

Research on the Application of Intelligent Algorithm in Personalized Creation of Animation Characters

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ABSTRACT

This paper discusses the application of intelligent algorithms in the personalized cartoon character creation. From intelligent character extraction and user-inspired character design, to real-time motion capture and enhanced expression generation, intelligent algorithms have shown the advantages of improving the efficiency and personalization level of animation character design. However, problems of data quality assurance, accuracy of feature extraction, accuracy of personalized customization and limitations of creativity generation still need to be solved urgently. To this end, this paper puts forward some optimization suggestions, such as strengthening data governance, upgrading feature extraction technology, deepening user research, and stimulating creative potential. The purpose is to promote the wider application of intelligent algorithms in the personalized creation of animation characters and promote the innovative development of the animation design industry.

KEYWORDS

Intelligent algorithm; Animation design; Personalized creation; Feature extraction; User motivation

1 Introduction

With the vigorous development of the animation industry, animation character design, as its core link, not only bears the important functions of telling stories and conveying emotions but also is the key to attracting audiences and shaping the brands of animation works. With the rapid development of science and technology, intelligent algorithms as a powerful tool is gradually infiltrating and profoundly changing the traditional animation role design mode. Intelligent algorithms with its efficient data processing ability, accurate feature recognition ability and strong creativity generation ability, have opened up a new path for personalized creation of animated characters. Although intelligent algorithms show great potential in animation character design, they still face many challenges in their application process, which restricts the wide application and in-depth development of intelligent algorithms in animation character design. Therefore, how to effectively cope with these challenges and give full play to the advantages of intelligent algorithms in the personalized creation of animated characters has become an important issue to be solved urgently in the field of animation design. Based on the application status of intelligent algorithms in the personalized animation character creation, analyzing the challenges and putting forward targeted optimization suggestions will help to provide useful reference for the animation design industry and promote the innovation and development of intelligent algorithms in animation character design field.

2 The application of intelligent algorithm in the personalized creation of cartoon characters

2.1 Intelligentization of character feature extraction and optimization of design modeling

Feature extraction is an important part of animated character design. Traditional methods relies on designers's subjective judgment and experience accumulation, and it is difficult to ensure the accuracy and consistency of role characteristics. The intelligent algorithm can train and learn a lot of cartoon character data through deep learning and other techniques, and automatically extract key features such as facial contour, hairstyle and clothing texture. We take Kyoto Animation, a well-known Japanese animation company, as an example, the company uses intelligent algorithms to extract and analyze the characters in its classic animation works, and successfully built a database containing rich character. When creating a new character, the designer need to select the required features in the database. Intelligent algorithm can automatically complete the role modeling and rendering, which greatly improves the design efficiency and the personalization of the role image. In the Violet Eternal Garden, intelligent algorithms help designers to quickly extract and combine facial features and clothing styles of different roles, making each role unique and loved by many audiences.

2.2 The realization of user-driven role design and satisfaction of user's personalized needs

In the animation industry, the diversification and individualization of user 'needs has become a trend that can not be ignored. Intelligent algorithms can accurately analyze users' behaviors and preferences through deep learning and other

technologies, thus realizing user-motivation role design. Taking the animation design platform Midjourney as an example, the platform fully uses the advantages of intelligent algorithms and introduces an innovative role customization system. Users can choose the gender, age, hairstyle, clothing and other characteristics of the character according to their own preferences and needs by simply operating on the platform, and fine-tune the character image by adjusting the parameters. The intelligent algorithm can quickly generate an animated character according to the user's input, which meets the user's personalized needs. The system can improve the participation and satisfaction of users. In addition, many design platforms can use big data to analyze the characteristics of popular cartoon characters in the current market, and automatically generate corresponding cartoon characters according to market demand to meet the market demand ^[1].

2.3 The real-time capture action and enhanced expression generation

The movements and expressions of cartoon characters are important means to express their personality and emotion. Traditional methods rely more on manual adjustment by hand-drawing or animation software, and it is difficult to capture and generate accurately in real time. The intelligent algorithm can capture and generate the action and expression of animated characters in real time through image recognition and action capture. We take Final Fantasy series games developed by Square Enix for example. This series of games uses intelligent algorithms to capture the actions of players in real time and convert them into the actions of the characters in the game. At the same time, the intelligent algorithm can automatically generate the expressions and sounds of the characters in the game according to the changes of the players' expressions and emotions. This can improve the interactivity and realism of the game, and provide new ideas for the design and development of animated games. For example, players in Final Fantasy 15 can capture their movements and expressions in real time through intelligent algorithms, and integrate them into the game characters, making the game experience more immersive and realistic. For example, in Nezha 2, the shaping of the character's character not only depends on the traditional script writing techniques, but also needs to train the character's behavior mode through deep learning, so that the character of Nezha can show the emotional response that meets the audience's expectations in different situations.

