



The Application of Digital Media Technology in the Innovation of Red Culture

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Abstract. In the context of rapid development of digital media technology, this paper explores the application of digital media technology in red animation creation through the combination of universities, governments, and enterprises, relying on practical projects. Specific implementation plans for the application of digital media technology are proposed, and the feasibility and practical effects of the technology are analyzed in detail. By repairing blurry photos and exploring the application of different software in red animation creation, we aim to explore new opportunities for red animation creation, summarize the important value and positive role that digital media technology brings to red animation, effectively inherit and promote red culture, further enhance national pride and cultural confidence, and provide certain reference significance for the inheritance and development of red culture in other regions.

Keywords: Digital media technology, Red culture, Animation Creation.

1 Introduction

General Secretary pointed out: "Red resources are witnesses to the arduous and glorious struggle of our party, and are the most precious spiritual wealth." "We must continue the red bloodline, protect and build the red landscape that revolutionary martyrs sacrificed their blood to lay down, and strive to create new achievements that live up to the expectations of revolutionary predecessors and are worthy of history and the people[1]. Red culture embodies the faith, belief, and confidence of the Party and the people, as well as the powerful spiritual force to overcome all strong enemies, overcome all difficulties, and achieve all victories. As a leading force in the world's technological revolution and industrial transformation, digital technology has injected strong impetus and innovative vitality into the inheritance and development of red culture, provided broad ideas for the inheritance of red culture, and outlined a new blueprint[2].

This paper explores the application of digital media technology in red animation by participating in the "Rain Flower Overseas Chinese Soul" series of heroic propaganda animation projects jointly created by the Nanjing Returned Overseas Chinese Federation and Nanjing Normal University.

2 Introduction to Digital Media Technology

2.1 The concept of Digital Media Technology

Numbers mainly refer to the collection, organization, and storage of information data through binary means; Media mainly refers to media or medium, which is interpreted as "a tool for disseminating information" in the Modern Chinese Dictionary; Digital media technology mainly focuses on the capture, processing, storage, transmission, and reproduction of digital media such as images, text, sound, and video. The main research areas include digital media representation and operation, digital media compression, digital media storage and management, and digital media transmission[3].

2.2 Characteristics of Digital Media Technology [4]

Digitization. Record, process, propagate, and retrieve information in binary form.

Efficiency. Capable of quickly processing and transmitting large amounts of data.

Interactivity. Enhanced the interactivity of information, allowing users to actively participate in the dissemination and communication of information.

Diversity. Capable of processing and presenting diverse information content to meet the needs of different users.

Integration. Integrating multiple technologies together to achieve comprehensive processing and display of information.

3 Introduction to Red Animation

3.1 The concept of Red Animation

Red animation refers to animated films with themes such as revolutionary history and socialist construction. It is a unique red resource in China[5].

3.2 Analysis of Red Animation Data

In the early stage of team research, it is necessary to use various multimedia channels to collect a large amount of red culture materials.

From the record data of TV animations and animated movies, it can be seen that. Although there was a major outbreak of the pandemic in 2020, it did not affect the enthusiasm for filing and distributing television animations in China. The number of TV animation registrations in China showed an increasing trend in 2020; By 2023, the number of TV animation registrations will approach 600. Unlike television animation, the number of registered animated films in China decreased significantly in 2020 due to the impact of the epidemic, with only 102 in 2020, a decrease of 29% compared to 2019. By 2023, the number of registered animated films in the country will exceed 130 [6] (as shown in Figure 1).

