Retraction Notice

The Editor-in-Chief and the publisher have retracted this article, which was submitted as part of a guest-edited special section. An investigation uncovered evidence of systematic manipulation of the publication process, including compromised peer review. The Editor and publisher no longer have confidence in the results and conclusions of the article.

ZM did not agree with the retraction.

Application of image fusion algorithm based on digital media technology in modeling design

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Abstract. The product modeling design is the concrete manifestation of realizing the unified identification goal of the corporate image. It can shape and disseminate the corporate image, create individual brands, and win in the fierce market competition. The product modeling design needs to serve the overall image design of the enterprise, with product design as the core, around people's needs for products, and to the greatest extent possible to meet the needs of individuals and society to obtain a general sense of recognition. It changes people's way of life and improves the quality and level of life. Different pieces of information need to be combined when designing a product. To achieve the best effect, we aim to study the application of image fusion algorithm based on digital media technology in modeling design. Digital media technology is a technology that combines abstract numbers, physical media, and computer technology. It is a generation of digital media technology for digital audio, digital video, digital film, computer animation, virtual reality, and so on. A compressed sensing multifocus image fusion algorithm based on non-subsampled shearlet transform is proposed. It improves the efficiency of the fusion algorithm without affecting the visual effect. We analyze the shape design of wearable smart products, summarizes the characteristics of product shape design, as well as the aesthetic value is shown, and summarizes the entry point of product shape design. The experimental results of this paper show that the proportion of choosing the classic style is 55.3%, which shows that people are more comfortable with the classic style, so they are more likely to buy. Health monitoring is the mainstream function of wearable products, and its proportion is as high as 71.3%, indicating that people are more concerned about health issues. [DOI: 10.1117/1.JEI.32.1.011213]

Keywords: digital media; image fusion; modeling design; image processing; wearable equipment.

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1 Introduction

With the advancement of economy, science, and technology, the world is in the process of continuous development. People are more curious about new things and use them more and more frequently in life. In addition to the main quality and function of the product, the appearance design is an important part of attracting consumers, so it needs to be personalized according to the needs of consumers. The product appearance design in this article takes wearable technology as an example. Different characteristics need to be combined when designing the appearance. For this reason, the new media technology of this article is displayed. It uses image fusion algorithms to combine different characteristics, hoping to create a unique shape to meet the needs of consumers. It integrates the multiband information of a single sensor or the information provided by different types of sensors to eliminate the possible redundancy and contradiction between the multisensor information, so as to enhance the transparency of the information in the image and improve the accuracy of interpretation.

Image fusion can extract image feature information from the source image, establish composite features, and then provide as much basis for decision analysis as possible, which is conducive to real-time image processing.[1] It conducts in-depth research on the fusion of

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multimedia technology and display design, thus summarizing the correct design method, which can lay a good foundation for future design. Image fusion can retain the feature information on the image to be fused, which is more conducive to a more accurate grasp of the image content and provides more comprehensive information for modeling design.

The current product design is similar and lacks creativity compared with other similar products. To meet the individual needs of consumers, we need to design its shape. We have incorporated traditional Chinese cultural elements into the design of our products to give them more substance and increase their added value and competitiveness. Through analysis, it was found that among the surveyed groups, the proportion of classic models was 55.3%, which accounted for the highest proportion of all styles. The ratio of liking rubber materials is 52.1%, indicating that skin-like materials are the most popular materials at the moment. In styling design, 70.2% think simplicity and generosity are very important.

2 Related Work

Product styling can not only trigger purchases but solve complex problems. In view of the aerodynamic noise problem caused by exterior rearview mirrors, Chen X conducted an experimental study on five types of rearview mirrors of a certain model series. The aerodynamic noise data of eight monitoring points measure the wake area of five rearview mirrors at four wind speeds ranging from 60 to 120 km/h. The experimental results show that with the increase in vehicle speed, the aerodynamic noise caused by the rearview mirror increases significantly, and the impact is most obvious at the monitoring point in the wake core area of the rearview mirror. Through the comparative analysis of five rear-view mirror modeling features, he extracted five modeling factors that had the most significant impact on aerodynamic noise. Aerodynamic noise is the noise generated by the separation of airflow caused by the exterior shape of the car (protrusions or unevenness on the outer surface of the body) and is introduced into the car through the body structure. The optimal combination of these factors can effectively reduce the aerodynamic noise level and have a satisfactory overall styling effect.[2] Jenkinson[3] revealed how young people use dress to negotiate, express, and display identity. Different young people are asked to fashion themselves using clothing or artifacts that represent their personal and citizenship identities. Responses to this styling workshop and accompanying interviews confirm the powerful role that dress can play as young people navigate different cultural backgrounds and social environments in their daily lives. The research brings new insights into how clothing can be used as a catalyst for self-awareness, communication, and self-development in multicultural urban environments. It proposes a new dress, youth, and identity (DYI) model. This model provides a structure on which young people's narratives about dress can be mapped and analyzed. A gray system is a system that contains both known information and unknown or uncertain information. The main task of gray system theory is to propose a new modeling idea and method from the perspective of cybernetics for an unclear gray system with insufficient overall information. The motorcycle seat modeling process is a gray system, with information partly known and partly unknown, influenced by many factors. Feng et al. used a gray model to predict the style of motorcycle seats, and extracted and parameterized the shape features of the seat through morphological analysis. He established the shape evolution process, predicted the modeling features by GM(1,1), and used five adjectives describing seat style to establish the equation of perceptual regression analysis, where regression analysis was used to modify the predictive modeling. Taking a certain brand of motorcycle seat as a model, he analyzed and verified the feasibility and scientific applicability of using GM(1,1) to predict the shape of motorcycle seats, providing a feasible and effective reference for motorcycle seat design.[4] To solve the two problems of design parameter combination explosion and complex mapping between design parameters and image goals in automotive exterior design, Li et al. combined design parameters and designed parameters with image goals based on the basic idea of product gene network. He established the gene network model of automobile exterior. The image target is used as a node, and the correlation between the nodes is used as an edge to express the intrinsic association and mapping relationship between the two sets of design parameters and the car modeling image objects. According to the sensitivity and degree of nodes, it classifies nodes, selects key nodes

