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Design and Visualization Strategy of Brand Recognition System Based on CAD Technology

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Abstract. With the evolution of the times and the wave of globalization, brands have become a bridge between enterprises and consumers, and the public's expectations for the brand identity system have also risen. In order to keep up with the pace of social progress, when shaping brand image, we should not only focus on the logic and practicality of the graphic identification system but also actively integrate cutting-edge technology to innovate and improve brand concepts. Therefore, this study will closely follow the current social dynamics, deeply explore the construction methods of brand identity systems and the teaching strategies of visual communication, and analyze the practical application of computer-aided design in building brand identity. The research objective is to improve the teaching quality of higher education institutions and strengthen students' practical operational abilities. This exploration not only has profound significance for the education reform of Chinese universities but also cultivates talents who are truly up-to-date and highly professional in our country. Through this series of research and practice, it is expected to promote the transformation of brand design courses in higher education in China, making them more practical and enhancing students' practical abilities.

Keywords: CAD Technology; Brand Design; System Design; Visual Teaching
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1 INTRODUCTION

The importance of brand design, as a powerful tool for enterprise or product promotion, is increasingly prominent. In order to better meet the actual needs of consumers, many companies have adopted cutting-edge design concepts and cleverly combined them with modern information technology to create a unique brand visual image.

Brand Visual Augmented Reality (AR) technology, as an outstanding representative of modern technology, is gradually demonstrating its enormous potential in multiple fields, such as design and facility management (FM). Chung et al. [1] presented their creativity in a three-dimensional form through AR technology and shared and discussed it with brand visual stakeholders. This enables complex information to be presented intuitively and interactively, greatly improving work efficiency

and communication effectiveness. This not only helps to reduce misunderstandings and conflicts in communication but also promotes design optimization and improvement. At the same time, through the visualization confirmation of AR, the information required for management can also be more accurately grasped, providing strong support for the smooth progress of the project. The design phase is the longest-lasting period in the brand visual application, during which the application of AR technology mainly focuses on information visualization and sharing. Dai et al. [2] delved into the challenge of achieving synchronous remote collaboration among multiple brand visions in mixed-reality scenarios. Traditional collaboration methods are often limited by factors such as geography and time, making it difficult to achieve efficient communication and collaboration. In the process of engineering machinery design and development, synchronous remote collaboration of brand vision has always been a difficult problem to overcome. Through mixed reality technology, they can gather brand visual personnel from different locations in the same virtual space, achieving real-time interaction and collaboration. This platform, through high-precision modelling and virtual simulation technology, can realistically reproduce digital prototypes of construction machinery and perform holographic visual verification in a virtual environment. Brand visual recognition, as a crucial part of modern business competition, plays a crucial role in accurately and quickly identifying brand identity through its robust features. In the conceptual domain, features come from an enhanced scene composed of unobstructed objects, which have rich detailed information, making feature extraction more accurate. These features are often interfered with by various environmental factors, such as lighting, occlusion, angle, etc., resulting in suboptimal representation. Inspired by the human association recognition mechanism, Du et al. [3] innovatively proposed a novel brand visual 3D detection framework. This module can adaptively strengthen the feature adaptation of regions with more brand visual identity information, so as to make full use of the network's feature enhancement capability without introducing additional costs.

The deep integration of brand visual recognition models and CAD technology has become a core issue in shaping products and space design that combine comfort and safety. Researchers are gradually realizing that visual recognition research is not an easy task, especially when attempting to integrate diverse visual data across different disciplinary backgrounds. Eldar and Fisher [4] developed a three-dimensional computerized evaluation model. This model is based on real-time brand visual identity and realizes accurate evaluation of local design. These interactive data are all based on precise calculations of geometric comfort data and category mapping. In the model, the visual presentation of each product part is accurately represented by colour coding on the points around the actual part. Not only does it provide us with a brand new perspective and method to examine and evaluate the quality of product design, but it also builds a communication bridge between designers and users. With the rapid development and in-depth application of quasi-reality technology, the field of brand visual design has ushered in unprecedented changes. Through stereo-visual rendering, they are able to create virtual models that are highly similar to actual physical models, allowing for precise preview and adjustment of design proposals before actual production. With the help of virtual reality technology, designers can easily construct realistic virtual scenes and simulate the entire process of model making. It can also stimulate their creative inspiration, allowing them to create more freely. Guo and Ma [5] developed a product modelling system based on brand visual feedback. This system can quickly generate high-quality virtual models according to the needs of designers and inject methods. In this system, we adopted a grid-based discrete mass point representation method, organizing the mass points in the model in the form of a triangular grid. This emerging technology provides designers with new auxiliary means, enabling them to shape and present brand images in unprecedented ways.

