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Computer-Aided Design AND APPLICATIONS

Practice of Computer Aided Design and Multimodal Integration in New Media Art

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Abstract. The creation of new media art has been significantly improved with the assistance of computers. Whether in the application of algorithms in artistic creation or in the study of the expression of artistic works. In the process of assisting design in the importance of artistic creation, this article combines CAD algorithms to apply the efficiency of artistic expression in new media applications. In the process of artistic creation, this article uses customized CAD algorithms for 3D modelling animation feature processing and multimodal fusion algorithms. After verifying the experimental results, this article achieved effective practical expression of new media art creation through the analysis and fusion of 3D models. The experimental results were diversified in creative path expression after multimodal data fusion. 3D models and seamless animations have been validated in related fields, significantly enhancing the immersion and interactivity of new media artworks.

Keywords: New Media Art; Computer-Aided Design; Multi-Modal Fusion; Algorithm Realization
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1 INTRODUCTION

The data stream of digital media art is actually quite large, especially for files such as videos and movies. In addition to high requirements for data read, write, and retrieval speed, storage technology also needs to consider performance indicators such as storage media and storage capacity. After being processed by digital art technology, digital media information will be output, and the output information will be converted into messages that people can understand [1]. The output technology of information includes various technologies, the most well-known of which are 3D display technology and sound systems, as well as hard copy functions, all of which can be seen in computers. The most commonly used storage technologies on the market include cloud storage, disk storage, semiconductor storage, etc. Among them, cloud storage technology is increasingly favoured by individuals and enterprises due to its advantages of data synchronization, no site limitations, and timely storage [2]. Some scholars have further summarized and condensed foreign talent cultivation cases, put forward new ideas on talent cultivation, and provided several new perspectives for the reform of digital media art education and talent cultivation in the education sector as reference value. Through the study of this topic, we can clearly see the digital transformation of traditional industries, as well as the talent gap and training needs faced by disciplines after transformation and upgrading [3]. Clarify the current status of digital media art teaching models in domestic and foreign universities, and have an independent understanding of the current development trend of digital media art. Observing the integration and application of digital media art with different disciplines under the influence of the artificial intelligence era, helps digital media art practitioners to have a clearer understanding of the opportunities and directions for the future integration of disciplines and industries. The difficulty lies in finding the disciplinary affiliation and essential characteristics of digital media art from different scholars' perspectives, and finding the applicable direction of technology from the intelligent application of digital media technology [4]. The key is to clarify the concept of digital media art, recognize the relationship between digital media technology and artificial intelligence, and understand the current domestic and international development status of the digital media art industry. Recognizing the potential social problems under the trend of intelligent development, utilizing the essential needs of the digital media industry, summarizing the qualified conditions for the required talents, and comparing the current situation of talent cultivation in domestic and foreign universities to propose independent thinking viewpoints. From the perspectives of technology, communication, and art, make judgments on the transformation and evolution of digital media art from old to new media under the trend of digitization [5].

Digital media is not only about technology but also has a wider range of artistic applications, that is, digital media art is a new era media art form based on digital media technology. Art and science are two sides of the same coin, often intertwined. Human artistic creation originates from the author's genuine perception and conscious imagination of the world, and with the help of virtual reality technology, all the creator's ideas can be virtually reproduced. Perform human-computer interaction to achieve the experience of the virtual environment and the operation of virtual objects and obtain corresponding perceptual feedback [6]. Interactivity is one of the prominent artistic features of virtual reality art, where the audience can establish a connection with the virtual space through digital sensing technology. The object of artistic expression is not only a reflection of reality but also an illusory imagination that transcends reality. This interplay of both real and illusory perceptions often leads people to endless thinking about what art carries. Virtual reality art emphasizes more on the perceptual behavior of natural people themselves rather than simple physical simulation behavior. Virtual reality art benefits from the creation of its immersive environment, which increases audience participation and deeper interaction. There are many interactive media, such as computers, mice, head-mounted devices, data gloves, controllers, smartphones, smart glasses, and other hardware devices [7]. The behaviour habits of virtual reality art are different from those of early human-computer interaction art. The expressive tension of virtual reality art largely depends on the creator's imagination. Conceptuality is another significant artistic feature of virtual reality art. Intelligence will become a new important feature of future virtual reality art. With the digital advancement of the intelligent era. Therefore, these optimization strategies will play an increasingly important role in the field of multimodal new media art.

