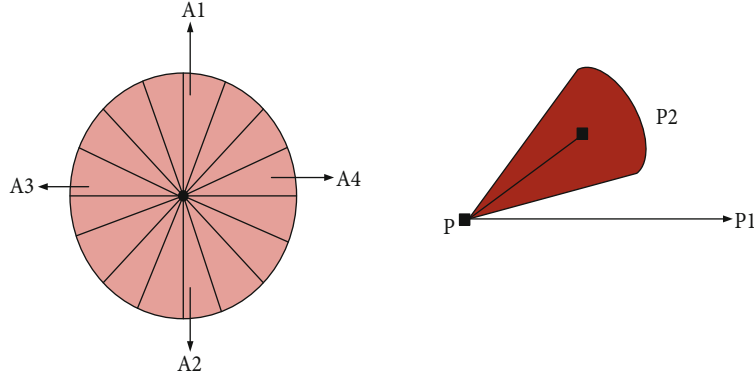


FIGURE 4: TWD circular template.

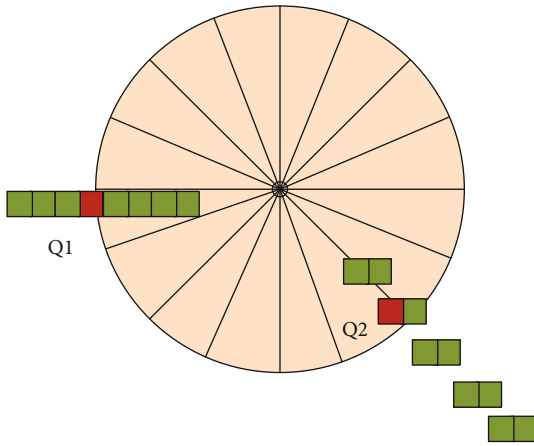


FIGURE 5: Schematic diagram of feature point detection.

TABLE 3: Comparative analysis of Harris algorithm and the algorithm in this paper.

Algorithm	The number of extracted feature points	Average extraction time/s
Harris	Perspective 1	125
	Perspective 2	256
Algorithm	Perspective 1	1150
	Perspective 2	2655

However, the input of the reconstruction process is a sequence of images with a certain relationship, so when it is extended to images, the texture function is converted to

$$(u, v) = f(a, b, z, I, P). \quad (15)$$

Among them, $I = (i_1, i_2, \dots, i_n)$ represents the set of input sequence images, and the set of projection matrices solved by each image corresponding to it is $P = (p_1, p_2, \dots, p_n)$.

3.5. Calculation of Three-Dimensional Coordinate Points in Space. The internal parameters of the camera are calibrated using the checkerboard calibration method, and the epipolar

geometric constraints between the images are used. The parameter size of the corresponding fundamental matrix F is obtained through the feature point matching relationship between the two images. The advantages of 3D reconstruction are shown in Table 4.

As shown in Table 4, the image-based 3D reconstruction technology has the advantages of fast, simple, and realistic and can better realize the virtualization of real things.

It is known that the image coordinate point of the same spatial point in the two sequence images is $a_r = [a_1, a_2, 1]^T$, and the parameterization of the fundamental matrix F is expressed as

$$F = \begin{pmatrix} f_{11} & f_{12} & f_{13} \\ f_{21} & f_{22} & f_{23} \\ f_{31} & f_{32} & f_{33} \end{pmatrix}. \quad (16)$$

Then, $a_r^T F a_1 = 0$ satisfied by the fundamental matrix can obtain a linear formula about the fundamental matrix F as

$$a_1 f_{11} + a_2 b_2 f_{21} + a_3 b_3 f_{31} = 0. \quad (17)$$

Calculating the n sets of matching points can obtain n linear formulas about the matrix f in Formula (17), which are

$$A f = \begin{bmatrix} a_1 b_1, a_2 b_2, a_3 b_3, \dots, a_n b_n \\ a_n a_n, b_n a_n, a_n b_n, \dots, b_n b_n \end{bmatrix}. \quad (18)$$

When solving Formula (18), the method of obtaining the least squares solution of f is adopted. The result obtained by the least squares solution is the eigenphasor of the minimum eigenvalue corresponding to the matrix A , and the matrix A is decomposed by SVD, namely, $A = U D V^T$. The last column of its V matrix is the required characteristic phasor.