Virtual reality technology has brought unprecedented immersive communication methods for brand visual recognition. This enables design artists to achieve a recognition accuracy of over 95%, which not only enriches the expression of teaching content but also enhances students' ability to combine brand visual recognition art with the teaching environment. Jiao and Li [6] constructed a brand visual visualization model that integrates deep learning within the framework of the metaverse. Fully unleash its creativity and shape a stunning new virtual world. In this model, they use deep learning algorithms to accurately capture and recognize brand visual elements and achieve

efficient and accurate 3D modeling through CAD technology. The perfect combination of these two enables brand vision to be presented realistically and vividly in the virtual world, bringing users an immersive experience. Lee et al. [7] are committed to developing a new brand visual recognition data automatic design and inspection system by integrating artificial intelligence modules and CAD software. In this system, the artificial intelligence module replaces the traditional judgment role assumed by engineers, while CAD software is responsible for executing various operations required by the artificial intelligence module. It is worth mentioning that design checks are completed through a Z-shaped interaction between artificial intelligence modules and CAD software. The target product is mold design for brand visual recognition, which is a field that requires extremely high precision and efficiency. Through close collaboration between the two, the design inspection process can be automated, greatly improving work efficiency. This interactive approach not only ensures the comprehensiveness of the inspection but also eliminates the need for expert intervention throughout the entire process, greatly reducing the possibility of human errors.

CAD technology, as an outstanding representative of modern information technology, has brought revolutionary changes to the design of brand recognition systems. Not only does it enhance the professionalism of design, but it also provides consumers with a higher-quality service experience. In view of this, in order to enable students to better master this technology and meet the increasingly strict requirements of brand design, it is particularly important to integrate CAD technology into practical teaching.

2 RELATED WORK

Immersive technology also plays an irreplaceable role in the middle and later stages of product development. As design deepens, immersive technology can also support more precise simulation and testing, ensuring that potential issues can be identified and resolved before the product enters actual production. From the initial concept generation stage, immersive technology can help designers understand and express ideas more intuitively through virtual environments and tools, thereby improving design efficiency and quality [8]. The potential applications are broad, and as the technology used becomes more advanced, commercial enterprises can more afford large-scale implementation, and the possibility is continuing to expand. In today's era, visual communication design is no longer a simple combination of graphics and text but a multi-dimensional and efficient design process that integrates artificial intelligence and CAD technology. The rapid development of these two major technological fields not only promotes innovation and transformation in visual communication design but also provides a strong impetus for the transformation of educational models [9].

Considering the importance of brand visual recognition in industrial design, combining VR technology. Liu et al. [10] delved into the application of a brand visual recognition interactive design system based on VR technology in the field of education. Through in-depth research and analysis, we have successfully established the corresponding model, laying a solid foundation for the subsequent development of VR systems. During the development process, they chose SolidWorks and 3DsMAX as the 3D model development tools. These two software have a wide range of applications and recognition in the field of 3D modeling, providing them with efficient and accurate modeling support. We have carefully planned the functions and scheme design of the brand visual recognition assembly and adjustment system. Brands are constantly updating with the needs of users in today's entertainment-oriented, fast-updating, and homogeneous business environment. Compared to the previous unequal one-way communication, interaction and listening require water. By establishing a fan economy and community effect through the brand and leveraging the power of brand visual design, we can build a bridge between users and the brand, thereby transforming users into loyal users of the brand [11]. The development of new media and digitization has brought new experiences to the visual experience of the public. The development of new media has also spurred the development of various applications and self-media. Short video and graphic design forms have emerged, and most other industries have also been affected by the wave of new media. How to improve comprehensive benefits through brand visual design, enhancing commercial value, ensuring

timely dissemination of content to target audiences, and gaining user brand value recognition are important issues [12]. Focusing solely on brand visual design or new media carriers is far from enough. The two complement and influence each other, and only in the process of creation can it be more important for enterprises to establish a good brand image in commercial competition. In the era of new media, communication carriers are presented in a multi-dimensional and three-dimensional manner, and establishing a good brand image can more easily gain recognition and popularity in commercial competition. Brand visual design is an important link in the development of enterprises, which can establish effective communication between the brand and users, improve user recognition of the brand, and improve the communication function of brand visual design [13]. Some optimization algorithms improve the generalization ability and robustness of the model by improving the loss function and introducing regularization terms. In the process of creating BIM (Building Information Modeling), the inconsistent application of various standards makes it difficult to achieve repeated use of many objects in brand visual recognition. This network structure can automatically extract the features of objects through learning and training a large amount of data, thereby achieving accurate recognition of 3D objects. In order to further enhance the semantic richness of BIM data, Rogge and Doukari [14] attempted to implement and apply convolutional deep confidence networks for brand visual recognition on new test data. Meanwhile, the operation and management of brand visual identity is a complex process that relies on the integration and interaction of various information systems. Sun et al. [15] constructed a digital twin of brand image. The system can capture and analyze the performance of brand visual elements in different scenarios in real-time, thereby providing accurate brand management and optimization suggestions for enterprises. Digital twin technology, as an emerging simulation method, can achieve precise mapping and real-time monitoring of the physical world by constructing virtual models corresponding to actual physical systems. It has established a high-fidelity digital twin model from multiple dimensions, such as geometric communication.