With the arrival of the era of comprehensive talents, the application of computers in new media art technology has opened up new paths for the safety and inheritance of intangible cultural heritage. This technology provides strong support for the creation and inheritance of multimodal new media art [8]. Successfully transformed new media art flat colour block images into vivid colour texture images. Especially in the training of CycleGAN, it not only achieves the task of extracting different types of land parcels from new media art floor plans. Subsequently, through the comprehensive application of modelling, learning algorithms, and community architecture, this article elaborates in detail on how to uniquely apply the PC Genius technology tool to Chinese New Year painting projects. Some scholars first delved into the B/S community architecture, Python programming techniques, and Django framework, which form the foundation for the application of new media art technology. In terms of algorithm design, this article innovatively proposes a hierarchical fusion generative adversarial neuron community structure based on generative adversarial neural networks [9]. This process not only demonstrates the innovative application of technology in the inheritance of traditional art but also demonstrates the enormous potential of multimodal new media art in cross-disciplinary cooperation [10]. This structure effectively integrates the structure and texture features of images through the new media art texture GAN, and then performs high-precision rendering, generating New Year paintings with rich details and realistic colors. In summary, it not only demonstrates the innovative application of computer new media art technology in the inheritance of intangible cultural heritage. Through the concept and practice of multimodal new media art, new ideas and possibilities have been provided for the modern inheritance and development of traditional art. The test results show that the algorithm's New Year paintings perform well in texture clarity, image realism, and colour saturation, with an IS index of 3.16, significantly better than other comparative algorithms [11].

This study centres on the practical implementation of CAD and multimodal fusion within new media art. The research encompasses the current application status and challenges of CAD in new media art; the fundamental principles of multimodal fusion technology and its potential applications in new media art; the design and implementation of a suite of CAD algorithms, integrated with multimodal fusion technology aimed at innovating and optimizing new media artworks; and the verification of the proposed method's effectiveness through experimentation, followed by a thorough analysis of the results.

Initially, this paper reviews the existing research on new media art, CAD, and multimodal fusion technology through a literature survey, clarifying the research background and current state. Subsequently, a set of CAD algorithms is designed and implemented, leveraging multimodal fusion technology to innovate and refine new media artworks. Ultimately, the study validates the proposed method's efficacy through experiments, conducts a comprehensive analysis of the results, and draws relevant research conclusions.

The novelty of this study is manifested in the following aspects:

1. The integration of CAD with multimodal fusion technology introduces novel ideas and methodologies for advancing new media art.

2. The design and implementation of a tailored set of CAD algorithms for new media art, achieving effective multimodal data fusion.

3. The empirical validation of the proposed method offers a practical reference for the application of new media art.

The structure of this paper is as follows:

The initial section serves as the introduction, providing an overview of the research background, significance, content, and methods, alongside highlights of innovation and structural organization.

The second section is a summary of relevant theories, combining the relevant research results of new media art, CAD and multimodal fusion technology.

The third section is about the practice of CAD technology in new media art, analyzing commonly used CAD tools and software and the design process.

The fourth section is about multimodal fusion technology and its application in new media art, introducing the definition and classification of multimodal data, the overview of multimodal fusion algorithm and its innovative practice in new media art.

The fifth section is the algorithm design and implementation, which expounds in detail the CAD algorithm design and the concrete implementation of the multimodal fusion algorithm for new media art; At the same time, it introduces the experimental purpose and hypothesis, experimental data set and pretreatment, experimental methods and steps, experimental results and analysis.

The sixth section is about case studies and practical application, showing specific cases and analyzing the application effect.

The seventh section is the conclusion and prospect, summarizing the research results and looking forward to the future research direction.

2 RELATED WORK

With the strong support of computer technology, intelligent teaching of new media art aims to create a virtual environment for students to experience the learning process firsthand and gain a deeper understanding of the knowledge they have learned. It not only provides learners with rich design and creative space but also receives widespread support and positive feedback from educators and participants. In the research of logo design for multimodal new media art, this digital network learning platform based on computer-aided new media art teaching mode has demonstrated its unique value. In response to the shortcomings of existing intelligent computer-aided teaching systems for new media art, Liu and Yang [12] explored the construction of an artificial intelligence computer teaching system model that integrates personalized teaching and collaborative learning functions for new media art. This model closely revolves around the development mode and application requirements of intelligent computer-aided teaching systems, deeply integrating artificial intelligence technology into teaching design. Through interactive communication and mutual evaluation on the platform, learners are encouraged to conduct deeper research and exploration, greatly improving learning efficiency and stimulating their enthusiasm and desire for learning in the art major.

