

AIGC Enabling the Transformation and Upgrading of Theatre Arts Designs

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Abstract: This paper discusses the innovative application and far-reaching impact of AIGC technology in the field of stage art design, which focuses on how AIGC can be the core driving force to accelerate the transformation of stage art design from traditional paradigm to intelligent and interactive. Through the comprehensive literature review, in-depth analysis of technology, and typical case studies, this paper comprehensively comprehends the core concepts and types of AIGC technology, as well as its latest application progress in stage art design. Through the in-depth excavation of AIGC technology to promote the specific path and strategy of the change of stage art design, including the reshaping of the design concept, the intelligent optimization of the creation process, the innovation of visual expression methods, and the upgrading of the audience's interactive experience, and so on. Taking the ballet 'Fusion' as an empirical research object, through detailed analysis of the specific application strategies of AIGC technology in this work and the stage effects it achieved, it shows how AIGC technology empowers choreography design and realizes the fusion of technology and art in actual projects, which provides valuable practical references and theoretical insights for the development of the field of choreography.

Keywords: AIGC; Stage Art; Design Research; Digital Design.

1. Background and Significance of the Study

1.1. Policy Background

Since 2023, policies related to AIGC (Artificial Intelligence Content) have received widespread attention and support globally in recent years, especially in China, a land full of innovative vitality, where the relevant policy system has also been perfected with the rapid development of technology and the continuous expansion of the application boundary. With the rapid development of technology and the constant expansion of the application boundary, the related policy system is also improving daily. To lead and guarantee the healthy development of AIGC technology, the State Internet Information Office (SNIO), together with several departments, formulated the Interim Measures for the

Administration of Generative Artificial Intelligence Services, which has been formally implemented since 15 August 2023, marking that China's regulation and promotion of AIGC technology has entered a new stage.

To accelerate the landing and application of AIGC technology, national and local governments have responded positively. Among them, the practice of introducing the AIGC creation platform channel in the 'China Space Day' propaganda poster collection activity is a successful exploration under this policy direction. It not only stimulated the design field's strong interest in and enthusiasm for exploring AIGC technology but also brought unprecedented innovation vitality and inspiration collision in aerospace design and even the wider design field, showing the great potential of AIGC technology in promoting cultural innovation and improving design quality.

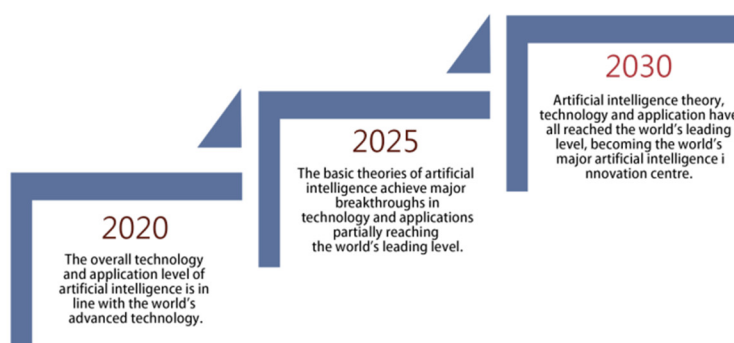


Figure 1. AIGC Industry Development Plans and Targets at the National Level in Recent Years

1.2. Industry Background

Today's stage art design is developed based on digital design: whether it is in the stage of data collection, the stage of idea visualization, or even in the final stage of design materialization, it needs to be completed through simulation, calculation, and transformation of a large number of software. [1] Nowadays, with the intervention of AI technology, these

tasks have become more efficient, intelligent, and popular. AI can generate various types and styles of digital choreographic content, such as images, videos, music, text, etc., by learning a large amount of data. [2]