3 The challenges faced by the application of intelligent algorithms in the personalized creation of animation characters

3.1 Hard-to-meet data quality assurance and diversity requirements

The application of intelligent algorithms in the personalized creation of animated characters depends on a large amount of data support. However, the guarantee of data quality and the satisfaction of diversified demands have become a huge challenge. On the one hand, the data of animated character design often involves complex graphics, textures, movements and expressions, and the collection, processing and storage of data all need high-precision technology and equipment support. On the other hand, the diversity of animation characters is extremely demanding, and it is difficult to collect and sort out the character design data with different styles and cultural backgrounds, which will lead to insufficient data diversity. Taking One Piece as an example, the characters in this work are different, from human to non-human, from realistic style to surreal style, and the design of character is extremely diverse. When designing a character with intelligent algorithm, if the data quality is not high or the diversity is insufficient, the intelligent algorithm cannot accurately capture the key features of the character, resulting in the difference between the designed character image and the original image ^[2].

3.2 The accuracy and modeling of feature extraction with complexity

The process of feature extraction and modeling of animated character design is indeed facing the challenge of accuracy and complexity. Taking Wukong in Dragon Ball as an example, his role design is very unique, including unique facial contour, iconic hairstyle and clothing texture with a sense of fighting. When using intelligent algorithm to design Wukong's character, it is necessary to accurately extract his facial features, such as the shape of eyes, the outline of nose and the line of mouth. Due to the strong artistry and exaggeration of Wukong's five senses, it is difficult for traditional image processing technology to accurately capture these features, resulting in the deviation of the designed characters. In addition, Goku's hairstyle and clothing texture are also design difficulties. Its iconic hairstyle needs a high-precision image processing algorithm to capture its details and texture, while the clothing texture needs to consider the dynamic changes and physical simulation during the fight. In the process of modeling, if the geometric and physical simulation is inaccurate, Wukong's clothing will appear stiff or unnatural during the performance, thus affecting the overall image of the character. Therefore, the process of feature extraction and modeling of animation character design really needs the

support of high-precision image processing technology and algorithms to overcome the challenges of accuracy and complexity.

3.3 The personalized customization of difficult and accurate matching and user's demand

The application of intelligent algorithms in the personalized creation of animated characters aims at meeting the personalized needs of users. In practical application, it is difficult to accurately connect personalized customization with users' needs. On the one hand, users' personalized needs are often diverse and uncertain, and it is difficult to measure them with uniform standards and indicators. On the other hand, intelligent algorithms still have limitations in understanding and meeting users' needs, and it is difficult to accurately capture users' real intentions and preferences. In practical application, there is a certain deviation in understanding and satisfaction of users' needs by intelligent algorithm, which leads to a certain gap between the designed role image and the expectations of users. In addition, it is difficult for users to accurately capture and meet the needs of characters and background stories through intelligent algorithms.

3.4 The limitation of creativity generation and the lack of cross-domain integration

Although the application of intelligent algorithms in personalized creation of animation characters can improve the efficiency and accuracy of design, there are some limitations in creative generation and cross-domain integration. Intelligent algorithms are often generated by existing data and patterns, lacking the ability of independent innovation and breakthrough. In addition, animation character design involves knowledge and skills in painting, sculpture, fashion design and other fields, and there are still shortcomings in the cross-domain integration of intelligent algorithms. Taking the famous French cartoon *The Little Prince* as an example, the characters in this work are concise and rich in connotation, with profound moral and symbolic significance. Although the basic characteristics and forms of the character can be extracted, it is difficult to compare with the original work in terms of creative generation and connotation expression. In addition, animation character design needs to be integrated and innovated with other fields, such as applying character images to games, toys, clothing and other fields. However, the limitations of intelligent algorithms in cross-domain integration will lead to the lack of innovation and practicability in role image design.