3 CONSTRUCTION OF A BRAND VISUAL IDENTIFICATION SYSTEM BASED ON CAD TECHNOLOGY

3.1 Brand Visual Identification System Design

The design process mainly includes the following core steps: the first step is to deeply analyze the basic components of the brand, such as the brand logo and theme tone. With the help of CAD technology, we can accurately define the brand's logo design and colour scheme. Secondly, the brand logo should be integrated with other relevant design elements to establish the cornerstone of the overall design. Furthermore, by comparing design specifications and deeply analyzing brand identity and its related elements, CAD technology is used to adjust the graphics finely. Based on these steps, we can use CAD technology to construct a complete design model, and its overall framework can be understood by referring to Figure 1.

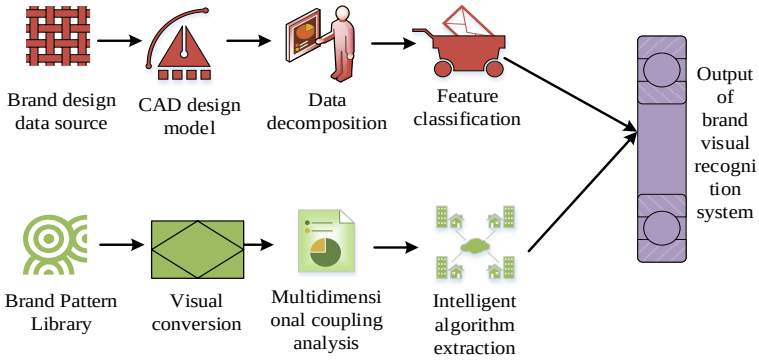

Figure 1: Overall system design concept.

In practical operation, building a design model requires following the following steps. The first thing is to analyze the brand logo and deeply clarify its basic components. Designing a scientifically sound brand visual recognition system is a meticulous and challenging task. In the design process, we need to ensure that the use of these elements not only aligns with the brand's positioning but also forms a distinct recognition in the market. In recent years, while visual recognition design emphasizes the extension and variability of logos, new thinking has emerged: the form of logos must be an independent unit shape. In many cases of brand redesign, we can see that, especially in the case of urban image design, multiple forms of integrated logos are presented in the new brand visual identity design. From the expression form of the logo, narrowly defined, dynamic refers to a form of presentation on electronic media that incorporates a temporal dimension in formats such as gif and flash. This is relative to the visual image design that exists on two-dimensional paper media. The dynamism of brand visual identity design mentioned in this article is not solely classified based on the expression form of the brand's core visual image but is classified based on the dimensions of the reasons and effects that arise and develop in the brand environment.

3.2 System Building Strategy

"Multiform" refers to a form of expression of a logo image that is opposite to traditional static logos, and its expression form is not fixed and fluid. Multi-form logos refer to the use of multiple visual symbols (or a series of symbols) to convey and communicate a certain characteristic of the brand image. Can combine any bright colour with interesting graphic elements. The graphic system composed of these elements is comprehensive and enjoyable. Usually, a two-dimensional expression is used to present a two-dimensional and half effect, with uneven planes and rich variations in seemingly fixed forms, which can reflect multi-dimensional or multi-content expressions. In a visual system dominated by multiple forms of symbols, the core image of the symbol that can carry any concept and information usually has infinite possibilities for transformation. Its manifestations include the following: the logo will appear in different forms from different angles and in different application environments.

This stage is not only related to the intuitive display of brand image but also closely linked to the audience's aesthetic experience and industry standards. At the same time, we will also use professional software for colour rendering to make the design effect more realistic and delicate. Of course, determining the standard color tone is not simply a matter of color matching but requires the use of a series of key calculation formulas.

$$H(a)=\int \frac{na_i+\ n-1\ a_{i-1}}{i^2+\ i-1^{\ 2}} \tag{1}$$

$$J(a)=\int \frac{n^2a_{i+1}+\ n-1^{\ 2}a_{i-1}}{\sqrt{i^2+\ i-1^{\ 2}}} \tag{2}$$

$$K(a)=\frac{\int \frac{na_i+\ n-1\ a_{i-1}}{i^2+\ i-1^{\ 2}}}{n^2+i\ i-1} \tag{3}$$

$$L(a)=\frac{\int \frac{na_i+\ n-1\ a_{i-1}}{i^2+\ i-1^{\ 2}}}{\int na_i^2+\ n+1\ a_{i+1}^2} \tag{4}$$

$$M(a)=\frac{na_i}{\int na_i^2+\ n+1\ a_{i+1}^2} \tag{5}$$

$H(a)$、$J(a)$、$K(a)$、$L(a)$、$M(a)$ is a comprehensive indicator that integrates various functions in CAD technology, such as rendering classification processing, brand classification recognition, brand standard comparative analysis, accurate determination of standard colours, and sharp recognition of visual differences.

a_i represents the cornerstone of brand design, encompassing all basic elements of brand design, whether it is colour, shape, texture, or other visual features, all within the scope of a_i. These elements are the key to building a unique brand image and the starting point for designing a brand visual identity system.

n is a quantitative indicator that represents the number of judgments or the number of times decisions and judgments need to be made during the brand design process. This indicator reflects the complexity and precision of brand design and is also an important basis for measuring the efficiency and quality of design work.