This includes but is not limited to multi-sensory experiences such as visual, auditory, and even tactile senses, providing viewers with a more immersive artistic enjoyment. Under the framework of multimodal new media art, this creative approach has been further expanded and applied. New media art is not limited to the microscopic world under an electron microscope, but also extensively integrates eight core technological means, including scale conversion, inspiration from accidental encounters, dual image construction, and paradoxical exploration, greatly enriching the dimensions and depth of artistic creation. Wang [13] created a strange and unfamiliar scene by extracting specific objects from traditional backgrounds and placing them in a heterogeneous, non-traditional environment, challenging the audience's cognitive boundaries. These technological means not only promote the deep integration of art and technology but also enable new media artworks to be presented in various forms. Through multimodal expression, new media art not only reveals miracles hidden in daily life but also leads audiences across the boundaries of reality and imagination, exploring unknown aesthetic boundaries. Wang et al. [14] are dedicated to studying the computer-aided interaction between visual communication technology and art in new media scenarios and have delved into the core role of digital technology in digital media art creation. In the context of multimodal new media art, the study of intelligent visual art creation highlights its unique value and significance. On this basis, further prospects were made for the future potential of digital technology and its profound impact on the development trend of digital media art practice. Digital technology not only shapes the diverse expression of visual and auditory but also promotes innovative practices of audio-visual integration, greatly enriching the creative field of digital media art. Specifically, it proposes an emerging art form suitable for the development of the intelligent era - "Intelligent Visual Art Creation", and deeply analyzes the new opportunities and challenges this art form brings to the fields of art and design. The research method is rigorous and comprehensive, based on existing research results, using various methods such as literature compilation, case studies, and experimental analysis. It not only integrates multiple modes of vision and hearing but also achieves interdisciplinary interaction and innovation through advanced technologies such as deep learning. Combining cutting-edge achievements in the field of design, Zhang and Rui [15] constructed an interdisciplinary research framework for intelligent visual art creation based on deep learning. This framework not only provides theoretical support for the creation of intelligent visual art but also opens up new exploration paths for the future development of multimodal new media art.

With the rapid development of digital media technology, dynamic visual recognition is gradually replacing traditional static visual recognition methods and becoming an important trend in the field of new media art. In this context, Zhao et al. [16] are committed to designing and implementing a booth recognition system based on multi-sensor fusion. By introducing key evaluation indicators such as the SGY coefficient, sensory load index, and conceptual cognition, this study comprehensively evaluated the recognition performance of the designed recognition system at the visual and behavioural levels. We have conducted in-depth analysis and optimization on the visual, behavioural, and conceptual identification dimensions of different types of booths and their specific needs. This system innovation integrates three core modules: visual recognition, behavioural recognition, and conceptual recognition, aiming to provide strong technical support for the display and dissemination of multimodal new media art. On the vast stage of multimodal new media art, the application prospects of this recognition system are particularly broad. The experimental results show that compared with traditional recognition systems, the multi-sensory fusion booth recognition system proposed by Zou [17] shows significant recognition advantages in three aspects, and has broad application potential and promotion value. Therefore, this study not only promotes the in-depth application of digital media technology in the field of new media art but also injects new vitality into the innovative development of multimodal new media art. It can not only bring viewers a richer, three-dimensional, and immersive artistic experience but also provide artists and creators with more convenient and efficient tools for displaying and disseminating their works.

3 THE PRACTICE OF CAD TECHNOLOGY IN NEW MEDIA ART

New media art is an art form that uses digital technology, network technology and other emerging media technologies to create and display. It breaks the boundaries of traditional art, closely combines art with technology, and brings a brand-new visual and auditory experience to the audience. The development of new media art has gone through many stages, and each new media art form represents the deep integration of technology and art (as shown in Table 1).

Stage	*Time Range*	*Main Characteristics*	*Representative Technologies/Art Forms*
Origin and Early Exploration	1960s-1970s	Electronic music, experimental films, computer graphics	Electronic music, experimental films, computer graphics
Personal Computer Popularization and Rise of Digital Art	1980s	Computer art, image processing software	Computer art, Photoshop and other image-processing software
Emergence of New Media Art	The early 1990s	Installation art, video art, nascent internet art	Installation art, video art, early WEB design
Maturity of New Media Art	Mid to Late 1990s	Rise of video art, introduction of web technology, Flash animation, video game technology	Video art, Flash animation, interactive art, 3D visual technology
Internet Popularization and Global Development	Early 2000s to Present	Internet art, virtual reality, interactive installations, cross-disciplinary collaborations	Web design, virtual reality, interactive installations, social media presentations

Table 1: Overview of new media art development stages.

New media art has not only changed the way of artistic creation but also changed the way of artistic communication and the way of audience participation. Computer-aided design (CAD) holds significant importance in new media art. It enables artists to efficiently create intricate artworks and attain effects that are challenging to achieve through traditional methods. The utilization of CAD in new media art is primarily manifested in several key aspects:

1. 3D modelling and rendering, namely, creating a realistic 3D model through computer technology, and performing light and shadow rendering to make the works of art more vivid and realistic.