It is now an industry trend for the choreography industry to utilize AIGC for empowerment. Jason Jamerson uses AIGC tools (e.g. Midjourney and DALL-E 2) to innovate the stage design for many classic plays such as Charles III,

demonstrating its ability to efficiently generate high-quality visual landscapes, which greatly enhances the artistic expression of the stage. In the audio-visual experiment of 'Point of Enlightenment', AIGC technology integrates pioneering Chinese music, naked-eye 3D, AI installation art, and sound and light interactions to create an immersive audio-visual experience of Chinese music and to interpret the modern charm of traditional culture. Clothing design integrates AI and 3D printing to achieve holographic dynamic color interaction; AI drawing technology innovatively transforms images into frame animation, and naked-eye 3D creates a technological dream space, symbolizing the future of digital symbiosis. Point of Enlightenment is not only an audio-visual feast but also a model of artistic innovation and cultural inheritance in the AI era.

1.3. Research Significance

AIGC technology has shown a revolutionary impact in the field of stage art design, significantly improving design efficiency and creative diversity. The technology uses algorithms to quickly generate diversified design solutions and shorten the design cycle, while the creative ability of AI provides designers with new inspiration and promotes design innovation. In response to the audience's personalized needs, AIGC achieves precise design, adjusting the stage effects in real time by analyzing preferences, themes, and venue characteristics to enhance the audience's sense of immersion. As a bridge for the integration of art and technology, AIGC breaks down the boundaries of traditional design, introduces advanced technological tools, and promotes the transformation and upgrading of stage art design and the cultural and creative industries. In addition, it promotes interdisciplinary education and cultivates composite talents who are both art and technology-savvy. In terms of applications, AIGC is not only limited to stage performances but also expands to emerging fields such as exhibitions and VR/AR, creating rich interactive experiences and enhancing viewing effects. AIGC has far-reaching significance for the transformation and upgrading of stage art design, and it will play a more central and crucial role in this field in the future.

2. Definition and Analysis of Relevant Concepts

2.1. Types of AIGC Technology Concepts

AIGC technology mainly includes natural language processing, computer vision, and other AI underlying basic technologies and capabilities that can automatically generate text, audio, image, video, code, multimodal, and other forms of content. In terms of natural language processing, AIGC technology relies on advanced language models, such as the GPT series, to understand and generate natural language text, which greatly enriches the boundaries of content creation. In terms of image and video generation, through the use of deep learning algorithms, especially Generative Adversarial Networks (GAN), Diffusion Models, and other technologies, AIGC can generate highly realistic image and video content. These generated contents not only have a high degree of visual aesthetics but can also be customized according to the user's needs, such as style migration, scene reconstruction, avatar generation, and so on. In addition, combined with multimodal technology, AIGC can also convert text descriptions into images or videos for cross-modal content generation, further broadening the possibilities of content

creation.

In addition to text, image, and video, AIGC technology can also generate multimodal content such as audio and code. In terms of audio generation, AIGC uses speech synthesis technology to convert text into realistic voice output, bringing a brand-new experience to audiobooks, voice assistants, virtual anchors, and other fields. In terms of code generation, by analyzing a large amount of source code data, AIGC can automatically write program code that meets the specifications and has clear logic, providing software developers with a powerful auxiliary tool.

2.2. Specific Path of AIGC Technology to Promote the Change of Choreography Design

When discussing the design application and optimization process of AIGC technology in the field of choreography, the first and key step is to generate design concepts efficiently, and AIGC technology, by its advanced algorithms and models, can rapidly produce preliminary conceptual drawings and material collections for choreography, which greatly shortens the conceptualization stage in the traditional design process, and lays a solid theoretical and practical foundation for the rapid advancement of the project. This process greatly shortens the conceptual idea stage in the traditional design process, and lays a solid theoretical and practical foundation for the rapid progress of the project. Specifically, through the use of cutting-edge AI tools such as Midjourney and Stable Diffusion, designers can obtain a series of diversified design drafts in a very short period, which not only improves design efficiency but also promotes the diversified development of design creativity. AIGC technology can generate the content of choreographic design according to the specific requirements of particular programs, scenes, or themes, and achieve the goal of creating the most effective choreographic design in the world. AIGC technology can accurately generate choreographic design contents that meet the specific requirements of a particular play, scene, or theme, thus realizing the personalization and customization of the design.