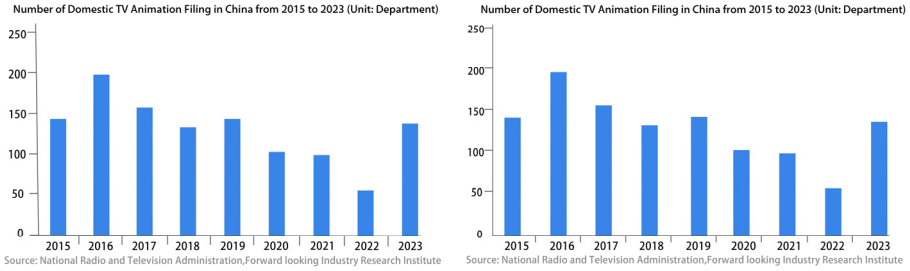


Fig. 1. TV animation and animated film registration data

From the perspective of active users of anime apps and the total output value of the anime industry.The output value of animation increased from less than 10 billion yuan at the end of the 15th Five Year Plan period to 47.084 billion yuan at the end of the 11th Five Year Plan period (2010), with an average annual growth rate of over 30%. Since 2014, China's animation content production strength has further improved. Against the backdrop of rapid development of national policies, the Internet, and digital media technology, animation production is increasingly closely integrated with mobile terminals and the Internet, and the market scale has steadily expanded. According to statistics released by the Beijing Animation and Game Industry Association, the total output value of China's animation industry slightly decreased to 211 billion yuan in 2021. According to data from the Chinese Animation Society, the total output value of China's animation industry will exceed 300 billion yuan in 2023[7].

For young people, anime apps have become one of the main channels for their parents to receive anime. According to the "2023 China Anime APP Market Research Report," platforms such as Kuaikan Anime, Bilibili Comics, and ACFun have become mainstream apps, with high numbers of active users [8] (as shown in Figure 2).

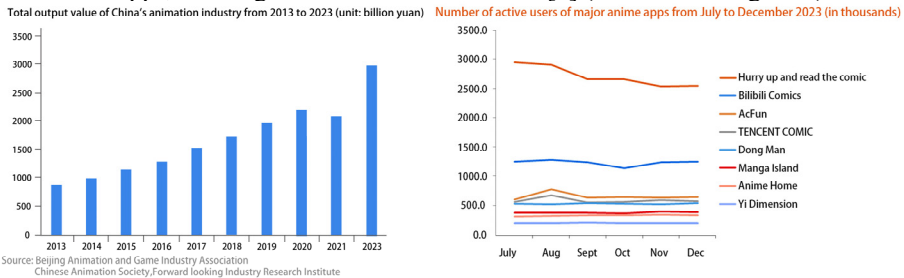


Fig. 2. Active users of anime apps and total output value of the anime industry

From the analysis of data on China National Knowledge Infrastructure and domestic animation theme types.Through the "China National Knowledge Infrastructure" online platform, with "red animation" as the keyword, only 59 relevant literature materials were consulted, including 26 articles related to "red animation" and "new media". These articles mainly focus on the role and influence of digital media technology in inheriting red culture, as well as the path of digital media tech-

nology inheriting red culture, without further research on how digital media technology is applied in red animation creation.

Fantasy themes account for 57%, daily/humorous themes account for 16%, science fiction themes account for 10%, martial arts themes account for 6%, other themes account for 10%, and historical themes account for only 1% [9] (as shown in Figure 3). According to incomplete statistics, there are only over fifty red animated films available online. Red animation, as a typical representative of historical themes, accounts for a very small proportion.

The "Rain Flower Overseas Soul" promotional animation project uses digital media technology to focus on the animation creation based on the revolutionary martyrs of Rain Flower Terrace, telling the heroic deeds and noble spirit of revolutionary martyrs such as Deng Zhongxia, Xu Baoye, Xie Wenjin, etc., in order to fill the gap in red animation.