2. Animation production and special effects processing, using computer technology to produce smooth animation effects, and adding various special effects to enhance the visual impact of works of art.

3. Interactive design, which realizes the interaction between the artistic works and the audience through computer technology, so that the audience can participate in the artistic works and enhance the interest and participation of the artistic works.

Multi-modal fusion refers to the integration and processing of data or information from different modes in order to realize more comprehensive and accurate information understanding and expression. In the new media art, multimodal fusion has great potential. By fusing multi-modal data, richer and more vivid works of art can be created, and the audience's immersion and interactivity can be enhanced.

Generally speaking, the potential of multimodal integration in new media art is mainly reflected in the following aspects: first, to enhance the expressive power of works of art; The second is to enhance the interactivity of works of art; The third is to expand the creative space of artistic works. In new media art, commonly used computer-aided design tools and software include three-dimensional modelling software, animation software, special effects processing software and so on. These tools and software provide artists with a powerful creative platform, enabling them to create complex works of art more efficiently. See Table 2 for details:

Software Type	*Representative Software*	*Main Role*
3D Modeling Software	3ds Max, Maya	Create realistic 3D models, and perform lighting and rendering, making artistic works more vivid and lifelike.
Animation Software	Adobe After Effects, Nuke	Produce smooth animation effects, add various special effects, and enhance the visual impact of artistic works.
Effects Processing Software	Houdini, RealFlow	Add realistic physical effects and simulation effects to artistic works, making them more authentic and believable.

Table 2: Commonly used software types and their roles in artistic creation.

In new media art, the design process of computer-aided design includes requirements analysis, conceptual design, detailed design, production and rendering, post-processing and other stages [15]. At each stage, artists need to use computer-aided design tools and software to create and modify in order to achieve the final artistic effect.

In the new media art, computer-aided design technology is also facing some challenges. In order to solve these challenges, artists need to constantly learn and master new computer-aided design techniques and tools and try to apply them to practical creation. At the same time, artists can also cooperate with experts in other fields to solve technical problems together.

According to the source and form of data, multimodal data can be divided into many types, as shown in Table 3.

Data Type	*Specific Examples*	*Main Role in New Media Art*
Image Data	Photographs, paintings, illustrations	Provide visual elements, and enhance the visual impact and expressive power of artistic works.

Audio Data	Music, sound effects, voice	Add sound elements, enrich the auditory experience of artistic works, and create an atmosphere.
Video Data	Moving images, animation, real-life videos	Combine visual and auditory elements, create dynamic artistic effects, and tell stories.
Text Data	Text, poetry, scripts	Provide textual information, convey ideas, emotions, and storylines, and enhance the depth and meaning of artistic works.

Table 3: Types of multimodal data and their roles in new media art.

Multi-modal fusion algorithm refers to the algorithm that integrates and processes data from different modes. These algorithms can effectively fuse multimodal data, thus extracting more comprehensive and accurate information. In new media art, the multimodal fusion algorithm plays an important role, which can help artists achieve richer and more vivid works of art.

4 ALGORITHM DESIGN AND IMPLEMENTATION

4.1 CAD Algorithm Design for New Media Art

Design appropriate and interesting interactive processes based on the characteristics of the site, the medium of expression, the medium of expression, and the way of interactive experience, and complete the artistic expression part of the interactive media landscape. Then use intelligent technology to present the final work. The implementation of intelligent technology mainly consists of two parts. One is the system hardware, selecting suitable hardware equipment for the sensing system, central processing system, and feedback system based on the solution. The second is the implementation of system software, which involves coding the central processing unit through interactive processes. Burn the written program into the central processing unit to control the sensing system and feedback system, achieving the final implementation effect.

$$V = v_1, v_2, v_3, \ldots, v_n \tag{1}$$

Select seed point v_0. Use the distance standard to determine other points $v_1, v_2, v_3, \cdots$ connected with v_0. Iteratively add new points until the termination condition (mesh refinement degree) is met.

Surface modelling usually involves the equations of parametric surfaces, such as spheres and paraboloids, which can be expressed as:

$$S\ u,v = x\ u,v\ ,y\ u,v\ ,z\ u,v \tag{2}$$

Where u and v are parameters, and $S\ u,v$ represents the coordinates of a point on the surface.