AIGC technology plays an important role in the optimization and improvement of choreography. Through in-depth algorithmic analysis and intelligent evaluation of the design scheme, AI can automatically identify potential problems and room for improvement in the design and put forward scientific and reasonable optimization suggestions accordingly. This automated optimization process not only improves the quality and professional level of design work but also reduces the workload of designers. Therefore, the application and optimization process of AIGC technology in the field of choreography not only embodies the in-depth fusion of technology and art but also provides a strong impetus and support for the innovation and development of the art of choreography.

3. New Design Paradigm for the Transformation of Choreography in the Digital Era

3.1. Leap from Tradition to Intelligence

Under the wave of digitalization, the transformation of choreography is not only an innovation in the form of artistic expression but also a key step in promoting the culture and art industry towards intelligence and efficiency. The importance

of this transformation is self-evident, it not only greatly broadens the creative boundaries of stage art, but also brings unprecedented immersive experience to the audience through the deep integration of technology. With the rapid development of stage technology, the new concept of digitalization, new technology, and new materials provide material conditions for the innovation of design, and more and more designers are beginning to explore and try the integration of science and technology and art, which provides new possibilities and a huge development space for the development of stage art. [3]

AI technology gives the stage image content to increase the 'dynamic range' and the expansion of the tension of expression, so that the stage image can present more diversified and personalized visual effects. The richness of this visual effect not only enhances the enjoyment and attraction of the theatre, but also makes the theme and connotation of the theatre more in-depth and comprehensive display, and achieves the richness and diversity of the theatre's spatial and temporal relationship. [4]

3.2. Integration of Technology and Art

The field of stage art design has been seeking breakthroughs and is committed to presenting richer effects and providing more enjoyable experiences. At present, the field of stage art design has integrated several digital media technologies. [5] The whole chain of innovation from creative conception to implementation and presentation has been achieved. Technology has become a powerful aid to artistic expression, and through high-precision modeling, real-time rendering, intelligent control, and other technical means, designers can create a visual feast beyond imagination.

In this context, advanced digital media equipment and technical means undoubtedly play a crucial role, and they jointly promote the profound change and comprehensive upgrade of visual arts. The high-definition display capacity of LED combined with the three-dimensional imaging effect of 3D poly-projection technology not only realizes the seamless integration of the stage background and the real environment but also completes the scene conversion from ancient to modern, from indoor to outdoor in an instant. With the help of the LED screen, the level of change in the spatial area of the stage performance is effectively improved, so that the diversity and fluency of stage art are effectively enhanced. [6] Let the audience in the visual and emotional double impact, get a more profound and real artistic experience. LED technology and 3D poly-projection technology innovation application, not only greatly enriched the stage visual effect of the levels and dimensions, but also the audience to create an unprecedented immersive experience, so that the audience seems to travel through space and time, personally involved in the stage story of the core scene, to feel every detail, every emotional fluctuations. every detail, every emotional fluctuation.

Through pre-designed digital models and real-time rendering technology, the construction and adjustment of the stage set have become unprecedentedly fast and convenient, significantly reducing the time and labor costs required for traditional stage setup. At the same time, the technology also reduces the reliance on physical set materials, reduces the overall cost of scene creation, and provides a solid material foundation for the flexibility and diversity of stage creation. Through the deep fusion of image and video, the realism and viewability of stage art are raised to a new level. The audience

no longer observes the performances on the stage only through the naked eye but can immerse themselves in the beauty of the details of each scene and the changing splendor of each light and shadow. This all-round visual feast not only allows the audience to enjoy the charm of art but also inspires the audience to a deeper level of understanding and perception of stage art.