and node groups, and assists designers in decision-making. Based on 106 modeling parameters, he established three-dimensional (3D) parametric models of 146 common types of models, and calculated the correlation between the parameters. He carried out image evaluation experiments on 20 image targets and used the experimental data to establish a genetic network model for automobile modeling. Based on the repeated modeling process of different samples, he proved the existence and stability of the network model through comparison.[5] While these theories describe product styling, they are not designed according to consumer needs. This article combines styling design and image fusion, hoping to create unique product styling.

The vulnerability of face recognition systems to so-called morphing attacks has been exposed over the past few years. Recently, different kinds of deformation attack detection methods have been proposed. However, the vast majority of published results have been obtained from rather restricted experimental settings. In particular, most studies do not consider variations in morphing techniques, image sources, and image postprocessing, failing to maintain the reported performance rates in real-world scenarios.[6] Scherhag et al. benchmarked existing algorithms on a new and more realistic database. The database consists of two different datasets, from which deformations are created using four different deformation algorithms. In addition, the database contains four different postprocessing. He also proposed a novel deformation attack detection method based on the fusion of different configurations of multiscale block local binary patterns (MB-LBP) on images divided into multiple units. His proposed fractional-level fusion of up to 18 different configurations significantly improves the robustness of the generated deformation attack detection scheme. The average performance in terms of detection equal error rate (D-EER) is between 2.26% and 8.52%, depending on the applied postprocessing.[7] Multimodal medical image fusion technology plays a vital role in biomedical research and clinical disease analysis. Medical image fusion is used to improve the quality of multimodal medical images by merging two multimodal medical images of the same patient.[8] Rajalingam and Priya proposed a novel multimodal medical image fusion method based on hybrid fusion technology. Magnetic resonance imaging (MRI) is an input multimodal therapeutic brain image and applies a curvelet transform with neural network technology to fuse the multimodal medical images. With subband decomposition, the multimodal medical image is divided into resolution layers, and the input medical image is smoothed at the appropriate scale using smoothing partitions. After applying the pulse coupled neural network fusion rule to the reconstructed multimodal medical image to obtain the fused multimodal medical image, he used the Ridgelet transform technique together with the radon transform to perform the multimodal medical image to convert the one-dimensional image to two-dimensional image. Compared with other state-of-the-art techniques, the experimental results of his proposed technique demonstrate better processing performance and results on subjective and objective evaluation criteria.[9] Tan et al. capture medical images of different morphologies of a given organ of a patient in image-based medical decision-making. Each of these images will represent a pattern that will present the examined organ in a different way, resulting in a different view of a given phenomenon, such as a stroke. He proposed a new multimodal medical image fusion algorithm for a wide range of medical diagnostic problems. This algorithm is based on the application of boundary measurement pulse coupled neural network fusion strategy and energy attribute fusion strategy in non-subsampled shear wave transform domain. Through qualitative and quantitative evaluation, it is verified that the algorithm proposed by him is superior to most of the current algorithms, which provides important ideas for medical diagnosis.[10] Image quality assessment (IQA) algorithms aim to predict the image quality perceived by a human observer. New algorithms are being developed rapidly in different areas of IQA, but are often tested and compared with limited existing models using outdated test data. There is a large gap when it comes to large-scale performance evaluation studies that include various test data and competing algorithms. Athar and Wang aimed to fill this gap by conducting the largest performance evaluation study to date. He tested the performance of 43 full-reference (FR), 7 fused FR, and 14 no-reference methods on the subject-rated IQA dataset. Five of them contain single distorted images and four contain multiple distorted content. The findings not only point to the best performing FR and NR IQA methods, but also highlight the performance gap between them. In addition, he conducted comparative studies on FR fusion methods. An important finding is that FR fusion based on rank aggregation is able to outperform not only other FR fusion methods, but also the best performing FR methods. It can be used to

annotate the IQA dataset as a possible alternative to subjective scoring, especially when human opinions are not available.[11] Although these theories have discussed image fusion, they have not been combined with product modeling and are not practical.

3 Image Fusion Algorithm of Digital Media Technology

3.1 *Digital Media Technology*

In the 21st century, the economic development of globalization has entered an accelerated period, and people's living standards and communication methods have undergone great changes. The development of economy has promoted the evolution of technology, and the progress of technology has made people's life more convenient.[12,13] Digital new media technology continues to progress with the blessing of science and technology. The main body of digital media is information technology and digital technology, the theoretical source is mass communication, and the guiding method is modern art. It is an integrated discipline that applies ICT in the cultural, business and management industries.

