

Application of Digital Image Technology in Design of Interactive Animation in Online Advertising

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Abstract: As a new kind of advertisement, online advertisement has been warmly welcomed by the public. It brings a deeper feeling to the public in terms of visual effect and auditory system. With the continuous progress of online advertising, interactive animation has gradually entered the public's attention. Interactive animation has certain advantages in online advertising, but interactive animation design is also facing many problems at this stage. At the same time, image processing technology is also widely used in online advertising. Applying it to the interactive animation design of advertising can reduce the production cost of interactive animation advertising. For the same interactive animation production of clothing advertising, the image processing technology only needs 6500 yuan, 2400 yuan less than the traditional production technology. In order to solve many problems of interactive animation, this paper used digital image technology to study interactive animation design in online advertising. It found that compared with traditional production technology, it can better improve the interaction rate of different types of online advertising, which was more than 91%, while the traditional production technology was less than 85%. In the interactive animation in advertising, it can better provide users with high-quality interactive experience, so that users can better understand the goods and improve the conversion rate of goods. Therefore, the research in this paper is meaningful.

1. Introduction

The technology of computer image processing has developed rapidly, and has rapidly infiltrated into the art and design industry, as well as all areas of people's lives. Digital image processing technology not only brings people a window to recognize and express the global mainstream, but also brings a new art genre [1]. When the image, sound, duration text, etc. can be intelligently keyed into the digital machine and become its solution elements, the computer animation plastic arts came into being. With the upgrading of media methods and the rapid development of electronic media, computer animation based on intelligent control has developed rapidly, gradually forming a separate culture, art and art genre. The large-scale use of online advertising has brought about a series of changes [2-3]. The integration of interactive animation and online advertising is to use modern computer information technology to integrate a variety of elements to enrich the forms of online

advertising. It makes the commodity information have completely different display methods, so that it can be more intuitive and efficient transmission of commodity information. Moreover, the rapid popularization of mobile Internet and the development of digital technology have brought a broader indoor space for the continuous improvement and popularization of animation. Based on digital image technology, this paper studies the interactive animation design in online advertising, which is a new opportunity for visual customization formed by the popularity of big data.

With the improvement of the Internet and science and technology, online advertising has gradually become a popular choice in the advertising industry. Many scholars have conducted interactive animation design, and research literature is also everywhere. Kamil Mohd Hafiz Faizal Mohamad developed a 2d interactive video animation design based on analysis, implementation and evaluation models and frameworks for women to choose their cosmetics preferences. The purpose was to improve women's understanding of the cosmetics used [4]. Liang Hui proposed a semantic framework to model the construction of interactive animation and promote the reuse of animation assets in a systematic and standardized way. It helps to better design and create complex interactive animation in the virtual reality field, and has developed two domain ontologies based on gesture interaction and animation data storage [5]. Lee Kyungho proposed a method to learn the interactive character animation from the original motion data. The motion generator uses continuous control input flow and generates the character's motion online. If a person learns the movement of a single role, the learning process is completely automatic. If the interaction between props and multiple roles is handled, the minimum user intervention is required [6]. Meng Wensi took interactive advertising as the research object. The research process starts with the concept of interactive advertising, and analyzes the current situation and characteristics of interactive advertising in the new media environment. He considered the needs of the advertising industry and listed the problems of interactive advertising in the new media environment. He selected representative cases from the market for demonstration and pointed out the direction of promoting interactive advertising [7]. These experts used a variety of methods and means to study interactive animation design, but few scholars considered the use of today's popular digital image technology to study interactive animation in online advertising. Therefore, this study is meaningful.

For the interactive animation design of online advertising, many experts and scholars have other different studies, and have made a series of research results. Schulz Trenton proposed an interactive method for character animation. The motion generator used in this method adopts continuous control input flow and generates the motion of the character online. The model adopts cyclic neural network conditional training to deal with space-time constraints and structural variables in human motion [8]. Seo Young-nam believed that e-sports refers to professional video games, which were usually broadcast through live comments on TV or the Internet. Advertising animation and in game dynamics have a significant impact on the visual attention of the audience. The results show a significant interaction in terms of the number of fixation times and duration measured by eye tracking devices [9]. Kang Ning believed that the rapid creation of 3d character animation by commodity equipment played an important role in enriching the visual content in virtual reality. For this purpose, he developed an interactive framework for stable motion capture and animation generation based on single body sensing devices, and designed a mechanism to further improve the animation quality by integrating adaptive filters [10].