4 The optimization suggestions on the application of intelligent algorithm in the personalized creation of animation characters

4.1 The strengthening of data management and the broadening of data diversity sources

Data is the basis of the application of intelligent algorithm, and the quality and diversity of data directly affect the performance and effect of the algorithm. Therefore, strengthening data governance and broadening the sources of data diversity are the keys to improving the application effect of intelligent algorithms in personalized animation character creation. First of all, a strict data management system should be established to ensure the accuracy, completeness and consistency of data. In the process of data collection, processing and storage, measures such as data cleaning, data deduplication and data standardization should be taken to improve data quality. On the other hand, we should actively broaden the sources of data diversity, including collecting data from animation works with different styles, cultural backgrounds and historical periods. When the designed character need to integrate the cultural elements of the East and the West, we can collect data from Japanese traditional animation works and draw inspiration from European and American animation, China ancient style animation and other works. At the same time, data can also be obtained from user feedback, social media and other channels to understand the audience's preferences and expectations for anime characters. These diverse data sources can provide rich training samples and test data for intelligent algorithms so that they can better learn and capture the key characteristics of different roles, thereby improving the accuracy and diversity of the designed role images.

4.2 The improvement of feature extraction technology and the optimization of modeling process

Feature extraction and modeling is the core of intelligent algorithms for personalized creation of animated characters. Therefore, it is necessary to improve the accuracy and efficiency of feature extraction techniques. Advanced image processing technologies such as deep learning and convolutional neural network can be used to accurately extract facial features, hairstyles, costumes and so on of cartoon characters. At the same time, the extracted features can be further processed and optimized to improve their accuracy and availability. Meanwhile, the modeling process needs to be optimized. Physics-based modeling methods can be used to model the bones, muscles, skin and so on of the cartoon

characters in detail, combined with their movements and expressions. We can also use data-motivation modeling method to learn and simulate the shape and action of the role by using a large number of training data to improve the efficiency and accuracy of modeling. In this way, more vivid characters can be designed and the appreciation and immersion of animation works can be improved.

4.3 The deepening of user research to realize personalized customization and accurate matching

In the design process, the user data can be deeply mined through big data technology, so as to understand the users's preferences, style requirements, cultural background and other key information about anime characters. We can also gain insight into users's inner needs and emotional tendencies from a psychological perspective. By analyzing the user's browsing history, interactive behaviors and comment, we can use psychological theory to identify the user's potential motives and emotional reactions to more accurately locate the direction of role design. When designing animation with the theme of future science and technology, the intelligent algorithm is used to analyze the users's preferences for high-tech elements, future styles, specific color matching, etc., so as to accurately locate the direction of character design. In the process of role design, intelligent algorithms are used to automatically match and optimize key elements such as facial features, hairstyles, and clothes. By inputting the user's preferred keywords, a variety of design schemes are automatically combined. In addition, the real-time collection and analysis of user feedback can be carried out at the same time, and the role design can be fine-tuned according to the user's real-time feedback to ensure that the designed role image can accurately meet the individual needs of users. This personalized customization method based on intelligent algorithms can improve design efficiency and enhance the sense of participation of users^[3].

4.4 The innovation of cross-domain integration promotes the stimulation of creative potential

In the early stage of character design, intelligent algorithms can be used to analyze a large number of animation works with different styles and cultural backgrounds and extract various unique elements and features. These elements and characteristics are helpful to inspire the source of inspiration for designing new characters. When designing a figure with oriental colors, we can analyze the lines, colors and composition in China's traditional paintings through intelligent algorithms, and skillfully integrate these elements into the figure design, making it both a modern and an oriental. Besides, intelligent algorithms can also be used for cross-domain integration and innovation. In the design, we try to combine cartoon characters with elements in different fields such as fashion, science and technology, music, etc. When designing animation with the theme of future music, we can analyze the rhythm, melody and timbre of modern music, and transform these elements into the appearance and action design of the character, so that it presents a unique sense of the future and musicality^[4].

5 Conclusion

Intelligent algorithms shows great potential in the personalized creation of animation characters. Through intelligent feature extraction, user-inspired design, real-time motion capture and other technologies, the design efficiency and personalized level are improved. However, it still faces challenges in data quality, accuracy of feature extraction, accuracy of personalization and creativity generation. The article holds that by strengthening data governance, upgrading technology, deepening user research and stimulating creative potential, it is expected to promote the wider application and innovative development of intelligent algorithms in the field of animation design.

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