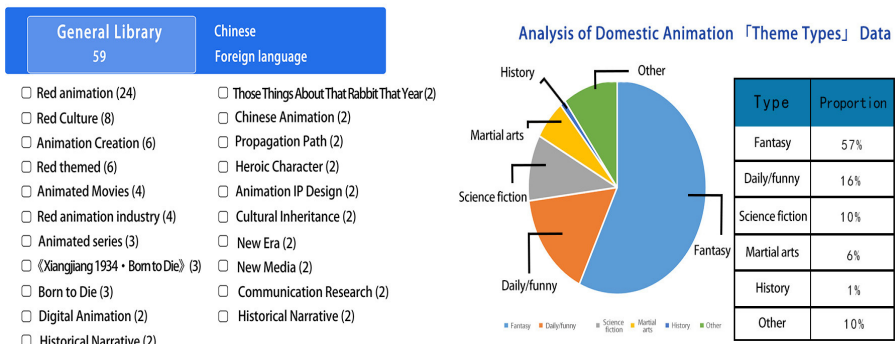


Fig. 3. Data Analysis of China National Knowledge Infrastructure and Domestic Animation Theme Types

3.3 Reasons Why Red Animation is Not Popular

Red animation itself lacks market appeal.The main reason why red animation is not popular is the lack of market appeal, making it difficult to adapt to the aesthetic and viewing habits of modern audiences. Red animation often focuses on conveying specific political ideas or educational messages, with relatively limited content and form in depicting historical events and heroic characters. In addition, these contents are relatively dry in the modern commercialized film and television market, and cannot meet the modern audience's demand for entertainment and freshness. At the same time, most of the historical events reflected by the red culture occurred decades ago. For modern youth groups, they have not experienced that era and it is difficult to resonate with them.

The misleading nature of digital media on red information.In the context of the digital media era, obtaining information on red culture can be somewhat misleading. Many platforms, in order to gain traffic, pursue click through rates and attention, engage in false advertising, exaggeration, and even intentionally release provocative or misleading information, inducing viewers to make wrong judgments. For young peo-

ple who do not understand history, they may easily believe some false statements and information, leading to misunderstandings of the facts.

Limitations of Digital Media Recommendations.In the era of digital media, many online platforms recommend historical behaviors and preferred content based on users' browsing habits and preferences. However, this personalized recommendation can lead to the phenomenon of "information cocoons", driven by commercial interests, where users only come into contact with information that meets their interests and preferences, while ignoring the existence of other different viewpoints or content. In this case, the dissemination of red revolutionary culture may be limited as the system will not recommend red cultural content that does not match the user's existing preferences.

4 The Specific Application of Digital Media in Red Animation Creation

4.1 Application of Digital Media in Repairing Blurred Photos

The Chinese nation is a nation that reveres heroes and has produced numerous heroes. Remembering the martyrs is our long-standing and vibrant tradition. Outside the Zhonghua Gate in Nanjing, under the Yuhua Terrace, countless Communist Party members and patriots sacrificed themselves and slept here for their lofty ideals and beliefs. The animation tells the stories of revolutionary martyrs such as Deng Zhongxia, Xie Wenjin, and Xu Baoye. Although their lives are short, their spirits will last forever.

Behind every old photo lies a touching story, which is not only a memory of the times, but also a faithful witness to history. During the animation production process, the team found a photo of Deng Zhongxia and her family of three taken in Moscow in early 1929 from limited image resources. This is the only and final family portrait of Deng Zhongxia and her family[10]. The team utilized the image quality restoration technology in Wink software to restore blurry old photos into high-definition photos (as shown in Figure 4), thus placing the photo in the introduction of Deng Zhongxia's animation history. This is a tribute to Deng Zhongxia's past and emotions. In the era of fast-paced development of digital media, people are prone to forgetting history or not understanding it. Restoring old photos has become a way to look back at the past and remember the martyrs. By restoring these precious historical images, more people can know the dedication spirit of the martyrs, pass on their noble qualities, and fill society with positive energy.

Therefore, in response to issues such as aging and blurring of photos, digital technology is used to restore and reproduce them, so that these precious red cultural materials can be preserved and rejuvenated.