Digital media includes information and digital modules.[14] With the support of science and technology, data media has developed very rapidly, so there are many industries where it is applied. As the media industry has grown, revenue growth from traditional channels has begun to slow. The revenue of digital media has become the core growth point of the industry, providing new growth opportunities for digital media.[15,16] Compared with other art forms, the biggest feature of digital media art is that it can fully apply digital media technology to the creative process. This is also the main way we distinguish digital media art from other arts. Figure 1 shows common elements of digital media.

With the popularization of Internet of Things technology, digital media technology has developed rapidly with the popularization of broadband. The digital media industry is becoming an emerging industry and is rapidly expanding in the market. Digital media is a very common communication method and one of the important means of information transmission, which is widely used in the industry.[17]

The common forms of digital media in our daily life are VR and AR. Virtual reality technology is the perfect combination of human and computer. Due to the uniqueness of its functions, we also refer to it as Astral Technology. Virtual reality technology is an interactive and dynamic virtual environment constructed by sensing technology, computer, and artificial intelligence that can act on human perception, making people feel like they are in it. In fact, virtual reality technology did not appear in recent years. In the middle of the last century, adding this

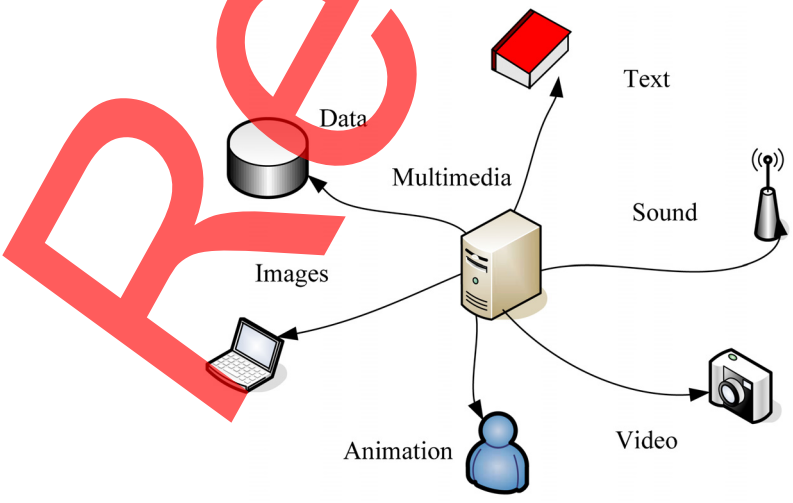

Fig. 1 Common elements of digital media.

technology to film and television animation has been attempted. Although not successful due to technical reasons, it is still developing slowly.[18,19] It was not until 2016 that the era of virtual realization technology began to arrive. It was also from this year that virtual reality began to appear frequently in life in time. It is called the first year of virtual because the virtual reality technology has brought a new impact on people's production and life. On the other hand, our understanding of virtual reality is far from enough, and the social, academic, and ethical issues derived from it need to be further explored. When virtual reality technology first appeared, it only existed in large research laboratories. Due to limited technology and lack of equipment, the development of virtual reality technology was limited, and it was not until the promotion of computer and Internet technology that it had a new development impetus.[20] In fact, academically, virtual reality technology is generally divided into exploration stage, practical stage, and development stage. Exploratory stage: 1950s to 1970s. From research to practicality: Early to mid-1980s. High-speed development stage: The late 1980s to the early 2000s. In the early 1960s, some scholars developed a multidimensional system, which is also the world's first device with virtual reality technology. It not only has different 3D senses but also smells different odors.[21]

3.2 *Image Fusion Algorithm*

Image fusion is to combine different types of images through specific fusion rules, and then synthesize image information to obtain more picture information. When designing the modeling, it is necessary to analyze the target image first and integrate the information of different images together to obtain the final modeling effect. In this process, it is necessary to use image fusion technology to fuse the required information to improve the effect of modeling.[22]

$$Q(a,b) = \chi * T(a,b) + \nu * \kappa(a,b), \tag{1}$$

where (a,b) represents the position of the pixel, and χ and ν represent the proportion of image fusion. This method belongs to the direct image fusion, the speed is relatively fast, and the result is relatively accurate.

Color is one of the most obvious image features and one of the earliest techniques applied to image fusion. It is insensitive to translation and rotation changes and has been widely used in image fusion technology, and many mature algorithms have emerged. In the RGB color space, the three-primary principle of color is mainly used for mixing. Figure 2 is a brief structure diagram of image fusion

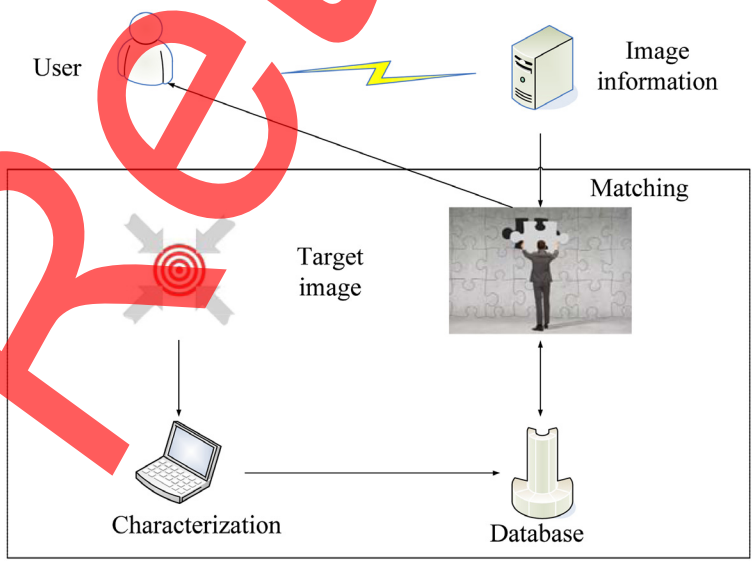

Fig. 2 Brief structure diagram of image fusion.