With the popularity of the Internet, massive data has spread around at an amazing rate, continuing to promote the rapid progress of human society. Traditional media has slowly failed to meet everyone's diversified requirements. The use of interactive animation in online advertising has become more and more common, involving more and more types of products, from actual to virtual, from concrete to abstract. The online advertising industry continues to expand. With the interactivity, visual effect, auditory system and even touch of interactive animation, its effects in the online

promotion of goods are more obvious. In order to get the best feeling and advertising effect, more and more advertisers use a combination of various forms of advertising for their own goods. Audience groups hope to communicate with advertisers in a more friendly way, and they can put forward opinions and suggestions while obtaining news information.

2. Relevant Theories of Digital Image and Interactive Animation Design

2.1 Basic Concepts of Interactive Animation

The formation of interactive animation is a new type of information-based animation expression form gradually formed with the computer multimedia system and Internet technology, which is the combination of computer image processing and art [11]. It develops and uses the basic knowledge of computer science, art and other relevant courses to form a colorful continuous virtual real interface on the computer, providing a new world that fully demonstrates one's creativity and artistic talent. Artists use various computer methods to design interactive animation. Computer image processing is widely used in arts and crafts and business reception arts. Interactivity is the essential feature of interactive animation. Interaction is a technical term in computer technology, which refers to allowing users to exchange data with computer systems. In fact, the form of human-computer interaction is a whole process of interactive processing. It is intended to set some steps for users to choose or determine according to their own needs in the middle of the program when planning and completing a functional program. The operation process is also gradual, step by step [12]. The structure diagram of animation interaction design is shown in Figure 1.

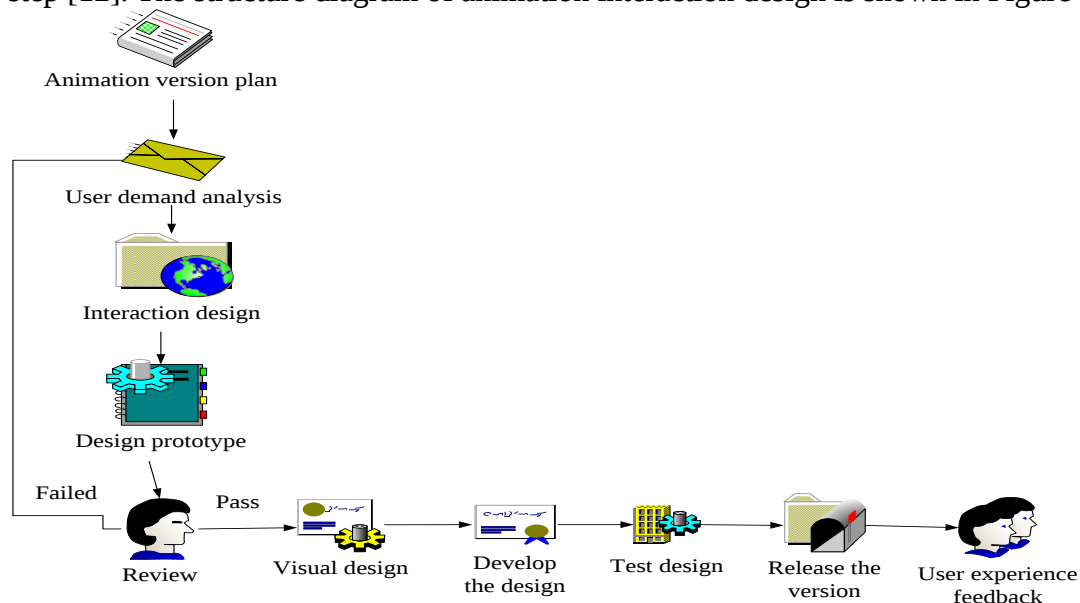


Figure 1: Animation interaction design structure

The application of interaction technology makes people's effective communication reach unprecedented breadth and depth. The number of types of information content that can be supported by digital media technology is totally different from that of traditional media. The development of interactive technology makes many personal behaviors of people intelligent, and electronic information can be controlled through this information command. Therefore, it can be said that interactive animation is the animation that the interaction between participants and animation is based on the interaction design scheme [13-14]. The interaction in interactive animation is mainly manifested in these aspects. To get interaction in animation, when designing interactive animation,

participants can select and participate in the role, and set some options at some key points in the animation video, which may produce different types of results.