Through professional design software, it is possible to accurately draw the basic graphics of the brand and utilize advanced rendering techniques to present a more realistic visual effect. Taking drawing a circle as an example, the powerful features of CAD technology can be utilized to draw the outline and lines of the circle accurately, and then the software's rendering function can be used to give it a more realistic light and shadow effect and texture.

In addition, in order to better demonstrate the effectiveness and change process of brand design, we also conducted multi-stage simulation experiments. The results of these experiments are detailed in Figure 2. By comparing the simulation effects at different stages, it is clear to see the evolution process of brand design, as well as the mutual influence and relationship between various design elements. This not only helps to gain a deeper understanding of the principles and techniques of brand design but also provides a strong basis for subsequent optimization and improvement.

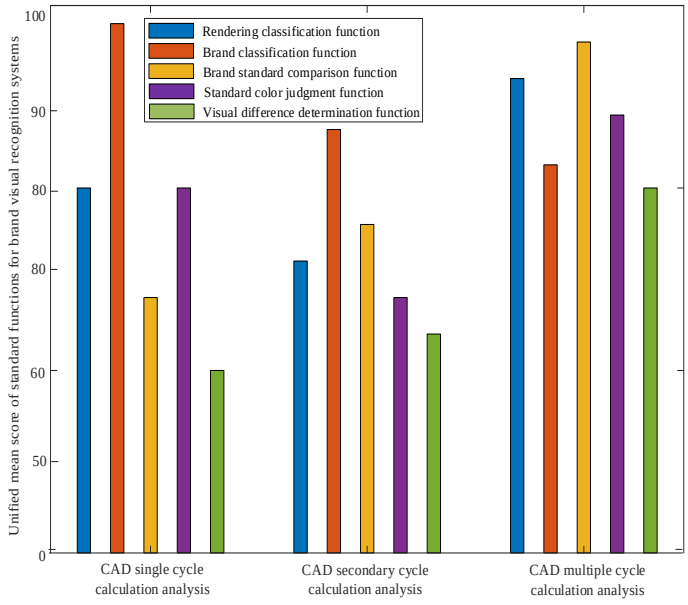

Figure 2: Functions at different stages.

In addition, improvements have been made to the design strategy of the brand's visual identification system. To improve the efficiency of brand recognition system design, optimization can be carried out in two aspects: first, using CAD technology to determine the benchmark color tone of the brand

accurately; second, fine-tuning the brand's basic graphics through CAD technology; Based on these adjustments, a model can be constructed that includes key elements such as colour, shape, size, and proportion. In practical operation, in order to ensure the accuracy of the standard graphics of the brand visual recognition system, we fully utilize the advantages of CAD technology for drawing. In the process of drawing standard graphics, we strictly follow the proportional relationship to ensure that every detail meets the design requirements. At the same time, we also use professional software for graphic rendering, using delicate colours and light and shadow processing to make standard graphics more vivid and realistic, enhancing visual impact. Similarly, when drawing rectangles, we also precisely control the ratio of their length and width, making the entire shape both aesthetically pleasing and practical. CAD technology, with its precision and efficiency, enables us to accurately draw various standard graphics, laying the foundation for brand visual recognition. For example, when drawing a circle, we first set the size of the standard shape and then draw it according to the set proportion to ensure that the final presented circle not only conforms to the brand's characteristics but also maintains harmony with other elements.

$$H'(a)=\frac{\sqrt{\int\frac{na_i+\ n-1\ a_{i-1}}{i^2+\ i-1^{\ 2}}}}{a+1} \tag{6}$$

$$J'(a)=\frac{\int\frac{n^2a_{i+1}+\ n-1^{\ 2}a_{i-1}}{\sqrt{i^2+\ i-1^{\ 2}}}}{a+1} \tag{7}$$

$$K'(a)=\frac{\sqrt{n+\int\frac{na_i+\ n-1\ a_{i-1}}{i^2+\ i-1^{\ 2}}}}{\sqrt{n^2+i\ \ i-1}} \tag{8}$$

$$L'(a)=\sqrt{na_i^2+\frac{\int\frac{na_i+\ n-1\ a_{i-1}}{i^2+\ i-1^{\ 2}}}{\int na_i^2+\ n+1\ a_{i+1}^2}} \tag{9}$$