Fig. 4. Image quality restoration techniques in Wink software

4.2 The Application of Digital Media in Red Animation Creation

Pre production stage. In order to ensure the smooth progress of the project, Professor Cao Yang from Nanjing Normal University successfully applied for the construction of a talent training practice base, providing a venue for the project. The students and teachers who participated in this project completed technical learning and training at Nanjing Yiji Technology Co., Ltd. during the holiday period, laying a solid foundation for the technical production of the project and ensuring its smooth progress. The Nanjing Federation of Returned Overseas Chinese provided policy guidance and financial support. The three parties jointly carry out platform construction, project management, and achievement transformation and dissemination, and establish a special fund utilization system to carry out dedicated use of funds, ensuring that the use of funds is related to the project and providing guarantees for the creation and revitalization of red animation. The overall style of 'Rain Flower Overseas Soul' has been determined, and the scripts of three revolutionary martyrs, Deng Zhongxia, Xu Baoye, and Xie Wenjin, have been approved and successfully completed.

Mid production stage. The team used Maya software to build models of the characters, scenes, props, and other elements in the overseas Chinese hero animation of "Rain Flower Overseas Soul", and used Unreal Engine 5 virtual software for three rendering and two rendering. The main creative team restored realistic images in Maya software and researched the innovation of Unreal Engine 5's "three rendering two" technology, adding vitality to the slightly dull picture, freeing the entire story from the heavy anxiety of the brutal revolution, and focusing on shaping emotional depth, making the story ups and downs, captivating, and creating more explosive and infectious emotions.

Character Model. The project team tried to replicate the model production of Deng Zhongxia and his family of three, Li Dazhao, and other characters as much as possible (as shown in Figure 5).

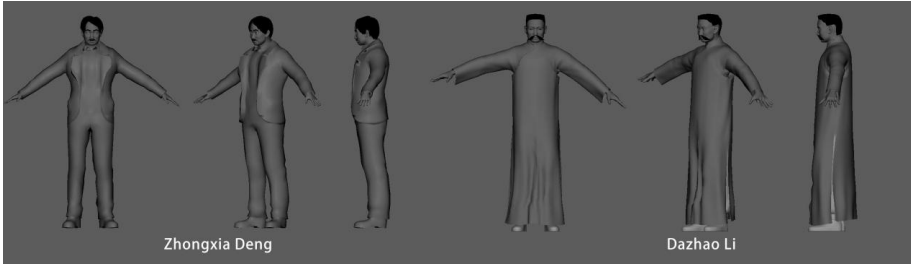


Fig. 5. Model making of Deng Zhongxia and Li Dazhao

Scene model creation. In this project, it involves the construction of a large number of scene models. The team created the model through on-site visits, image collection, expert interviews, and other methods. The following are some scene models (as shown in Figure 6).



Fig. 6. Scene model

When encountering exquisite and textured decorative models, the team responsible for making the models use ZBrush software to carve and color them (as shown in Figure 7).



Fig. 7. Decoration model

Animation production. The creative team used AdvancedSkeleton software for skeleton binding, combined with Mixamo motion capture actions attached to the adv binding model, connected the actions in Maya, and finally imported them into Unreal Engine for rendering. The following is a comparison of three rendering and two rendering effects (as shown in Figure 8).

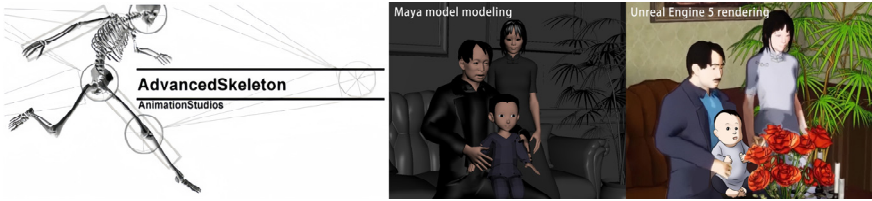


Fig. 8. Comparison of Three Rendering and Two Effects

Post synthesis. In the post production synthesis, the creative team invited specialized voice actors to dub, and the rich and magnetic male voice led the audience back to the historical era. The team collected a large number of sound effects needed in the scene, such as walking sounds, train sounds, baby crying sounds, etc., and even completed the sound effects production through members' own dubbing. Finally, they synthesized them using Adobe Premiere Pro software (as shown in Figure 9).