2.2 Interactive Online Advertising

Online advertising generally refers to an information transmission activity in which the established advertiser uses pre online media by paying and persuades the public [15]. It is a new form of advertising, which appears with the help of Internet technology and uses the Internet as the media. Commercial advertising can spread to specific target groups through various means, informing the emergence and characteristics of products and services, or a certain behavior, so that it can attract the attention, purchase and trust of advertisers, so that advertisers can obtain rights and interests. Interactive online advertising refers to online advertising with interactive functionality. Adding an interactive control module to an online advertisement that can bear other information can bring many benefits. The core business process of online advertising is shown in Figure 2.

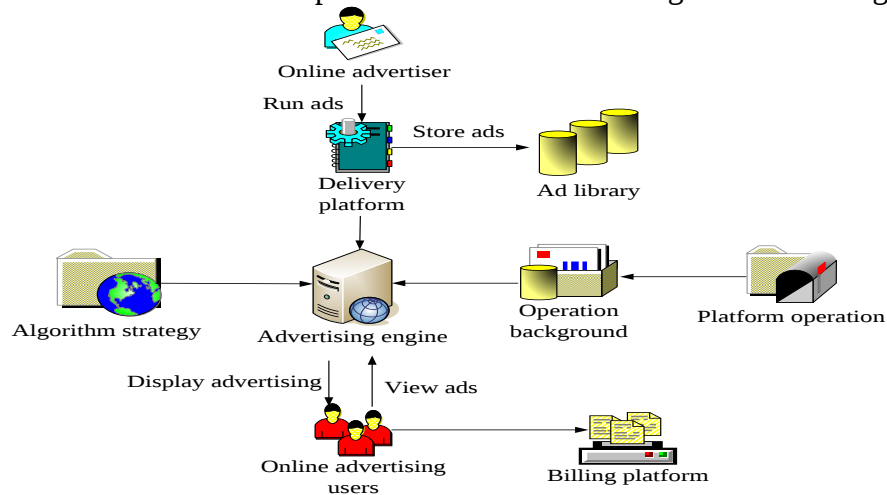


Figure 2: Core business process of online advertising

Interactive advertisement refers to all advertisements that stipulate or allow visitors to act. In the most general practical sense, clicking on a banner can also be regarded as an interaction. According to the form and content, it can be divided into many kinds. According to the classification of promotion terminal equipment, it can be divided into traditional interactive online advertising and mobile intelligent terminal interactive online advertising. Interactive animation of online advertising can have different and direct feelings on goods through the interaction of advertising, thus making it easier for users to grasp the data of goods, facilitate the evaluation of goods, so as to promote the audience to make a choice of purchase and generate profits for sellers.

2.3 Digital Image Technology

Digital image technology is the basis for the survival of digital science and technology image art creation. It must be supported by computer system equipment and mobile phone software technology, which directly affects the speed and quality of image formation and processing. Image technology can be simply summarized as vector material graphics technology and sharpness bitmap file technology. The definition bitmap file is a technology based on color theory to process images, which is also called dot matrix image or image making. It is composed of a point called clear pixel. The image is input to the electronic computer according to the output device, or after the data image is formed by computer technology, it is actually based on digital information, and each pixel

number of the interface is given a specific label value. That is, if people change the interface on the display screen, in fact, they would make corresponding changes to each data of the interface. The simulated image data signal must be intelligentized, and then transformed into the existence and storage format acceptable to the microprocessor, and then analyzed and processed by the microprocessor, mainly in three aspects. The brief flow of digital image processing is shown in Figure 3.

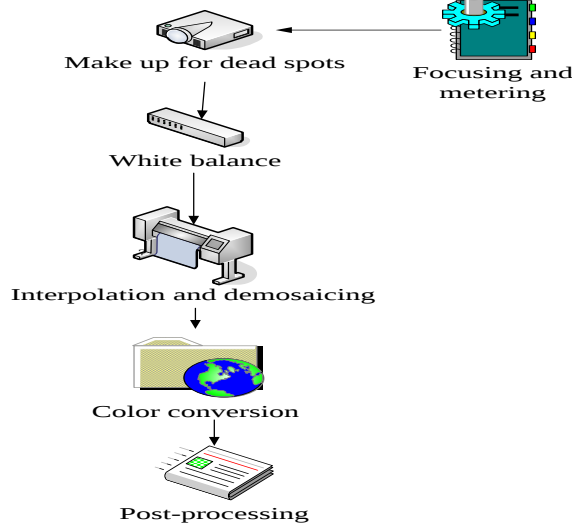


Figure 3: Brief flow of digital image processing

At the same position, there are usually three independent optical signals. The relationship between the pixel and the input optical signal in the photo system is simulated as follows:

$$\theta^{(n)} = Q^{(n)}(v^{(n)}) = \int H(\gamma)R^{(n)}(\gamma)d(\gamma) \quad (1)$$

