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Computer-Aided Design AND APPLICATIONS

Corporate Brand Design Strategy Based on Basic Graphical Language Descriptions of Visual Communication

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Abstract. The competition among enterprises is intensifying, and enterprises in various fields need to have their own corporate characteristics in order to dominate the competition, and the brand becomes a good display of corporate image. To a certain extent, the brand design of an enterprise will determine people's perception of its products, and brand design is a particularly important aspect, and many brand designs incorporate visual communication design. With the advancement of technology, people's design concepts have also been updated, and the addition of visual communication design concepts has better responded to the development trend of the times. The application of visual communication in brand design was achieved through basic graphical language descriptions. The importance of visual communication for enterprise development was elaborated, and brand value was updated through the analysis and design of semantic descriptions.

Keywords: Corporate Brand Design; Visual Communication Design; Graphic Language; Internet of Things
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1 INTRODUCTION

With the unprecedented prosperity of visual expression, the field of visual communication design research is no longer limited to art, but has expanded to a broader range of high technology, especially digital technology. Fan and Li [1] use relevant algorithms to process solid images in two or three dimensions, which can ultimately be displayed and utilized on a computer. Simultaneously conducting standardization research on pixel values, color space, and other aspects of digital images to facilitate data exchange between different devices. Through computer graphics and artificial intelligence technology, the natural interaction between images and humans is realized, thus improving the efficiency and experience of human-computer interaction. These technologies are important components of computer graphics and image processing technology, and can be used in digital image processing, analysis, display and interaction. Technological changes have led to many

advancements in education and teaching. Guan and Ko [2] attempted to teach using Illustrated Photoshop design through an 18-week university design course combined with digital learning. The study was conducted among 10 students at a vocational and technical college in Taiwan. The research results indicate that Illustrator and Photoshop enhance students' creativity and the achievement of learning goals. The digital development has promoted the mass production of graphics, and through the Internet, visual information can be disseminated at high speed, which shortens the distance between people in time and space, and the Internet of Things has formed a communication network of virtual and real connections between various media. Therefore, the Internet of Things era is no longer limited to the design innovation of a single medium, but also a redesign of the integration of various media, which not only reflects the integration of multiple interfaces and technologies, but also a kind of information and cultural spirit, reflecting the new trend of joint dissemination of information across media. Li et al. [3] utilized network technology to provide auxiliary support. These systems can include teaching resource sharing systems, teaching assistance systems, teaching evaluation systems, etc. Among them, the teaching resource sharing system allows teachers and students to view physical education teaching outlines, teaching videos, teaching materials, etc. at any time; Teaching assistance systems can include speech recognition, virtual reality technology, intelligent wearable devices, etc., which can provide more intelligent support for physical education teaching.

The continuous development design, this paper is divided into four chapters, based on the corporate image and brand concept, to study the functional aspects of visual communication design in corporate brand strategy, and to propose the management and implementation concepts of brand design. The first chapter attempts to explore the development trend of the functionality of the corporate brand design industry through three levels: brand strategy, brand management and brand market, argues its inevitable correlation, and puts forward the view that "the functionality of visual communication design in brand construction will determine the fate and success or failure of the brand", expecting to have a positive effect on the modern corporate brand marketing concept and brand image design implementation. It is expected to play a positive role in the implementation of modern corporate brand marketing concept and brand image design. Chapter 2 analyzes the brand strategy, operation management and market feedback, and penetrates into the theory of sustainable development from three aspects, which plays a positive role, targeting the methods of conducting effective brand positioning and the content of the developmental brand image design model to help small and medium-sized enterprises achieve sustainable brand image development, through certain specific means to achieve It further reveals the application of IoT-based brand graphic language auto-curation technology, a design process based on computer-aided visual communication brand design that achieves the desired visual effect by certain specific means. The fourth chapter studies and analyzes the experimental results by testing and analyzing the above automatic scheduling algorithm.

The innovation point of the research is that the research on brand positioning and brand image design strategy of enterprises in China generally involves only one of the aspects, but this paper, integrates the research on how to carry out brand positioning and how to carry out brand image design. The content is more systematic and comprehensive, so that companies can recognize the defects of their own brand development, guide how to make effective brand positioning, and realize the description of graphic language based on the syntactic description of rules and the semantic description of ASM. It will be a good guide for both SME operators and brand design practitioners in their future work.