Texture mapping is the process of mapping image texture to the surface of a 3D model;

$$T\ u,v = s\ u,v\ ,t\ u,v \tag{3}$$

Where $T\ u,v$ is the texture coordinate, and $s\ u,v$ and $t\ u,v$ represent the texture coordinates in u and v directions respectively. These coordinates are determined by the model vertex coordinates and the size of the texture image. Through the application of this algorithm, artists can quickly and efficiently construct a three-dimensional model with complex geometric shapes and a highly realistic appearance, laying a solid visual foundation for new media works of art.

Secondly, in order to achieve dynamic effects and special effects in new media works of art, this paper specially designed a set of animation production and special effects processing algorithms. Animation production and special effects processing algorithms involve keyframe animation, bone animation, and particle systems. Keyframe animation technology describes the position, size, shape, and speed of an object at a specific time by setting keyframes and then automatically generates intermediate frames through an interpolation algorithm.

Suppose there are a series of keyframes:

$$K = \; k_1, k_2, k_3, \ldots, k_n \tag{4}$$

Each keyframe k_i defines the state of the object at a time t_i, and the interpolation formula can be expressed as:

$$T \;\; t \;\; = \sum_{i=1}^{n} w_i \cdot k_i \tag{5}$$

Where $T \;\; t$ is the object state at the time t and w_i is the interpolation weight, which can be determined by the distance between key frames.

Bone animation technology is to drive the animation of the model through the transformation of bone and skin. Suppose there is a bone structure and a skin-skinning technique, and the bone structure is expressed as:

$$B = \; b_1, b_2, b_3, \ldots, b_m \tag{6}$$

The transformation matrix can be expressed as:

$$T_b = \begin{bmatrix} \text{Skeletal transformation matrix} \\ 0 \\ 0 \\ 1 \end{bmatrix} \tag{7}$$

$$T_s = \begin{bmatrix} \text{Skin transformation matrix} \\ 0 \\ 0 \\ 1 \end{bmatrix} \tag{8}$$

Among them, T_b are the skeleton transformation matrix and T_s the skin transformation matrix, which can be determined by the joint points and weights of bones and skin.

Particle system technology generates dynamic effects and visual impact by simulating the behaviour of a large number of tiny particles. Suppose there is a particle set:

$$P = \; p_1, p_2, p_3, \ldots, p_n \tag{9}$$

Each particle p_i has the properties of position pos_i, speed vel_i, life cycle $life_i$ and so on. The animation of the particle system can be updated by the following formula:

$$pos_i^{new} = pos_i^{old} + vel_i \cdot dt \tag{10}$$

$$life_i^{new} = life_i^{old} - dt \tag{11}$$

Among them, $pos_i^{new} t \;\; pos_i^{old}$ are the new and old positions, vel_i the speed, $life_i^{new}$ and $life_i^{old}$ are the new and old life cycles, and dt the time interval.

4.2 Concrete Implementation of Multimodal Fusion Algorithm

These feature vectors lay the groundwork for subsequent multimodal data fusion. For audio data, we employ the Recurrent Neural Network (RNN) to model time series data. Given audio's inherent time series characteristics, RNN effectively captures time dependencies within the series. Through RNN processing, the algorithm extracts feature sequences from audio signals, reflecting key audio information like rhythm, tone, and timbre, thereby supporting audio feature representation.

For video data, we use the 3D Convolutional Neural Network for feature extraction, enabling the capture of temporal and spatial information within the video. Figure 1 illustrates the process of image feature extraction.

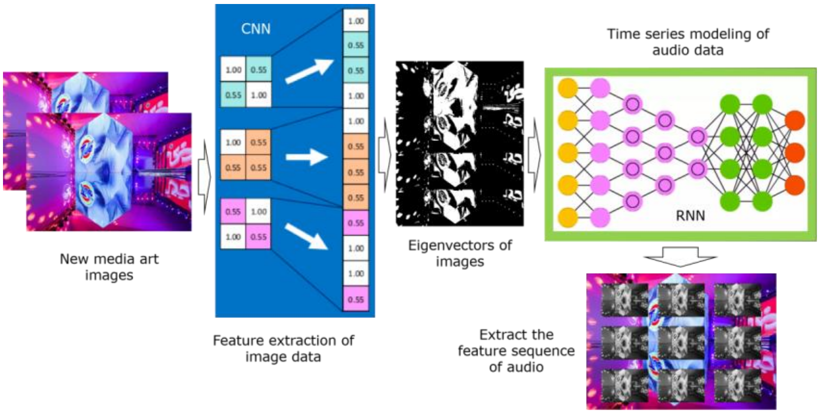

Figure 1: Image feature extraction.

After obtaining the features of image, audio, and video data, this paper designs a fusion layer to realize the effective fusion of these features. The fusion layer adopts an attention mechanism. According to the complementarity and enhancement effect between different modal data, it can effectively fuse the features of images, audio, and video to form a unified feature representation.