$$F = \arctan\frac{t_i}{t_o}, \tag{2}$$

$$Q = \sqrt{t_i^3 + t_o^3}, \tag{3}$$

where F represents the hue of the image, and Q represents the saturation of the image. These two quantities are independent of each other, and they need to be operated separately during the fusion algorithm

$$Y_b = (\beta \times Y_{b-1})_{\downarrow 3}, \tag{4}$$

where b represents the current frequency level, Y_b represents the Gaussian image, and β represents the adopted low-pass filter.

The color moment method uses the mathematical basis utilized on the representation. That is, on the basis of the color histogram, the mean, variance, and deviation of different colors are calculated, and the color distribution is replaced by data. Its function expression is as follows:

$$\eta_a = \frac{1}{m}\sum_{b=1}^{m} \text{fab}F_{ab}, \tag{5}$$

$$\nu_a = \left(\frac{1}{m}\sum_{b=1}^{m}(f_{ab} - \eta_a)^2\right)^{0.5}, \tag{6}$$

$$D_a = \left(\frac{1}{m}\sum_{b=1}^{m}(f_{ab} - \eta_a)^3\right)^{1/3}, \tag{7}$$

where f_{ab} represents the color component of the b pixel; m represents the number of pixels

$$\hat{T}(a,b) = \frac{1}{u^3}\sum T(a,b). \tag{8}$$

Equation (8) represents the filtering template formula. After smoothing filtering, all pixels in the digital image are replaced by the average value of the surrounding points

$$F(a,b) = \text{med}(F(a-g, b-u)), \tag{9}$$

where $F(a,b)$ represents the median filtered pixel value of the image point. Figure 3 shows the image fusion algorithm of wavelet transform:

$$T(o,p) = GI^{m^3(w,k)/3\varepsilon^3}. \tag{10}$$

Equation (10) represents filtering out high frequency components while retaining low frequency signals.

In practical applications, to reduce the computational complexity, we often use histograms to roughly express color information. Its expression is as follows:

$$d = [\eta_A \eta_B \eta_C]^W, \tag{11}$$

where A, B, and C represent the components of the three primary colors

$$L_{\chi^2}(S,T) = \sum_{i=1}^{m}\frac{(s_i - n_i)^2}{n_i}. \tag{12}$$

Here $n_i = \frac{s_i + t_i}{2}$

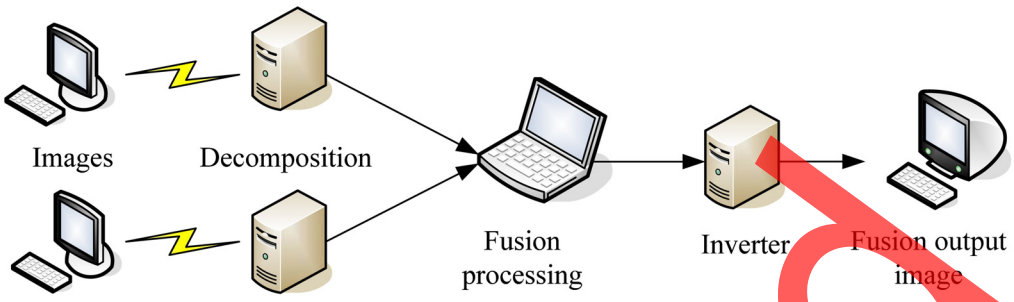

Fig. 3 Image fusion algorithm of wavelet transform.

The central moment is used to represent the color image, and the matching value between the three primary colors is represented by the following expression:

$$Q(F,G)=\sqrt{R_t\sum_{i=1}^{3}(N_{i,\mathrm{FT}}-N_{i,\mathrm{GT}})^2+R_Y\sum_{i=1}^{3}(N_{i,\mathrm{FY}}-N_{i,\mathrm{GY}})^2+R_E\sum_{i=1}^{3}(N_{i,\mathrm{FE}}-N_{i,\mathrm{GE}})^2}. \tag{13}$$

Among them, N represents the central moment of the histogram of the three components of the image, and Q represents the matching value. This method is also applicable to other color image distributions. Figure 4 shows the basic structure of image processing

$$\beta_{z,x}(q)=\left|\frac{1}{\sqrt{z}}\right|\beta\left(\frac{q-x}{z}\right). \tag{14}$$

Among them, z represents the scaling variable, which represents the width of the function, and x represents the translation, which determines the distance of the translation. So for any function, its wavelet transform can be expressed as

$$T_{zx}(q)=\langle f,\beta_{z,x}\rangle=\int_{-\infty}^{+\infty}f(q)\frac{1}{\sqrt{z}}\beta\left(\frac{q-x}{z}\right)\mathrm{d}q, \tag{15}$$