$Q^{(n)}$ is an identity function and $v^{(n)}$ is the response value of the n th channel. $R^{(n)}$ is the response function of the camera sensor to the n th channel, and $R^{(n)}(\gamma)$ is the linear transformation of the color matching function.

The statistical calculation formula of image mean value is as follows:

$$\begin{cases} R_{avg} = \sum_{t=1}^M \sum_{k=1}^N R_{tk} \\ G_{avg} = \sum_{t=1}^M \sum_{k=1}^N G_{tk} \\ B_{avg} = \sum_{t=1}^M \sum_{k=1}^N B_{tk} \end{cases} \quad (2)$$

At the edge details of the image, the larger the selected neighborhood, the greater the degree of blur of the preprocessed image. The introduction of threshold can reduce the blur effect. The definition of mean value method is shown in the formula:

$$P_{xy} = \begin{cases} \frac{1}{tk} \sum_{(x,y) \in (t,k)} g(x,y) & |g(x,y) - \frac{1}{tk} \sum_{(x,y) \in (t,k)} g(x,y)| > W \\ g(x,y) & \text{other} \end{cases} \quad (3)$$

The regional energy term is:

$$W_i(b) = \sum_{i=1}^N -\ln q(y_i, b_i) \quad (4)$$

$$q(y_i, b_i) = \sum_{j=1}^M b_j \frac{1}{\sqrt{2\pi|\Sigma_j|}} e^{-0.5(y_i, \theta_j) \Sigma_j^{-1} (y_i, \theta_j)} \quad (5)$$

In this study, after the gain value index is obtained, the original image is adjusted and the calibration conclusion is drawn. For example, when obtaining a color offset image without knowing

the actual color temperature, statistically analyze the points within each triangle where the color offset source image falls, and then compare the number of pixels in that triangle. The triangle with the most points is the light source in the photographing environment, and the color temperature calibration is carried out. The key process steps of the data processing method are shown in Figure 4:

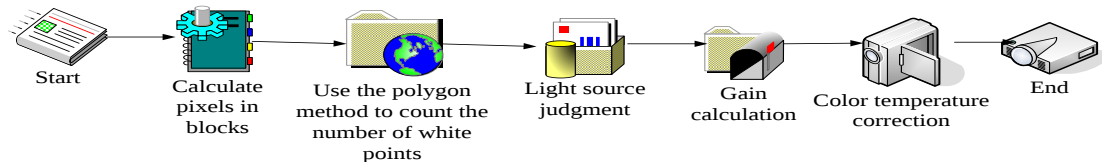


Figure 4: Main steps of data processing in digital image

2.4 Design Principles of Interactive Animation in Online Advertising

(1) The basic principle of combining practicality with artistry

Interactive animation in online advertising is a combination of advertising and animation. It should not only highlight the economic benefits of advertising, but also reflect the cultural value of animation. In the process of specific writing, the designers of advertising animation should stick to the basic principle of combining practicality and artistry, and master various cutting-edge technologies and methods. It changes the monotony and passivity of traditional advertising animation and introduces more meaning to advertising. Only in this way can people make the interactive animation in the online advertisement deeply popular, thus obtaining people's unquestionable affirmation of the product.

(2) The principle of accurate communication

As far as the interactive animation design of online advertising is concerned, its purpose is to clearly convey product information to the audience. The accurate transmission of information is one of the basic principles of interactive animation design of online advertising. Interactive animation design of online advertising is a comprehensive technical design method, which has a unique appeal and charisma. Its information transmission method is more casual and natural, which is very characteristic. However, the simple accumulation of various performance levels would not easily convey the information clearly, but should pay attention to all aspects of the design style. It should adhere to the principle of accurate communication to achieve the effect that one plus one is greater than two. In addition to adhering to the principle of accurate communication, it also want other aspects of assistance to achieve this effect.