Substitute the RGB value of a pixel into the Gaussian mixture model GMM of the target foreground and

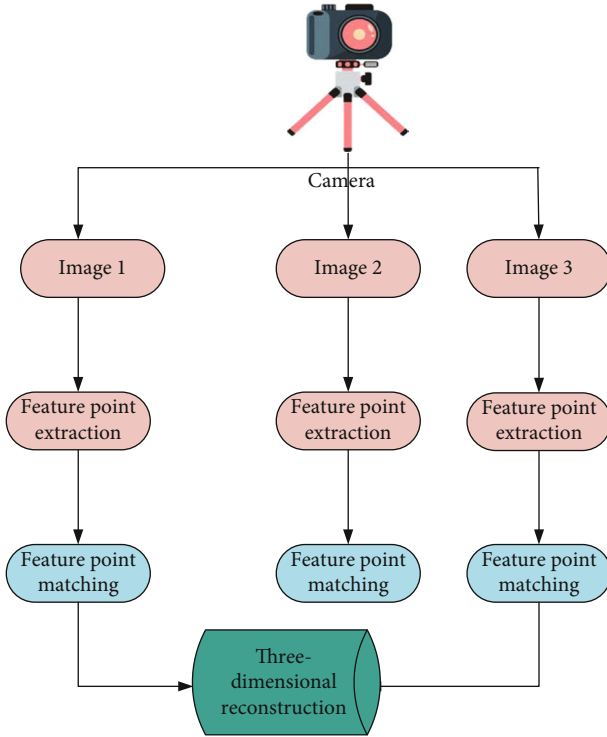


FIGURE 6: 3D reconstruction process.

TABLE 4: Advantages of 3D reconstruction.

Object	Fast	Easy	Lifelike
1	87%	81%	92%
2	79%	85%	91%
3	83%	84%	88%
4	86%	82%	95%

background, respectively, then the probability of the pixel in the two GMMs can be obtained, respectively. The boundary term is then

$$V(\alpha, Z) = \gamma \sum_{(m,n) \in C} [\alpha_m \neq \alpha_n] e^{-\beta \|z_m - z_n\|^2}, \quad (19)$$

where C represents the set of adjacent pixel pairs and γ and β are all constants.

3.6. Application Areas of Digital Media Art. The use of personal computers has continued to grow, and it has come to an age when a vast number of artists can use photographs and manipulate them in computer language. Photos are translated into computer language by scanning, and in a simple process, a two-dimensional image is rendered into a mathematical binary computer language. The photo becomes stretchable because it is now a discrete number.

Digital cinema has been the dominant art form in the last century, globally popular and impressive. Acting in fantasy movies or in stills can deepen people's personal life experience. Film has become an art, not video art, but as

an art medium, it has its own history. Therefore, it is also a kind of digital art and new media art. The display design of digital film is shown in Figure 7.

As shown in Figure 7, in the display design, "zhan" is the means and form, and "shi" is the purpose and appeal. The basic attribute of display design should be to set off the displayed object, and excellent designers should actively create appropriate artistic techniques to express this object. The essence of display design is the transmission of information, which can be an artist's artistic concept, a scientific and technological achievement, or a commodity. What the designer does is to present the information to the audience in a suitable form, and to provide a convenient information exchange and interaction platform for both parties. With the development of modern technology, the means of expression of display design are also constantly diversifying. It is manifested not only in the invention of new technologies but also in the integrated display with traditional media, which makes each display have its own unique language expression.

4. Digital Media Arts Experimentation and Analysis

How to realize the efficient allocation of resources has always been the subject of microeconomics research. With the extensive application of a large number of microenterprise data in economic research, people have begun to conduct more in-depth discussions on the effective mechanism of resource allocation. However, among many mechanisms, in the past period of time, most of the academic circles have paid attention to the relationship between resource misallocation, total factor productivity, and financial distortion, but there is insufficient research on structural mismatch between industries. Misallocation of resources will hinder the overall. In the increase of factor productivity, the misallocation of resources is inversely proportional to the total factor productivity.

4.1. Development of Digital Media. In real life, the use of DMAT is very common. It is widely used in various exhibition halls, and DMAT is used in digital display, 3D virtual display, interactive display, and guide system design. It is a DMAT that spreads across media, completes special art forms and language modes, and is gradually understood and used by more and more people. The data of Figures 8 and 9 in this paper are from reference 20.