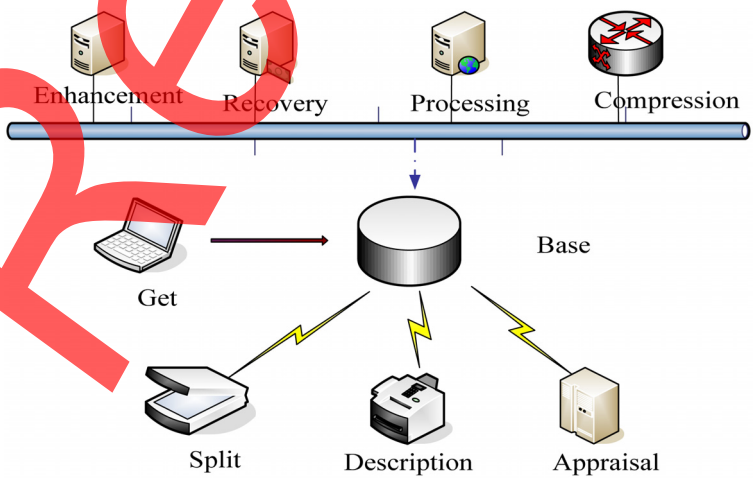

Fig. 4 Basic structure of image processing.

where $T_{z,x}(q)$ is the convolution of functions $f(q)$ and $\beta_{z,x}(q)$, which exists in the frequency domain

$$\beta_{z,x}(\varepsilon) = \sqrt{z}e^{-j\varepsilon}\beta(z\varepsilon). \tag{16}$$

3.3 *Modeling Design*

The product modeling design is the concrete manifestation of realizing the unified identification goal of the corporate image. It takes product design as the core to carry out systematic image design, shapes and disseminates corporate image, creates individual brand, and makes profits in the fierce market competition. Although styling design is not the core function of a product, it is one of the important means to attract consumers. This article takes wearable products and devices as an example in the introduction of modeling design.[23,24] Figure 5 shows the system design structure of the wearable device.

In the design of wearable devices, personalized needs and emotional expression are indispensable design elements. With the improvement of living standards, people's aesthetic level has also reached a new height. The designs of various products are relatively similar, and there is no bright spot in terms of external aesthetics. According to traditional aesthetics, beauty may refer to a sense of pleasure or physical satisfaction, or it may be an expression of appreciation or a preference for personal taste. At this time, the personalized design of product modeling has become a consumption hotspot. The various shapes of wearable devices increase the user's dependence, which to a certain extent increases the consumer's desire to buy.

In fact, the most important thing for us to buy a product is to buy its function, so product function is the first element of product design. Whether it is comfortable to wear or not determines whether the device can be accepted by the human body. Wearing comfort requires that the proportions of the wearable device match the anatomy of the human body. Therefore, when designing a wearable device, it is necessary to take into account the different parts of the wearable device and adopt corresponding proportion settings. This requires a targeted investigation of consumers' requirements for products at the beginning of product design so that they can meet market needs in the design industry.

Material is the guarantee of product quality but also the coat of the product. Appropriate material selection can make the structure of the product more concise. As decoration, materials can effectively improve the aesthetics of wearable products, that is, it increases the charm of products on the aesthetic level. Material is one of the ways that users perceive products. When people touch the surface of an object, they will also perceive the material of the object and evoke the experience of using the material. In this way, the process of using touch to stimulate memory is also a quasimaterialization process and a good user experience. Therefore, different materials need to be selected and matched in the product to meet the individual needs of consumers. The dials of the Apple Watch series are made of alloy, noncast steel and 18 k gold to cater to different levels of consumer groups. The straps are made of different materials so that users can freely replace the straps according to their own preferences.

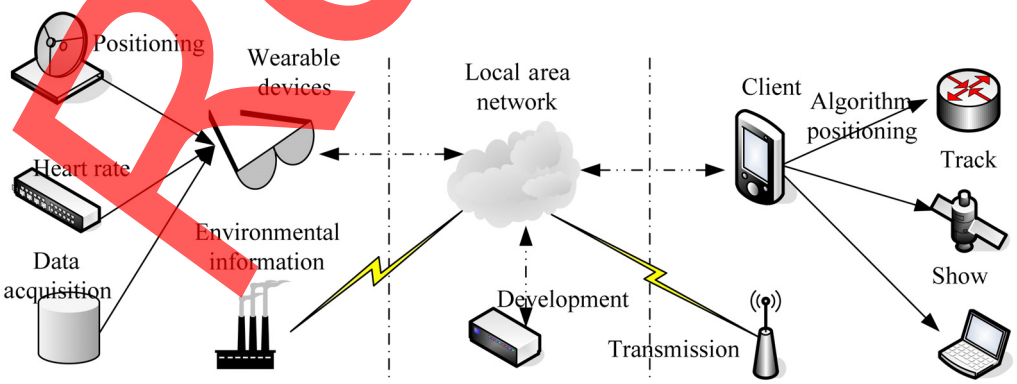

Fig. 5 System design structure of wearable devices.

Table 1 Basic information of experimental subjects.

Category	Content	Number of people	Proportion
Gender	Male	57	47.2
	Female	63	52.8
Age	18 to 24 years old	33	27.5
	25 to 30 years old	40	33.4
	31 to 45 years old	22	18.2
	>45 years old	25	20.9

4 Modeling Design Experiment

4.1 *Investigation of Experimental Subjects*

With the continuous progress of the economy, people's living standards are getting higher and higher, and great changes have taken place in terms of clothing, food, housing, and transportation. To explore its changes in styling, we discussed the styling design of wearable smart clothing. With the changes of the times, there are more and more cultural and technological elements in the design and modeling of wearable devices. Under the current situation of the same shape of wearable smart products, personalized shape has become a necessary means to catch people's attention. To find out what people think about the styling of wearables, we surveyed.