2.5 Application of Image Processing in Advertising

Image processing generally refers to the use of machine vision systems to receive images and intelligentize them, so as to minimize the damage to key points of images. Then it would carry out a series of production and processing to repair the original characteristics of the original object for the convenience of observation. In addition, it analyzes the actual characteristics of the image, and converts the image into an abstract way to complete a variety of services according to the mathematical software. In general, image processing is a process of extracting information entropy from images. The greater the information content involved in the image, the greater the uncontrollable factors, and the greater the information entropy. Grasping and summarizing these data is a process of entropy increase or decrease.

At present, the images processed according to the image processing technology have brought a series of huge impacts to the images. When the image processing technology is applied in the network advertisement design scheme, the designer can carry out the second creation of images

according to the actual situation of different network advertisement design schemes. It is necessary to let a single image work enhance the subjective initiative, get rid of the two-dimensional cognitive ability of a single image, build a new space experience, improve the diversified visual enjoyment, and create multi-level visual expression forms. It brings rich and diverse design materials for advertising creative design, which overcomes the problem of single content and limitations of materials faced in conventional design. The diversity of design materials promotes the effectiveness of interactive animation design for advertising to be more colorful. The flow chart of data image processing is shown in Figure 5.

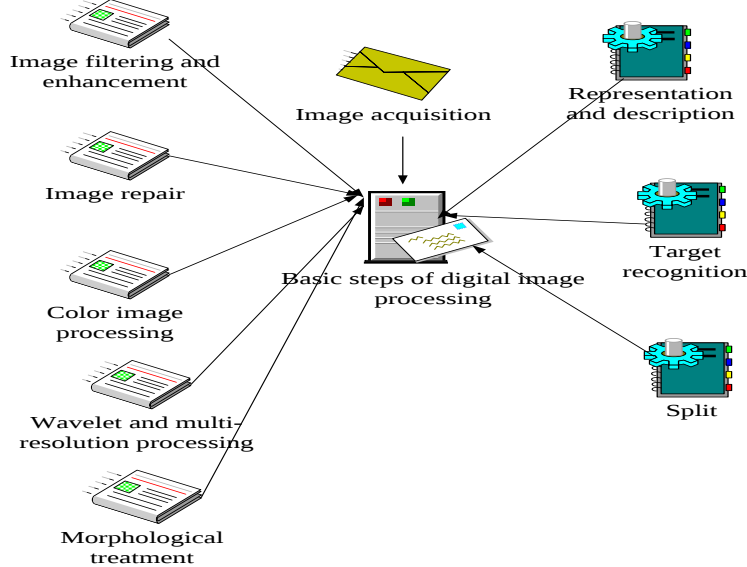


Figure 5: Flow chart of data image processing

3. Experimental Analysis of Interactive Animation Design Based on Digital Image Technology

In order to further study the impact of interactive animation design using digital image technology on online advertising, this paper uses it to produce online advertising in sports equipment, clothing, food, beauty and mobile phone equipment, and applies digital image technology to these five types of online advertising. It uses it to design interactive animation for these five types of online advertisements. Compared with the interactive animation produced by traditional production technology, this paper uses different technologies to produce the same type of ads, and puts them on a randomly selected network platform. The experiment observed the change of the interaction rate between the research technology and the traditional production technology. The specific comparison results are shown in Figure 6.

As shown in Figure 6, the design of interactive animation in online advertising by different technologies can help improve the interaction rate. The interactive animation that can be produced by using digital image technology makes the interaction rate of online advertising higher. Compared with that produced by traditional production technology, the interaction rate of different types of online advertising is more than 91%, while that produced by traditional production technology is less than 85%. Among them, the interaction rate of interactive animation designed by using digital image technology in beauty advertisement is the highest, 94.59%, which is 10.07% higher than that of traditional production technology. The interactive rate of clothing advertising is the lowest, only 91.82%, but it is 7.7% higher than that of traditional production technology. The interaction rate of interactive animation designed by traditional production technology in mobile devices is the highest, 84.79%, but it is still 9.12% lower than the technology studied in this paper. Its interaction rate in

online food advertising is the lowest, only 83.09%, 9.78% lower than the research technology in this paper. These data shows that the interactive animation of digital image technology in advertising can better help online advertising improve the interaction rate, help advertising better attract customers to have a deeper understanding of the product, and help improve the conversion rate of goods.