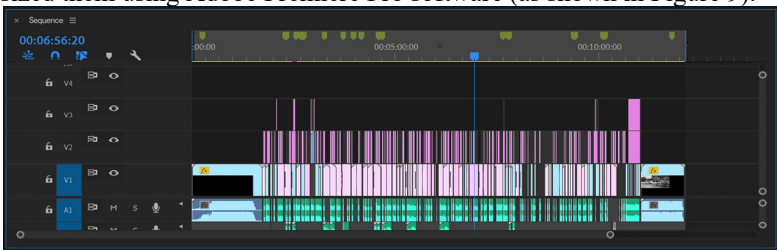


Fig. 9. Adobe Premiere Pro software synthesis

Circuit correction. After the completion of the animation short film creation, it is submitted to the government for acceptance. If some parts of the animation are not satisfactory, they will be subject to cyclic correction. The following is the specific production framework (as shown in Figure 10).

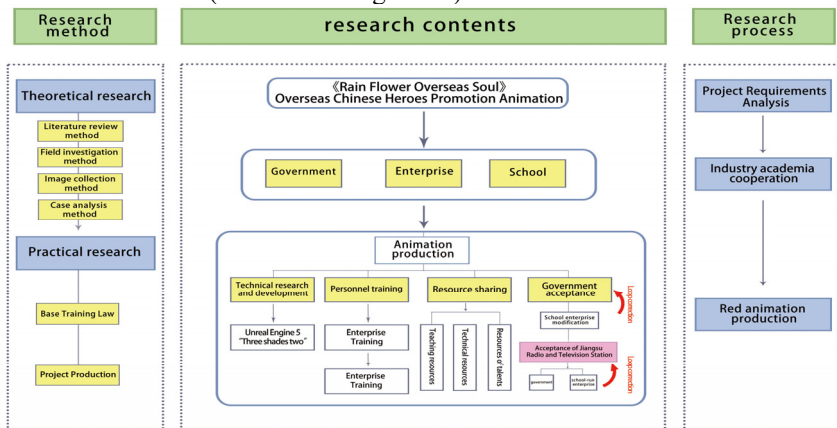


Fig. 10. Create a framework

5 The Value of Digital Media Technology in Red Animation

5.1 Enriching Research Resources on Red Culture

As a martyr cemetery, Nanjing Yuhuatai is one of the "spiritual highlands" of the Communist Party, leaving valuable resources in the revolutionary struggle and providing a large amount of materials for the creation of red animation. There are very few red animated works about the revolutionary martyrs of Nanjing Yuhuatai. Currently, there are only animations on the internet based on the theme of Yuhuatai martyrs, and only the 2022 animated TV series "Lilac Flower" is based on the female martyrs of the Lilac Revolution, highlighting the story of women who are not inferior to men in the era. It can be seen that it is particularly important to explore the resources of Yuhuatai's revolutionary culture. This project combines traditional red culture resources with modern animation technology, providing new perspectives and materials for red culture research, enriching and expanding the field and depth of red culture research, and promoting the development of related disciplines.

5.2 Provide Rich Materials and New Perspectives for Interdisciplinary Research

The research on the activation path of red animation from the perspective of digital media involves multiple disciplines such as digital media technology, history, and art. Through this project, rich materials and perspectives are provided for interdisciplinary studies, promoting cross disciplinary integration between different disciplines. Other scholars analyze and interpret animation content from different perspectives, exploring its historical value and cultural significance, and exploring its role in mainstream ideological propaganda and the dissemination of socialist core values[11].

5.3 Enhancing Animation Art Forms

In the creative process of Yuhuatai Martyrs Animation, the latest virtual software was used to develop the "Three Rendering Two" animation style, in order to balance the authenticity of history with the "edutainment" of animation art, explore more animation forms that meet the characteristics of the times and the needs of young people, and combine the background of the times and the needs of reality to creatively interpret and promote red animation, reflecting the strong vitality and appeal of red culture.