4.3 Algorithm Optimization and Performance Evaluation

The implementation of the system software, in simple terms, is to program the central processing unit in a computer-recognizable language to express the interactive process of interactive media landscape devices and realize the control of the sensing system and feedback system by the central processing unit. For Arduino microcontrollers, their programming language uses a syntax similar to C language, but the language is simpler and the programming interface is more concise. Designers need to have a certain level of proficiency in using programming languages for software design, including identifiers, operators, constants, etc., in order to complete the entire program. The design of the program is particularly important for the implementation of device interactivity. It can be said that without this part, interactive media landscape devices are no different from traditional media landscapes in the past. Therefore, whether the software part can be programmed reasonably determines the presentation of the final interactive effect of the device.

A comprehensive set of evaluation metrics is established to assess the algorithm's performance. For the three-dimensional modelling algorithm, modelling accuracy and speed are evaluated. Specifically, Figure 2 illustrates modeling accuracy, while Figure 3 demonstrates modeling speed.

Judging from the scoring of modelling accuracy, this algorithm performs best, with a high score of 9.2, which shows that it has high modelling accuracy in 3D modelling. In terms of modelling speed, this algorithm also performs best, and its modelling speed reaches 40 seconds/model, which is significantly faster than other algorithms. This shows that the three-dimensional modelling algorithm has significant advantages in modelling efficiency.

For the multimodal fusion algorithm, we evaluate its fusion effect and task-related performance. Figure 4 shows the fusion effect of the multimodal fusion algorithm. Task-related performance is shown in Table 4.

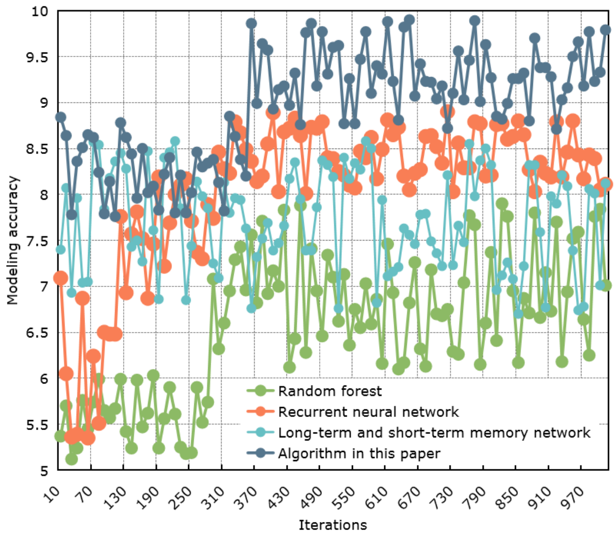

Figure 2: Modeling accuracy.

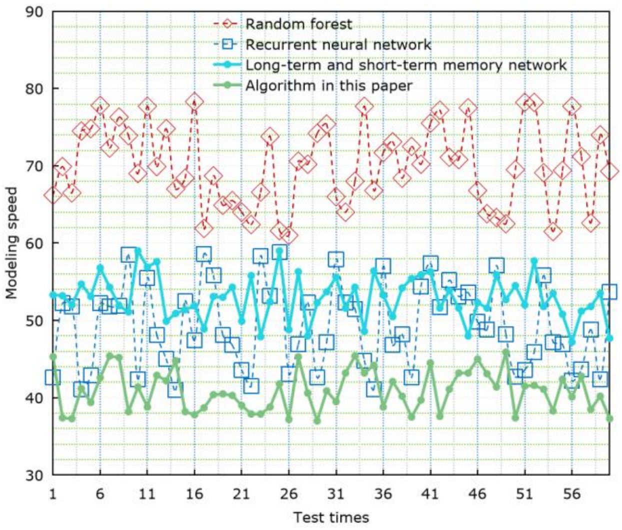

Figure 3: Modeling speed situation.

By analyzing the contents of the table, we can draw the following conclusions:

Advantages of multimodal fusion algorithm:

No matter whether in task 1, task 2 or task 3, the average accuracy and average F1 score of the multimodal fusion algorithm exceed all comparison models.

Compare the performance differences between models:

The accuracy and F1 score of random forest on all tasks are the lowest, indicating that its overall performance is relatively weak. The performance of recurrent neural networks and long-term memory networks is relatively close, but it is slightly lower than that of multimodal fusion algorithms in all indexes.