$$M'(a)=n+\sqrt{\frac{na_i}{\int na_i^2+\ n+1\ a_{i+1}^2}} \tag{10}$$

The formula $H(a)$、$J(a)$、$K(a)$、$L(a)$、$M(a)$ refers to the collection of a series of advanced functions in CAD systems. It specifically covers various complex functions such as the precise implementation of rendering classification, detailed classification of brand categories, in-depth comparison of various brand standards, the accurate judgment of standard colours, and sharp recognition of visual differences. a_i comprehensively summarizes the fundamental elements of brand design, which are not only the starting point of brand design but also the cornerstone of shaping a unique brand image. As an important quantitative indicator, n not only represents the number of judgments but also reflects the frequency and complexity of decision-making in the brand design process at a deeper level. It is a key indicator for measuring the refinement of design work. The simulation results of this stage are shown in Figure 3.

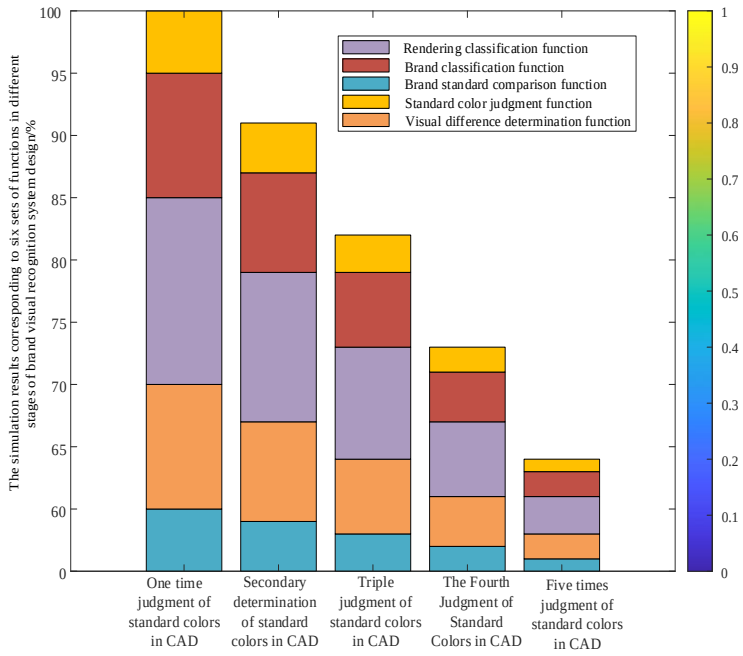

Figure 3: System function division.

In the practical application of models, the primary task is to establish and depict standard colours. During the drawing process, this study will provide a more detailed classification from the perspective of colour. The primary consideration is the choice of colour, which must take into account the public's aesthetic orientation and the unique personality of the brand. Secondly, there is colour matching. When shaping standard graphics, appropriate colour matching can significantly highlight the brand's characteristics. For example, if you choose to draw a circle, you can use white as the standard colour and use software rendering techniques to improve its realism. In addition, depicting the basic graphics of the brand and clarifying their proportions is also a key step. After completing these basic tasks, we will refine the graphics further to better reflect the core characteristics of the brand.

By examining Figures 2 and 3, it can be clearly seen that in order to demonstrate the uniqueness of the brand more intuitively, this study combined a variety of brand types and traits to shape the basic graphics. This approach not only provides space for adjustments based on actual situations to meet the growing demand for visual experience but also helps us determine the size of the graphics to fit the brand's style better. With the rapid development of new media technology, the way brand image is disseminated has undergone profound changes. Nowadays, with the widespread use of new media, the geographical limitations of brand image have been greatly weakened, greatly promoting the widespread dissemination of brand image content and expanding the audience. Although new media has provided convenience for the dissemination of brand image, fundamentally, many brand image displays still rely on live streaming. In virtual space, audiences can freely explore, interact, and immerse themselves in the atmosphere of music festivals, thereby obtaining a more authentic and in-depth experience. In order to overcome these shortcomings, music festivals in virtual space scenes have gradually emerged in recent years. For example, due to the viewing environment and equipment limitations of the audience, the impact of the audio-visual experience is often weakened, and the originally expected ceremonial interactive experience will also be correspondingly reduced. This form of communication, although real-time and interactive, also has some obvious drawbacks. This form of music festival provides audiences with richer ways to participate and experience through interactive game formats. However, whether it is offline scenes, online live broadcasts, or virtual spaces, music festivals cannot be held stably in the long term and maintain a balance between

commercial interests and brand image without valuing and building brands. In this situation, the audience's perception and experience of brand image are often limited to visual and auditory perception, and cannot obtain a more comprehensive and in-depth feeling. Branding not only means that the music festival needs to have a unique logo and visual image, but also requires a complete visual recognition system design. This design needs to shift from a single poster design to a more comprehensive and systematic visual presentation to ensure consistency and coherence of the brand image across different media.