According to the data in Table 1, we investigated the subjects who participated in the experimental investigation. According to the data, first of all, in terms of gender, among all 120 personnel, there are 57 males, accounting for 47.2%, and 63 females, accounting for 52.8%. According to this situation, the number of boys and girls is not much different, indicating that there is no obvious difference in the survey data.

From the perspective of age, we divided them into four categories. Among them, 33 were aged 18 to 24, and 40 were aged 25 to 30. These two groups accounted for the largest proportion, about 60.9%. There are 22 people aged 31 to 45 and 25 people over 45 years old. The proportions of these two groups are not much different. According to this situation, it can be seen that the differences in the proportions of the target groups in this survey are not obvious, indicating that the data extracted in this survey are relatively representative and can explain the general situation.

According to the data in Table 2, we have investigated the income of the participants in the experiment. According to the data, 22 people have a monthly income of $< 3,500$, and the proportion is 18.2%. Most of this group are students and young people entering the workplace, and they are generally interested in new things. There are 36 people whose monthly income is between 3500 and 5000, which is 30.3%. This group accounts for the largest proportion of the

Table 2 Monthly income survey.

Category	Content	Number of people	Proportion
Revenue	2000 to 3500¥	22	18.2
	3500 to 5000¥	36	30.3
	5000 to 6500¥	27	22.3
	6500 to 8000¥	13	10.7
	8000 to 9500¥	11	9.4
	> 9500¥	8	8.1

overall group and also consumes the most wearable devices. They have both a certain purchasing power and a certain interest. There are 27 people whose monthly income is between 5000 and 6500, which is 22.3%. This group accounts for a larger proportion, but its overall consumption is smaller than that of the previous group. The proportion of monthly income > 6500 is relatively small. This group has the spending power, but the desire to buy wearable devices is not strong, and the requirements for products are relatively high.

4.2 *Occupational Situation Survey*

In addition to personal interests and hobbies, the purchase of products will also have a greater impact on professional needs. To explore the relationship between different occupations and wearable device design, we investigated the basic occupational conditions of the experimental subjects, as follows.

According to the data in Table 3, we briefly surveyed the occupations of the personnel investigated in the parametric experiment. According to the survey, among all groups, there are 37 students, accounting for 31.1%, which is the largest among all groups. It shows that students pay more attention to wearable devices and have a greater demand for this. In addition, there are 18 people in administrative positions, and the proportion is 15.3%. In the survey, it was found that this profession is also concerned about the development of wearable devices. There are 20 people whose occupation belongs to management positions, accounting for 17.2%, and other occupational groups account for a smaller proportion. However, from the perspective of occupational distribution, each occupation has a little attention to the field of wearable devices. It shows that the design of wearable devices in different fields can achieve unexpected results in the market. Figure 6 shows the user role model construction process.

Table 3 Information survey on the occupational situation of the experimental subjects.

Category	Content	Number of people	Proportion
Career	Students	37	31.1
	Sales	11	9.1
	Administrative staff	18	15.3
	Clerical	13	10.5
	Management post	20	17.2
	Teachers	8	6.6
	Other	12	9.6

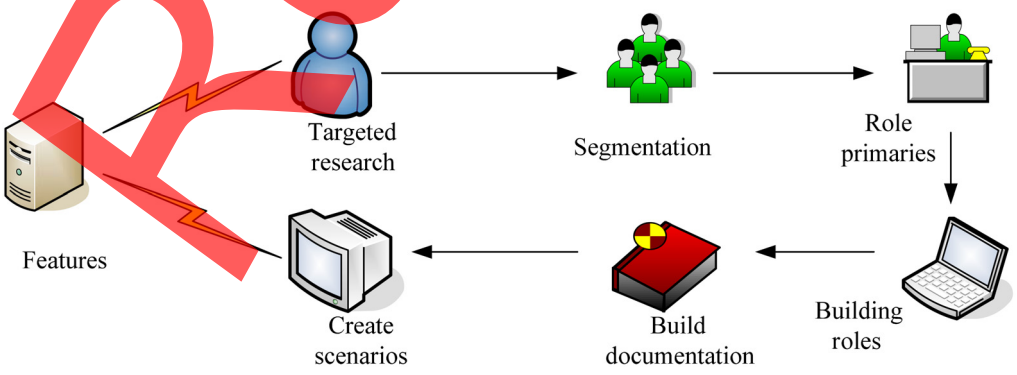

Fig. 6 User role model construction process.