5.4 Strengthen Patriotic Education for Young People and Promote Revolutionary Spirit

The Yuhuatai Martyrs Animation showcases the heroic deeds and noble spirit of the Yuhuatai Martyrs to the public through vivid images and touching storylines, inspiring people's patriotism and national pride, promoting revolutionary spirit, and inheriting the red gene. As an important carrier of patriotic education, the Yuhuatai Martyrs

Animation is widely disseminated through diversified channels and platforms to strengthen patriotic education among young people, enhance national identity and cultural confidence, and further guide young people to establish correct worldviews, life philosophies, and values.

5.5 Promote Cultural Exchanges Between Different Countries and Regions

The Yuhuatai Martyrs Animation showcases Nanjing's red culture and revolutionary spirit to the whole country and even the world, promoting the exchange and dissemination of red culture between different regions and resonating with them. Red animation, as an important part of Chinese culture, can enhance the international influence and competitiveness of Chinese culture through the widespread dissemination of digital media platforms.

5.6 Enhance Social Influence and Promote the Coordinated Development of Cultural and Creative Industries

The launch and dissemination of the "Rain Flower Overseas Chinese Soul" overseas Chinese heroic propaganda animation is expected to attract a large number of viewers' attention and participation, thereby enhancing the social influence and popularity of related venues (such as the Rain Flower Terrace Martyrs Cemetery, Memorial Hall, etc.). At the same time, we believe that the promotion and popularization of red animation can stimulate the vitality of the cultural and tourism industry chain and promote the development of related industries. This includes but is not limited to innovative development of red animation derivatives, publication of related red themed books, etc., injecting new vitality into the market and cultivating new economic growth points.

6 The Advantages of Digital Media Technology in Red Animation

6.1 Digital Media Technology Enhances Visual Expression

Digital media technology can bring more flexible creation and visual impact effects to red animation, improving the quality and expressiveness of design works. In the animation of "Deng Zhongxia" in this project, we used the special effect of "fire" to make the scene of burning down Zhao's house more vivid and immersive; In the scene of Deng Zhongxia returning to Hong Kong, the production of water effects in the scene makes the entire scene more majestic, spectacular, and so on. These effects of wind, fire, thunder, electricity, fog, fabric, and character hair, along with a large amount of physical simulation and solving techniques, have better captured the audience, enhanced the affinity, fusion, and infectivity of red culture, and achieved digital display of red animation and maximized the use of group attention[12].

6.2 Enhance The Protection and Interaction of Red Animation

Digital media technology provides scientific basis and technical support for the restoration and interaction of red cultural relics. Restoration of blurry, damaged, and other old photos; Through virtual interaction and immersive experience as media, support is provided for presenting revolutionary history in an audible, visual, perceptible, and touchable manner through modeling, animation, rendering, and other methods, constructing spatiotemporal fields that combine virtual and real elements such as battle scenes.

6.3 Promoting Innovation in Red Animation Creation

Digital media technology provides creators with unlimited imagination and technical support, enriching the diversity of red animation presentation and changing the relatively traditional static exhibition mode of red culture. In this project, a new technology called "Three Rendering Two" was innovatively developed through virtual rendering. The film "Deep Sea" has made a breakthrough in traditional Chinese ink painting. After seven years of exploration and experimentation, it uses various materials such as acrylic and edible pigments to restore a visual effect similar to ink under conditions close to the state of ink, breaking the rigid boundaries of three dimensionality and perfectly integrating the unique freedom and particles of ink painting[13].

6.4 Expand the Dissemination and Influence of Red Animation

Digital media technology enables faster dissemination of information and more diverse platforms for dissemination. Through the integration of human and technological communication, technological innovation promotion, deepening industry academia cooperation, multimedia display of red exhibition halls, construction of red cultural brands, development of derivative products, and the use of various platforms such as online media, further promote the dissemination of red animation[14].

7 Conclusion

The application of digital media technology in red animation creation is extensive and profound. It not only improves creative efficiency, enriches forms of expression, enhances audience experience, but also broadens communication channels. With the continuous advancement and development of technology, digital media technology will play a more important role in the creation of red animation.

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