3.3 System Optimization and Simulation

A crucial step in the journey of building a brand visual recognition system is to utilize advanced computer systems, CAD technology, and diverse common patterns to conduct detailed and in-depth classification and analysis of the brand. Meanwhile, in-depth research on common patterns is also an indispensable part. It should be said that this kind of expression lies between two-dimensional and three-dimensional. Although the presentation of the logo is still two-dimensional static, it's rich expressive power and visual tension are different from the brand visual identity design that existed in previous printing media forms. Its tolerance for large amounts of information and rich visual expression are more likely to stimulate the audience's visual appeal. The strong dynamic effect in brand system elements is about to emerge, which is a visual expression of brand recognition that transcends two-dimensional to three-dimensional. In terms of the expressive effect of visual language, it is a "broader visual language effect". Its function is that systematic brand visual recognition design can enable brands or enterprises to achieve high-capacity information communication with customers in many cases. Enable the core visual image to mobilize the dominant force of all visual design elements, and fully and systematically disseminate brand information.

$$H''(a)=\frac{ka}{n+1}+\frac{\sqrt{\int\frac{na_i+\ n-1\ a_{i-1}}{i^2+\ i-1^{\ 2}}}}{a+1} \tag{11}$$

$$J''(a)=\frac{ka}{n+1}+\frac{\int\frac{n^2a_{i+1}+\ n-1^{\ 2}a_{i-1}}{\sqrt{i^2+\ i-1^{\ 2}}}}{a+1} \tag{12}$$

$$K''(a)=\frac{ka+n}{n^2+1}\frac{\sqrt{n+\int\frac{na_i+\ n-1\ a_{i-1}}{i^2+\ i-1^{\ 2}}}}{\sqrt{n^2+i\ i-1}} \tag{13}$$

$$L''(a)=\sqrt{\frac{na_i^2}{kn+n+1}+\frac{\int\frac{na_i+\ n-1\ a_{i-1}}{i^2+\ i-1^{\ 2}}}{\int na_i^2+\ n+1\ a_{i+1}^2}} \tag{14}$$

$$M''(a)=\frac{n+k}{\int na_i^2+\ n+1\ a_{i+1}^2}+\sqrt{\frac{na_i}{k}} \tag{15}$$

The refined design of visual recognition systems refers to the deep visual correction and improvement of the designed brand image to ensure the integrity of the VI system and the consistency of dissemination in different media. Standardized drafting of basic elements such as identification and auxiliary graphics, data-driven design standards, minimum size limits, minimum spacing limits, and specifications for basic element combinations. Design and plan the basic elements of the VI system in terms of graphics and layout. For different application scenarios, limit the

appearance of each element, convert these elements into static symbol specifications, and prevent deviations from repeated use in the later stage. Always maintain visual standardization and consistency, which is more conducive to brand communication. This stage of design strictly adheres to the VI system design principles, highlights the characteristics of the Nova brand, and forms a unified brand image. The visual image of a brand is a bridge for communication and exchange between a company and its target audience. Changes in market conditions, competitive environment, and target consumer groups require companies to keep up with the times and strategically update their brand image. The reshaping of the VI system has become an effective way for various brands to enhance their brand influence, and it is a dynamic, continuous, and systematic project. Behind the reshaping of the VI system, there is a rational thinking of the brand by the enterprise. It is an external visual expression of the enterprise's development strategy adjustment and brand image upgrading, an important means to enhance brand influence, win more market share, and gain recognition from the target audience for the brand. Enterprises should attach importance to the upgrading and maintenance of the VI system, interpreting brand connotations with fresh visual symbols, which is more conducive to brands adapting to this diversified and information-based era. The rationality of brand image lies in whether its visual presentation matches its brand strategy, and whether it can effectively convey the core concepts, corporate culture, corporate vision, core values, and corporate image of the brand. Real-time updating and reshaping of brand image based on brand strategy is essential to clarify the direction and goals of design work. To effectively create a positive brand image, it is necessary to ensure that the reshaped brand image does not deviate from the guiding direction of the brand strategy. Maintaining a brand advantage in competition and enhancing brand influence can in turn promote the implementation of brand strategy.