The development of DMAT from 2018 to 2021 is shown in Figure 8.

As shown in Figure 8, in recent years, digital media art made rapid progress in display design activities, and the use of digital TV, digital broadcasting, digital advertising, virtual reality technology, laser lights, and thermal sensing equipment has become more and more extensive. This plays a vital role in improving the visual effect of the display, creating the atmosphere, and promoting publicity.

4.2. Deficiencies in Display Design and Countermeasures. In some small- and medium-sized exhibitions, many exhibition designs often only pay attention to the display of technology

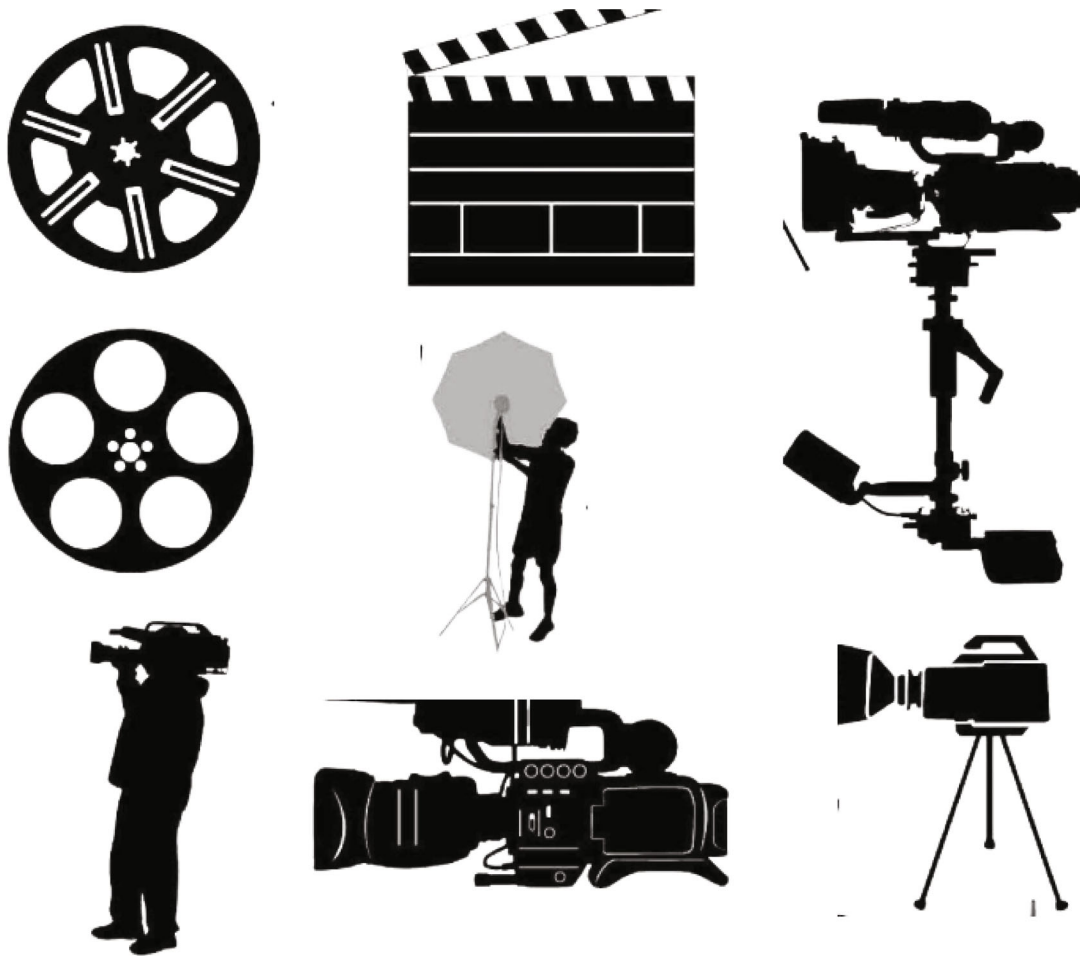


FIGURE 7: Display design for digital cinema.

and ignore art. This paper analyzes the shortcomings of the traditional display design, as shown in Figure 9.