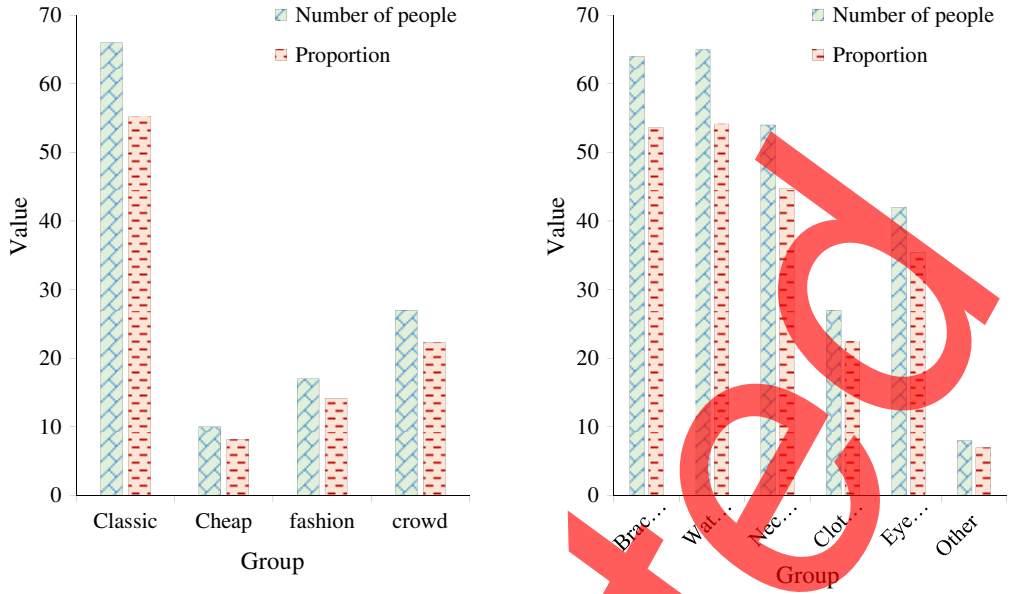

Fig. 7 Analysis of users' consumption tendency in the field of wearable devices.

5 Application Analysis of Modeling Design

5.1 *User Psychological Analysis*

In the process of consumption, consumers will choose product types according to their own preferences, and have their own unique insights into different types of products. Therefore, in the process of designing products, it is necessary to analyze the consumer psychology of consumers, so as to design products in a targeted manner, increase product sales, and occupy the market.

According to the data in Fig. 7, we have investigated the consumption tendency of users in wearable device products. According to the survey data, we have discussed consumer psychology and target types. First of all, from the perspective of consumer psychology, among the surveyed groups, 66 people chose the classic style, and the proportion was 55.3%, which accounted for the highest proportion of all styles. This shows that people are more comfortable with classic styles and feel that products that have been tested by the market are less likely to have accidents, so they are more likely to buy. In addition, 27 people choose to follow the crowd, and the proportion is 22.3%. These groups care about the functions or other advantages of products. They are purely competitive and do not want to fall behind. There are fewer people who pay attention to price and fashion. Most people think that wearable devices are technology products, that they are relatively fashionable products, and the price is not too low.

From the perspective of product consumption goals, 64 people prefer bracelet products, accounting for 53.6%, and watches account for 54.2%. According to the trend of the table, these two types of products are more popular in the market. It is worth noting that the demand for necklace products has been rising in recent years. In fact, consumers are still most concerned about product quality and functionality when choosing a product. Consumers are highly dependent on products they wear frequently and do not like to change products frequently. Therefore, it is necessary to pay attention to its function and quality when designing products and to attract consumers in terms of appearance design.

5.2 *Functional and Material Design Analysis*

In the above sectionc, we have completed the consumers' attention to product quality. To refine the functions, we have analyzed the specific functions of the products. Function is the soul of a product. Consumers buy products mainly to buy their functions, so they need to strictly control the design of product functions. Second, the material of the product is an important aspect that

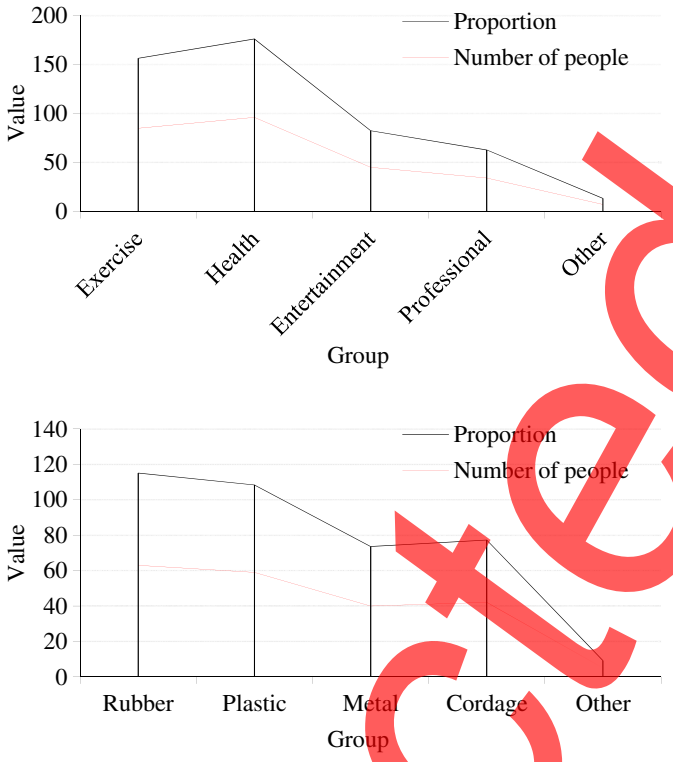

Fig. 8 Functional and material design analysis.

consumers pay attention to. In the subconscious mind of consumers, the material and quality of the product are linked, and the service life of products designed with different materials is different. There are also consumers who prefer a certain feel and choose a certain material.