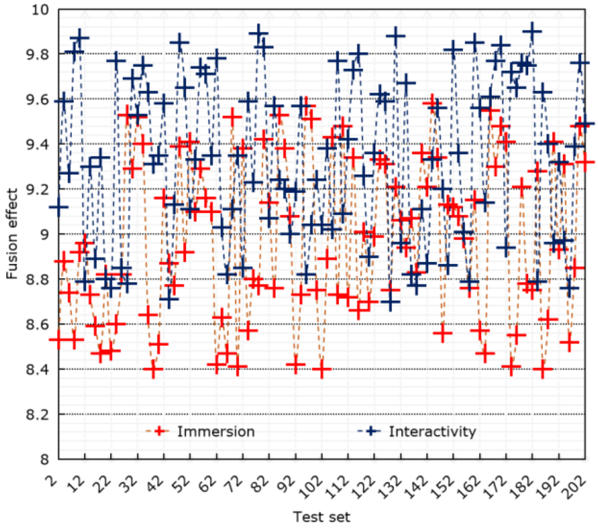

Figure 4: Fusion effect.

Model/Algorithm	*Task 1 Accuracy*	*Task 1 F1 Score*	*Task 2 Accuracy*	*Task 2 F1 Score*	*Task 3 Accuracy*	*Task 3 F1 Score*	*Average Accuracy*	*Average F1 Score*
Random forest	82.5%	0.81	87.4%	0.86	85.1%	0.84	85.0%	0.84
Recurrent neural network	84.7%	0.83	88.9%	0.87	86.8%	0.85	86.8%	0.85
Long-term and short-term memory network	85.2%	0.84	89.5%	0.88	87.6%	0.86	87.4%	0.86
Multimodal Fusion Algorithm	88.1%	0.87	91.2%	0.90	89.5%	0.88	90.0%	0.88

Table 4: Task-related performance showcase (accuracy and F1 score).

Stability and generalization ability of the algorithm:

The multi-modal fusion algorithm shows stable and high performance in all tasks, which shows that it has good generalization ability and stability.

For animation production and special effects processing algorithms, we evaluate their animation fluency and special effects fidelity. Figure 5 shows the animation fluency score. Figure 6 shows the fidelity score of special effects.

Judging from the animation fluency score, the proposed algorithm has the best performance, with a high score of 9.5, which shows that it has high fluency in animation production. In the aspect of fidelity of special effects, the proposed algorithm also performs best, with a score of 9.0, which shows that it has excellent fidelity performance in special effects processing.

5 CASE STUDY

In this case, firstly, the computer-aided design algorithm is used for 3D modelling and animation, and a 3D model with complex geometry and realistic appearance is created, and a smooth animation effect is achieved. Then, the multi-modal fusion algorithm is used to effectively fuse various types of data such as images, audio and video, bringing an immersive viewing experience to the audience. The case display effect is shown in Figure 7 and Table 5.

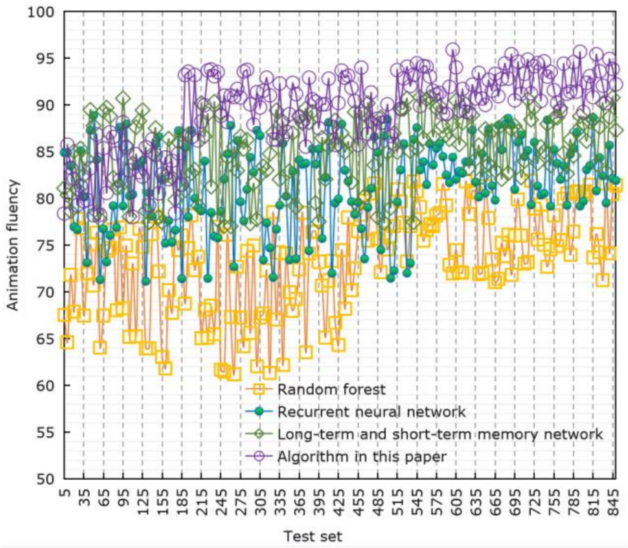

Figure 5: Animation fluency score.

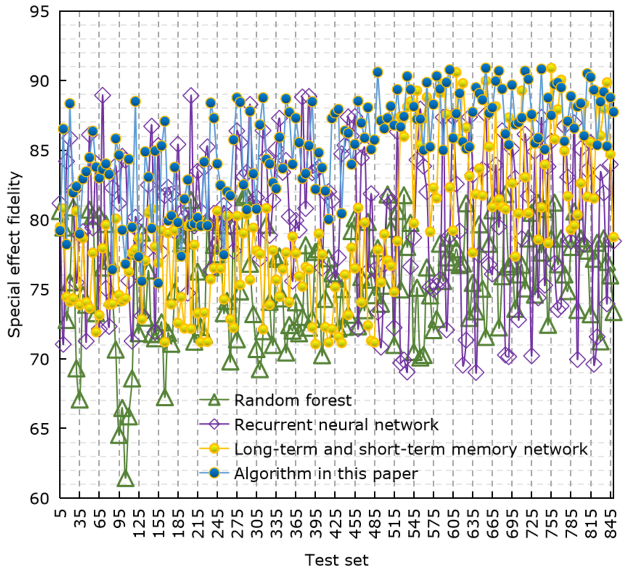

Figure 6: Special effect fidelity score.