4 ANALYSIS OF EXPERIMENTAL RESULTS

4.1 Experimental Design

The three visual centres of the logo refer to researchers, staff, and students, who synthesize new graphics through projected images, echoing the information exchange and ideological convergence of the three in the laboratory. This is a new form of brand identity design that emerged on top of new media. The core image of the brand appears in the form of GIFs, videos, and even animations, which is a brand identity design concept that goes beyond two-dimensional to three-dimensional. The biggest difference is the use of media to create dynamic visual representations, incorporating the dimension of time, and even incorporating storytelling and plot. Compared to traditional media, brand information expression is more vivid, vivid, and infectious, providing people with various sensory experiences such as visual, auditory, and even touch and smell. This approach combines the focus of graphic attention with the symbolic symbols of recognition to form a comprehensive visual presentation. It should be said that this design approach is not new, but it can continuously adjust to any new actual situations and factors. We use CAD software to guide students in creating, editing, and optimizing brand visual elements, helping them master the core elements and design skills of brand visual recognition. We have provided them with rich case materials to guide them in analyzing the characteristics and patterns of brand visual recognition and help them establish a basic understanding of brand visual recognition. To ensure the rigour of the experiment, we have also developed a detailed questionnaire survey to collect real feedback and feelings from students during the experimental process. These experiments aim to comprehensively evaluate how CAD technology affects students' design abilities and understanding of brand visual recognition. The control group of students received traditional teaching methods, mainly through theoretical learning and case analysis, to understand the brand visual recognition system. They used CAD software to conduct in-depth design and analysis of the brand visual recognition system and became familiar with various operating methods of the software through practical operations. Experimental observation found that students in the experimental group were able to proficiently use CAD software for various operations according to design requirements after installing and using it. The control group, on the other hand,

mainly learned the functions of CAD software in brand visual recognition system design and performed corresponding operations according to the software functions. The experimental results are detailed in Figures 4 and 5.

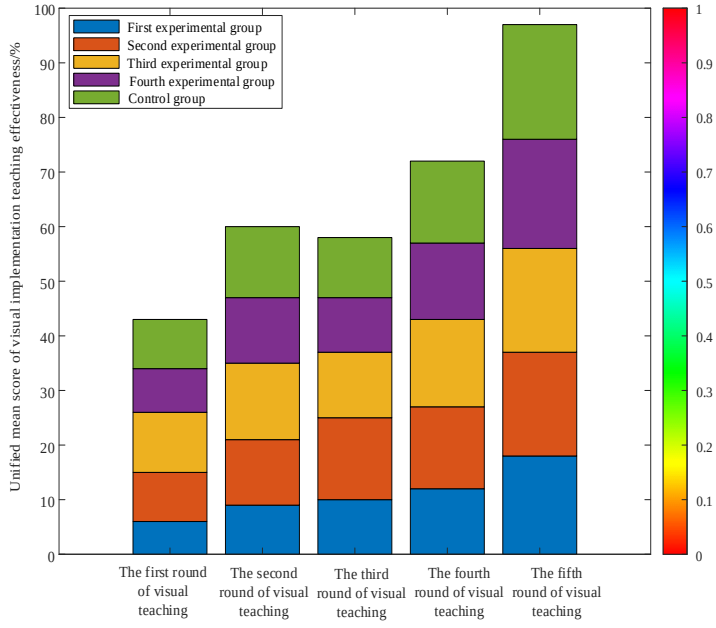

Figure 4: Experimental result 1.

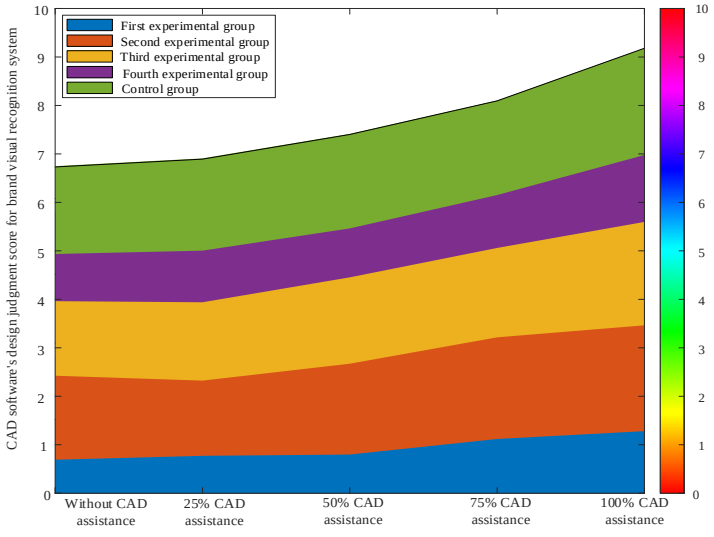

Figure 5: Experimental results 2.

Through the experimental data shown in Figure 5, By analyzing the experimental data shown in Figure 5 in-depth, we can clearly see the significant differences between the experimental group and the control group in the application of CAD software. They encountered many difficulties during the operation process and were unable to utilize CAD software for brand visual recognition design work

effectively. This not only affects their learning effectiveness but also limits their further development in the field of brand visual recognition. They fully utilized the functional characteristics of CAD software, perfectly combining brand concepts with visual elements, and created a series of creative and recognizable brand visual identification works. In contrast, the students in the control group, due to a lack of corresponding practical experience and skills, find it difficult to complete the design task of the brand visual recognition system even using CAD software. With the strong support of CAD software, the students in the experimental group were not only able to successfully complete the design work of the brand visual recognition system but also demonstrated high proficiency and excellent design ability in the operation process.