According to the data in Fig. 8, we have analyzed the functional refinement and material of the product. First, let us look at the refinement of the product's functions. According to the survey, sports tracking and health monitoring are the mainstream functions of wearable products in the market, accounting for 71.3% and 80.2%. Judging from this data, people are more concerned about health issues in modern life, especially the monitoring of sleep. It can be seen that sleep has a greater impact on people. In addition, the demand for entertainment functions of wearable devices is on the rise. It can be seen that such products are also continuously expanding in entertainment, and their proportion in the market is constantly expanding, which is also related to the current consumption tendency of young people. In terms of specialized features, fewer people choose this product. This shows that wearable products are insufficient in this aspect, and the design of this function needs to be improved to meet market demand.

Judging from the material selection of the products, 63 people like rubber materials, and the proportion is 52.1%. This is followed by plastics with a proportion of 49.2%. From this point of view, consumers generally accept skin-like materials in material selection. It is similar to the touch of human skin, soft and delicate, and has good sweat absorption. Products of this type of material are more popular in the market. In addition, it is worth paying attention to cord products, which are increasingly popular in the market. The cord is a product with national characteristics. The popularity of such products continues to increase, indicating that consumers are paying more and more attention to the uniqueness of design. Injecting traditional cultural elements into technology products is a hot spot in current sales.

5.3 *Modeling Design*

Although the function and quality of the product are the soul of the product, the appearance design of the product is still an important factor to attract consumers. For this reason, in addition to paying attention to quality, the design of the appearance of wearable devices cannot be

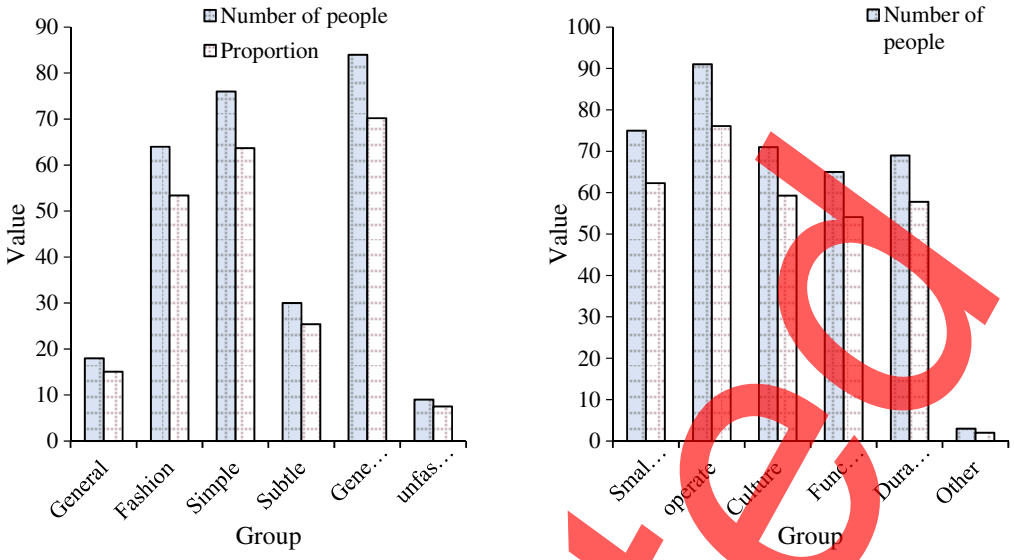

Fig. 9 Styling design analysis.

ignored. To explore the market's pursuit of product design, we have explored this. The details are as follows:

According to the data in Fig. 9, we have explored the attitudes and expectations of the product's characteristic design. First of all, from the perspective of characteristic design, 64 pays attention to fashion, and its proportion is 53.4%. 76 people focus on simplicity, with a ratio of 63.7%. 84 people pay attention to generosity, and the proportion is 70.2%. This data shows that it is more necessary to be concise and generous in the appearance design of wearable products, which provides ideas for product design. This also shows that people's current needs for products do not need to be complicated, and what is suitable is the best. In addition, the number of people who prefer to be implicit in product design is also larger, accounting for 25.4%, which is related to the personal character of consumers. Therefore, in addition to conforming to the mainstream of the market when designing the appearance of the product, it is still necessary to have a personalized design to meet different types of consumer needs.

From the perspective of consumers' design expectations, 91 people want to simplify the operation process and optimize the design of human-computer interaction, which is 76.1%. In addition, product quality and volume, color and shape are more in line with Chinese characteristics, and the demand has been rising in recent years. It can be seen that the current consumers are constantly improving their confidence in culture, and their pursuit of culture is getting higher and higher. However, from the perspective of the situation, it is precisely because the current product design is less related to traditional culture that more people hope to have such products. From this perspective, incorporating more cultural elements into the design of technological products is the entry point for products to open up the market.

6 Conclusions

With the advancement of science and technology, the combination of products and technology has become very common. To meet market demands, and in addition to improving product quality, product design is also very important. The purpose of this paper is to study the application of image fusion algorithm based on digital media technology in modeling design. Through consumer-centric analysis, we found that consumers generally prefer classic designs. In addition to quality requirements, consumers generally want products that can be operated simply and are less complex. In terms of product material selection, they generally accept skin-like materials. Although the article has certain gains in modeling design, there are deficiencies in throwing. In terms of user demand analysis and market segmentation, it only conducts small-scale research and requires professional in-depth research on the market.

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