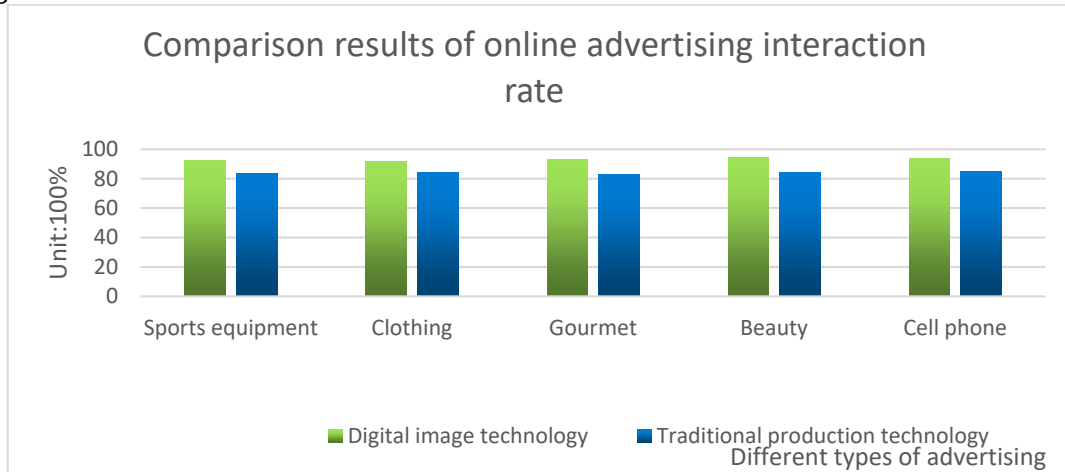


Figure 6: Comparison results of online advertising interaction rate produced by two technologies

Interactive animation that can be designed with digital image technology can improve the interaction rate for advertising. In addition to improving the interaction rate, it can also improve the speed of making elements in all aspects of interactive animation. This paper extracts elements related to advertising interactive animation design from a platform, mainly including image signs, animation elements, background pictures and background music. 100 elements are selected from each of the four aspects, and the speed of image logo modification, animation element production, background image copying and background music collection are studied respectively. The time spent is compared with that spent in traditional production technology. The specific comparison results are shown in Figure 7.

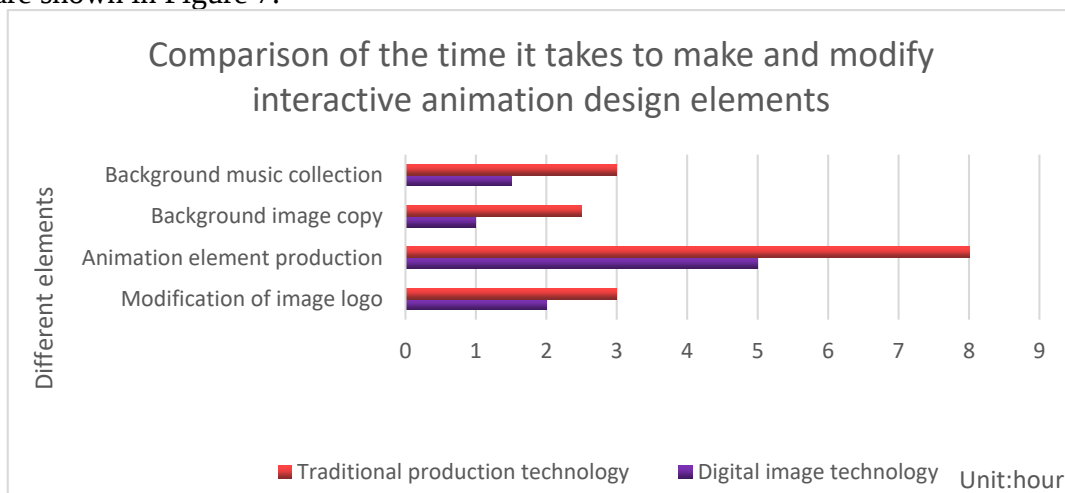


Figure 7: Time spent by the two technologies to make changes to interactive animation design elements

Through the analysis of Figure 7, it can be found that the time spent on the design modification of the extracted interactive animation elements by digital image technology in this paper is much shorter than that by traditional production technology. Among them, both technologies spend the

shortest time on the reproduction of interactive animation background images. The technology studied in this paper takes 1 hour, 1.5 hours less than the traditional production technology. The two technologies spend the longest time in the production of animation elements. The technology studied in this paper takes 5 hours, which is 3 hours less than the traditional production technology. The time difference between the two technologies in the modification of image marks is the smallest. The technology studied in this paper took 2 hours, while the traditional production technology took 3 hours, with a difference of 1 hour. The use of digital image technology can greatly shorten the time for making and modifying different elements of interactive animation in online advertising, improve the speed of making and modifying, and better improve the design of interactive animation.