3.3. Realise the Digital Revolution of Innovation and Interaction

In the era of new media, virtualization technology, and Internet communication technology, the theatre performance has entered a brand new era, and the characteristics of the theatre performance are more manifested in the application of new technology and the presentation of new ideas, which are no longer subject to the limitations of fixed space and time. [7] The integration of choreography into cutting-edge digital technologies, such as virtual reality, augmented reality, holographic projection, etc., has not only allowed the stage visual effects to reach an unprecedented degree of shock but also endowed stage performances with more narrative dimensions and interactive possibilities. Designers can create a virtual scene beyond the physical limitations, so that the audience seems to be in another time and space, and the performance content produces a deeper level of resonance.

The transformation of choreography in the digital era has achieved a revolutionary change from static display to dynamic interaction and from one-way communication to two-way interaction. It not only injects new vitality into the development of stage art, but also brings the audience a richer, more diversified, and personalized aesthetic experience.

4. Case Study - Ballet Fusion

4.1. Design Background

FUSION, staged at the Leipzig Opera House in May 2023 by the Leipzig Ballet in Germany, is a multidisciplinary ballet that pushes the boundaries of art and technology. Directed and composed by artist and technologist Harry Yeff, it tells a story about the balance between humans, machines, and natural archetypes. In Fusion, this philosophy is given new life as a bridge between classical and modern, human and machine, nature and technology.

4.2. Design Positioning

Fusion is a multidisciplinary ballet that pushes the boundaries of art and technology. It is not only a traditional ballet, but also a product of the close integration of multiple fields such as sound design, set design, costume design, and choreography design with artificial intelligence. From music and set design to costumes and choreography, AI played an important role in the entire production process. Harry Yeff created a series of AI-imagined ballerinas using portraits of 35 international dancers from actual performances, and these avatars formed a kind of 'fusion' with the real dancers, bringing a whole new viewing experience to the audience. Paul Zoller's stage design visually depicts a journey toward harmony, exploring the fascinating fusion of light, water, and shadow, and delving into the intricate interplay between humanity, artificial intelligence, and nature.

4.3. Design Strategies Empowered by AIGC

4.3.1. Immersive Design with Virtual and Reality Fusion

The cross-border inspiration fusion and intelligent design

strategy have been fully demonstrated in the Fusion project, where AIGC technology, by its deep learning and big data analysis capabilities, draws inspiration from a vast library of art and design data, and cleverly fuses the classical flavor of traditional ballet with the rhythmic movement of modern electronic music and avant-garde elements of visual art, bringing unprecedented vitality and innovation to the dance drama. The dance theatre has never been more energetic and innovative. From the delicate rendering of sets to the detailed design of costumes, AIGC can effectively share the tedious tasks, allowing human designers to focus on the deepening of creativity and the optimization of solutions, ensuring that the final design results not only accurately convey the concept, but also perfectly present the artistic aesthetics. Meanwhile, the data-driven innovation strategy of Fusion not only keeps up with the trend of the times but also leads the future design trend through the intelligent prediction of AIGC, which gives the work a double charm of foresight and sustainability.

5. Conclusion

In the research journey to explore how AIGC technology empowers stage art design and realizes its transformation and upgrading, we have witnessed the profound change and comprehensive innovation of this cutting-edge technology to the traditional stage art design field, which, as an outstanding representative of the fusion of AI and creative design, not only opens up new possibilities for stage art design but also injects unprecedented vitality and creativity into the whole culture and art industry. AIGC technology, as an outstanding representative of the integration of artificial intelligence and

creative design, not only opens up new possibilities for stage art design but also injects unprecedented vitality and creativity into the entire cultural arts industry. In the future, through the empowerment of AIGC technology, the stage art design will be upgraded to be more intelligent, artistic, and interactive, injecting new vitality and momentum into the development of the culture and art industry, and providing an important reference for the research and practice of stage art design.

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