As shown in Figure 9, the shortcomings of traditional display design are as follows:

- (1) It is impossible to integrate technology and form well, which is more typical like the case of e-books. According to relevant surveys, the sensitivity of e-books will decrease after 5 to 8 years of use. At the same time, the clarity of the picture will also decrease, and the speed of obtaining information by reading is also relatively slow
- (2) The data is huge, and the transmission is slow. When using virtual reality technology to do display design, a huge problem to be faced is that the data of the final generated file is huge, and the speed of file transmission is too slow
- (3) The design concept is outdated and lacks humanization. The single knowledge structure is a common problem for many display designers at present. They

do not accept new knowledge and new technologies. They basically adopt several inherent methods in design. The design concept lags behind, and there is no innovative spirit

- (4) There is a serious lack of funds in the display design and application, the lack of technical personnel, and the limited level of technical personnel. Many new ideas and new designs cannot be realized, and it is difficult to ensure the continuity of resource development in the future

The analysis of the dilemma of display design has the following points:

- (1) Speed up informatization construction and update technology types. Nowadays, the use of digital media art display design has become the mainstream, but even under such an inevitable social trend, the speed of display design information dissemination and update still cannot keep up with the development needs of the times. As a display designer, it should

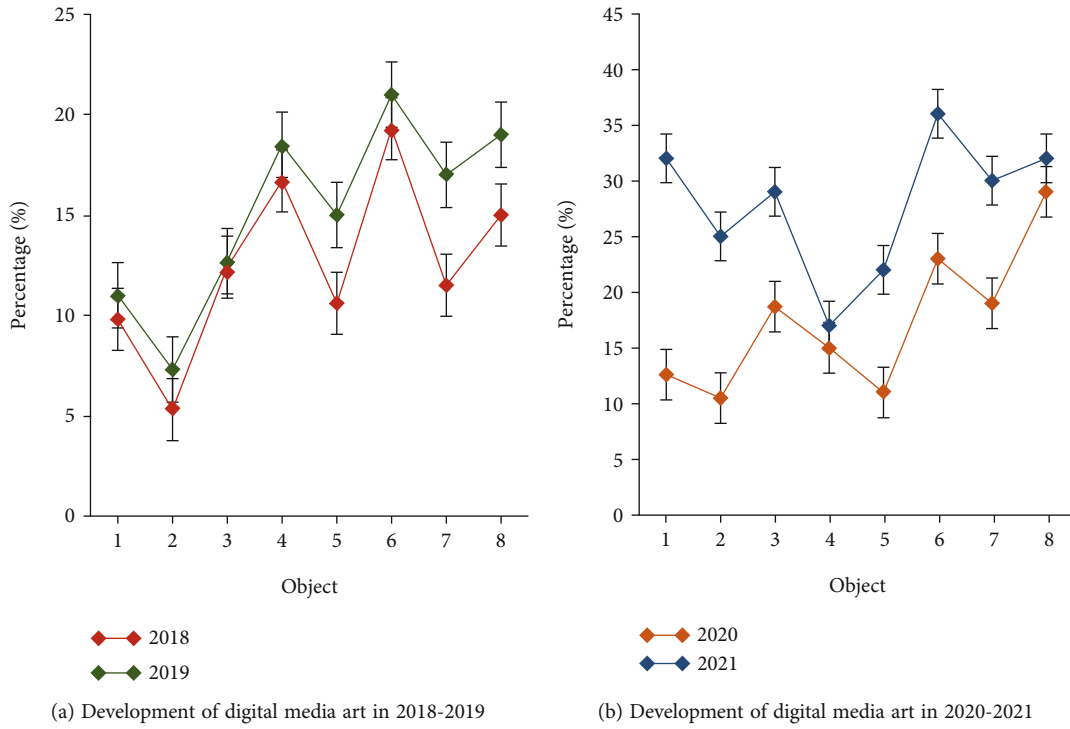


FIGURE 8: Development of digital media arts 2018-2021.