Note: In the column "Performance of multimodal fusion algorithm", "-" indicates that this index is mainly related to computer-aided design algorithm, rather than the direct evaluation index of multimodal fusion algorithm.

Through the above case analysis, we can find that the designed algorithm performs well in practical applications, which can significantly improve the creative efficiency and expressive power of new media artworks. At the same time, the audience also spoke highly of the innovation and interactivity of the works.

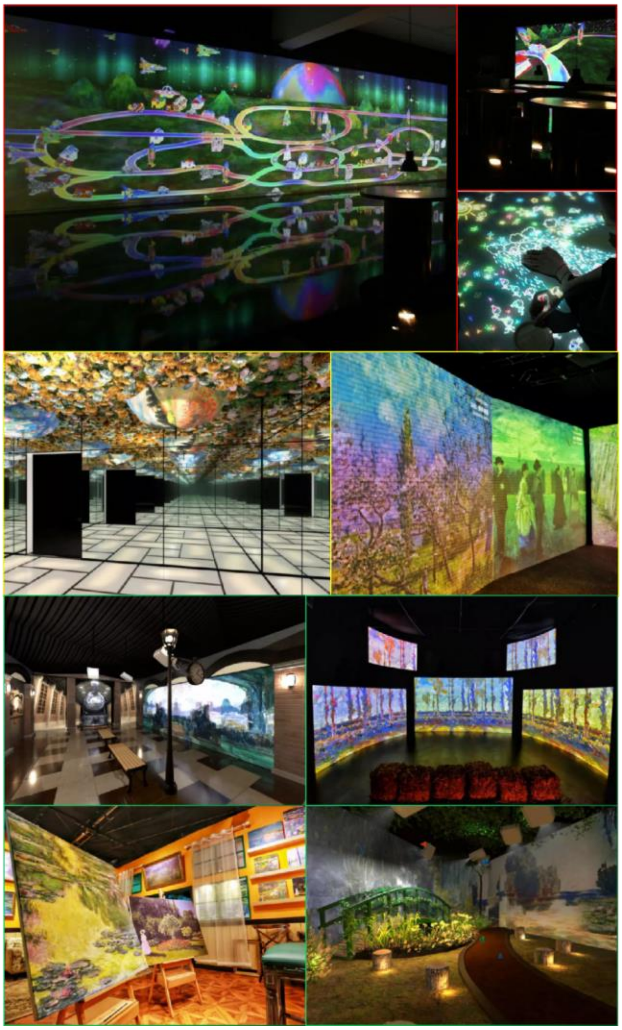

Figure 7: Case effect display.

Evaluation Metric	*Performance of Computer-Aided Design Algorithm*	*Performance of Multimodal Fusion Algorithm*	*Overall Evaluation*
Creation Efficiency	Significantly Improved	-	Excellent
Expression Power of Works	Significantly Enhanced	-	Excellent
Innovation	Prominent	Significantly Enhances Viewing Experience	Outstanding
Interactivity	Good	Significantly Increases User Engagement	Excellent

Audience Feedback	Highly Praised for Creativity and Design	Highly Praised for Immersive Experience	Extremely Satisfied
Evaluation Metric	Performance of Computer-Aided Design Algorithm	Performance of Multimodal Fusion Algorithm	Overall Evaluation
Creation Efficiency	Significantly Improved	-	Excellent

Table 5: Case analysis results of the new media art exhibition project.

6 CONCLUSIONS

This paper delves into the exploration and development of CAD and multimodal fusion algorithms tailored for new media art. A suite of computer-aided design algorithms is designed and implemented, encompassing three-dimensional modelling, animation, special effects processing, and a multimodal fusion algorithm. Experimental verification and practical applications have demonstrated their effectiveness and practicality in new media art creation. Key contributions include introducing novel ideas and methodologies for computer-aided new media art creation, significantly enhancing the creative efficiency and expressive power of new media artworks with the designed algorithm, and validating the algorithm's effectiveness and practicality through real-world applications, offering fresh insights for algorithm research in related domains.

In summary, this research introduces innovative approaches to computer-aided new media art creation and confirms the algorithm's efficacy and practicality. We anticipate that with ongoing optimization and exploration, our algorithm will make substantial contributions to the field of new media art in future research.

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