4.2 Result Analysis

The application experiment of CAD technology in brand visual recognition system design and visualization teaching covers the learning progress of students at different stages, the improvement of brand design and teaching practical skills, the enhancement of overall literacy of students, and quantitative data on the learning effectiveness of brand design systems. A detailed analysis of these experimental data can be found in Figures 6 and 7.

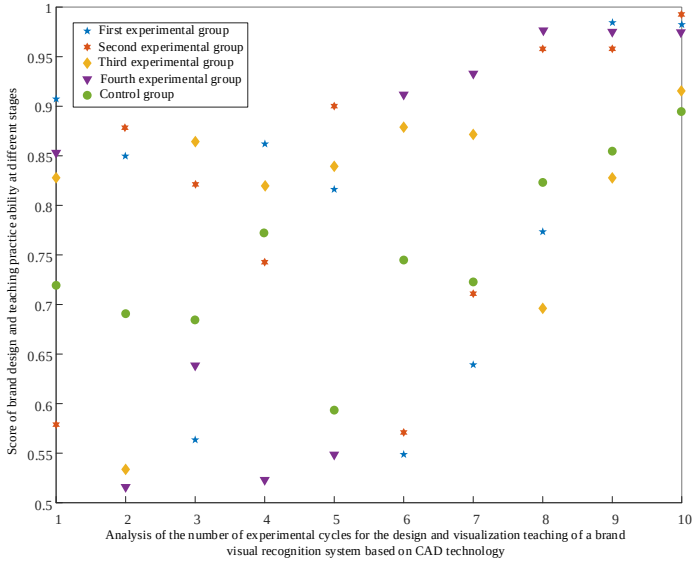

Figure 6: System analysis result 1.

After an in-depth analysis of the experimental data and results shown in Figure 6. The application of CAD technology in brand visual recognition system design and visual teaching methods has brought significant teaching effectiveness and improvement at the design level. Compared with traditional design methods, CAD technology not only improves design efficiency but also makes design works more innovative and recognizable.

Figure 7 shows that the visual recognition system has achieved very good results in data-driven teaching, demonstrating the high practicality of this teaching strategy. The achievement of this effect is due to the extensive use of professional design software such as Photoshop, CorelDRAW, Illustrator, etc. by students in the design process, which greatly improves the overall quality of the design. In addition, when designing a brand visual recognition system, students can combine the actual situation of the brand and the specific needs of the target audience to create, making the design results more in line with market and consumer expectations.

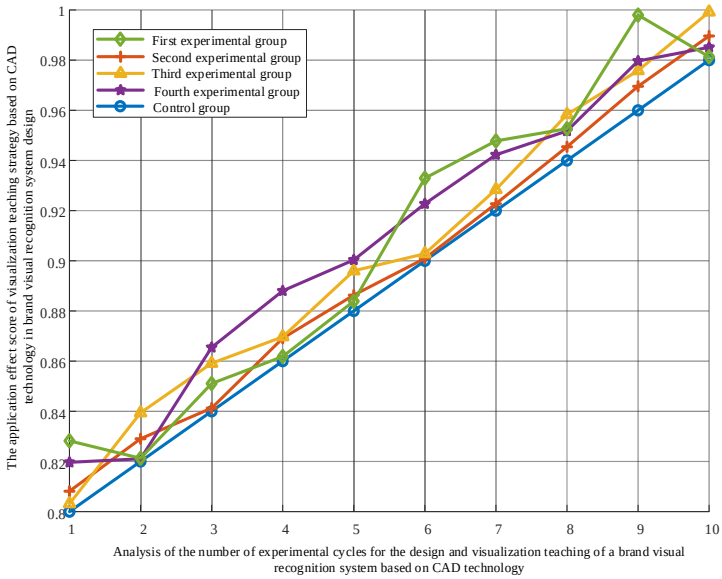

Figure 7: System analysis results 2.

In summary, incorporating CAD technology into brand visual recognition system design and visualization teaching strategies can not only significantly improve the quality of design, but also play a positive role in promoting the cultivation of practical skills and comprehensive literacy of students.

5 CONCLUSIONS

The dynamic presentation of brand identification in online media in the new media environment. The dynamic interaction between internal elements of the brand recognition system, as well as the dynamic interaction between the brand and external audiences. Brand visual identity is not static, and its development is also dynamic growth and development based on the development of the market and media. The development of overall brand identity also requires the brand design to maintain "elasticity" in marketing, brand structure, brand standards, and brand display applications. Considering the uncertainty of future technology and the periodicity of enterprise or brand development, the overall identification of the brand system itself will inevitably exhibit a dynamic development trend to meet its long-term development. In the new media environment, dynamic brand visual identification design is a design trend that has emerged. In the new media environment, although traditional publishing tends to develop towards electronic publishing, paper media still has a certain market presence and will not disappear due to the development of new media. It is just that its market share is not as high as before. Due to the fact that communication symbols and media will not always develop in a superimposed state due to new media technology, just like old media will not immediately disappear due to the emergence of new media, this will present a state of symbiosis and coexistence.

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