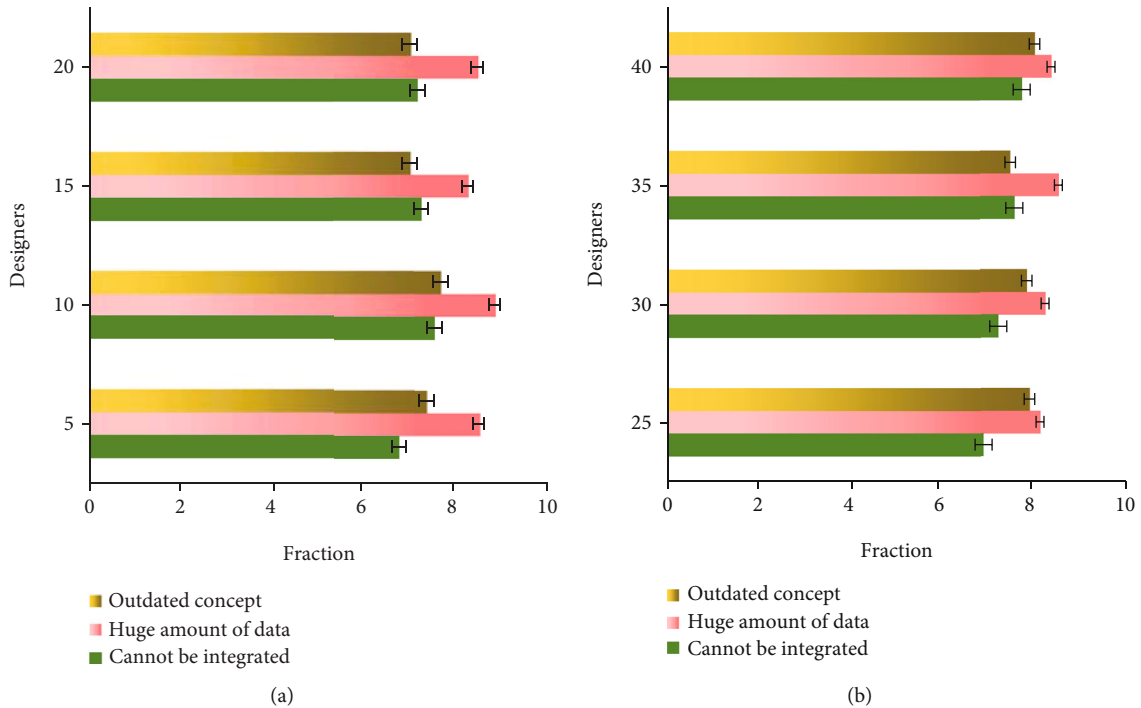


FIGURE 9: Disadvantages of traditional display design.

continuously acquire information through the network, lay the foundation for market adjustment, strive to maintain the relationship between customers and stakeholders, and integrate and collect previous display data to form a display database

(2) Establish and improve the talent training system. At present, one of the primary problems in display design is the lack of professional talents. In order to solve this problem, the joint efforts of the government, universities, and the display industry are

needed. As a state organ, the government should play a leading role, and by increasing financial support and macroadjustment, some colleges and universities should set up DMAT majors. The course should be set according to the actual needs of the exhibition design, and the number of students should be planned reasonably

- (3) Conform to the development trend and make technology available to designers

5. Discussion

This paper analyzes how to obtain 3D point cloud data based on sequence images. This paper also makes reasonable use of image segmentation and feature point extraction algorithms. As image segmentation and feature point extraction algorithms are used in more and more fields, it also shows powerful functions in image processing. Image segmentation can effectively lay a solid foundation for 3D reconstruction, and feature point extraction algorithms can effectively extract the desired information. So, this paper proposes an image segmentation method and a feature point extraction algorithm.

Through experimental analysis, this paper shows that in this era of faster and faster development of digitalization, any field can be combined with digitalization. It should not only apply digital media art film and photography but also apply digital media art display design. So, it makes sense to combine display design with digital media art.

6. Conclusions

With the development of modern technology, display design has become more and more important in various media. However, the traditional display design can no longer meet the development of the modern digital age. In order to keep up with the trend, the display design should be combined with digital media art. Therefore, this paper analyzes and studies the DMAT display design based on the 3D point cloud data acquisition technology of sequence images. This paper expounds the concept of sequence image and 3D reconstruction technology and display design and proposes many methods for 3D reconstruction technology, such as image segmentation. In the method part, the algorithm of 3D reconstruction technology is clearly explained, and it is found that 3D reconstruction technology plays a great role in sequence images. In the experimental part, this paper analyzes the development of DMAT and finds that in recent years, the development of DMAT is getting faster and faster. This paper also analyzes the intersection of display design and DMAT and the development trend of display design and finds that display design and DMAT complement each other. Finally, this paper proposes corresponding solutions to the difficulties faced by display design. Due to the limited knowledge of the author, the solution to the dilemma may not be in place.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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