Although the spread area of online advertising is wide, the production cost is also high. How to reduce its cost is a research topic for many scholars. The image processing technology can be applied to the interactive animation design of online advertisements, which can effectively reduce the production cost of different types of advertisements. This paper calculated the cost of the five types of advertisements studied in Figure 6, and compared the interactive animation advertisements produced by image processing technology with those produced by traditional production methods. The comparison results are shown in Figure 8.

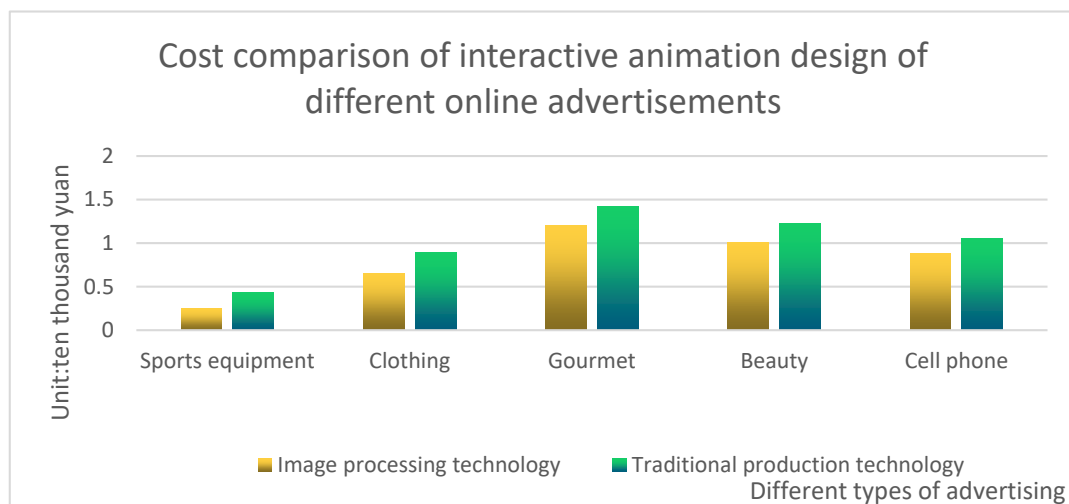


Figure 8: Cost comparison of two technologies for different online advertising interactive animation design

As shown in Figure 8, using image processing technology to design interactive animations of different types of advertisements can reduce the production cost of modified advertisements. The cost of different types of advertising is much lower than that of traditional production technology. Among them, the cost of interactive animation production of the two technologies for sports equipment advertisements is the lowest. The image processing technology costs 25 thousand yuan, while the traditional production technology costs 43 thousand yuan, a difference of 18 thousand yuan. The cost of the two technologies for interactive animation production of food advertisements is the highest. The image processing technology costs 12000 yuan, which is 2200 yuan less than the traditional production technology. The difference between the two technologies in the production cost of mobile device advertising is the smallest, and the image processing technology cost 8800 yuan. The traditional production technology cost 10500 yuan, with a difference of 1700 yuan. The difference between the two technologies in the production cost of clothing advertising is the largest. The image processing technology cost 6500 yuan, and the traditional production technology cost

8900 yuan, with a difference of 2400 yuan. Using image processing technology in different types of advertising interactive animation design can reduce production costs.

4. Conclusions

The interactive design scheme of online animation advertisement breaks the unilateral narrative mode of traditional animation, subversively integrates expressiveness, technicality and profitability, and can maintain its expression form in a dynamic, open and active scene. In daily life, people are experiencing the disruptive independent innovation brought by technology every day. As a new technology, digital image technology is constantly innovating, and customer demand is still expanding. Applying it to the creative design of advertising interactive animation, it is injecting new vitality into the online advertising industry with a new attitude. The use of digital image technology can better improve the interaction rate of online advertising and design different elements of interactive animation faster. Only when people look at animation from a new perspective of thinking about animation technology and understand interactive animation can they show the advantages of interactive animation advertising. At the same time, the application of image processing technology to the interactive animation design of online advertising can reduce the cost of advertising production and help to spend less money to get better interactive animation online advertising.

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