2 CURRENT STATUS OF RESEARCH

Statistical evidence shows that compared with students who adopt traditional face-to-face teaching methods, the use of blended learning has a significant impact on the final exam scores of CAD module students. The research findings of Onofrei and Ferry [4] emphasize the positive impact of RLO on students' learning behavior, engagement, and knowledge retention. Ostrosi et al. [5] believe that computer-aided corporate brand visual design refers to the process of using computer technology and design software to assist companies in brand visual design and optimization. This software typically

includes graphic design software, image processing software, video production software, etc. With this software, designers can quickly carry out brand visual design, including logo design, standard color selection, packaging design, and more. In addition, computer-aided corporate brand visual design can continuously optimize brand design solutions through data analysis and user testing to enhance brand awareness and reputation. Pando et al. [6] believe that multi scale design refers to the process of selecting different image resolutions and output formats based on different design requirements and scenarios in the CAD design process, in order to better display the design results. This design approach can enable CAD software to better understand the design intent and intelligently process according to different design requirements, thereby achieving more efficient design results. At the same time, multi-scale design can also improve the flexibility and adaptability of design, enabling designers to better respond to different design scenarios and requirements, and achieve more personalized and refined design. Therefore, multi-scale design is one of the important ways to stimulate the intelligence of computer-aided design (CAD). Phadnis et al [7] tested the generalizability of the findings in paired programming literature for the same binary working configuration in CAD, which we refer to as paired CAD. A human experiment was conducted on 60 participants to test three working modes: individual work, pair sharing control over a model instance and input, and pair editing the same model from two inputs at the same time. Ren et al. [8] conducted a systematic analytical investigation. A series of descriptions have been provided on the process system of divine division analysis.

More and more business operators and brand designers are aware of the importance of brand image design, and call on SMEs in China to recognize the situation, adjust their strategies and take the initiative to change. With the right imagination, the right resources, and the right decisions, brands can renew themselves and be passed on from generation to generation. The most important thing for a brand is to adapt its strategy with the times in order to achieve optimal performance and to live and prosper. When physical scale models involve all detailed information, they provide valuable additional information. For this information, the model in engineering is usually another product in the manufacturing process, Saor í n et al. [9] analyzed the graphic reengineering and planning of full-size high detail model (HDM) digital manufacturing, referring to the HDM manufacturing process. By reprocessing and planning graphic data, higher image quality and better design results can be achieved. Graphic reconstruction refers to the reconstruction of HDM data to better represent design intent and details. This can be achieved by performing geometric transformations, scaling, rotation, and other operations on HDM data. For example, the reconstruction of the entire model can be achieved by transforming a set of parameter points and mapping them to another coordinate system. Shabana [10] reorganized HDM data for graphic planning to better represent design intent and scenarios. This can be achieved by performing operations such as cropping, stretching, and twisting on HDM data. For example, a set of parameter points can be transformed and mapped to another coordinate system, and the mapped coordinate system can be re planned to better represent the design intent and scene. In short, graphic reengineering and planning are very important steps in the HDM digital manufacturing process, which can help designers better express design intentions and details, and achieve more efficient and accurate design effects. Shammar and Zahary [11] argue that heuristic elimination of business system heterogeneity refers to the establishment of a knowledge system that can automatically process and eliminate heterogeneity through the use of heuristic algorithms and graphic processing techniques. This knowledge system can fuse and process knowledge from different business systems, thereby achieving a global and efficient knowledge management and utilization. Shivegowda et al. [12] proposed that the establishment of a knowledge base is a crucial aspect in graph-based knowledge systems that heuristically eliminate heterogeneity in business systems. A knowledge base can include knowledge from different business systems and integrate and process them. Specifically, a knowledge base can establish a knowledge system that can automatically process and eliminate heterogeneity by classifying, associating, and integrating knowledge from different business systems. All levels of the Internet of Things are considered as knowledge nodes. Each knowledge node has its own knowledge representation and management method, and can transfer and exchange knowledge with upper and lower-level nodes. In this middleware, knowledge graph is an

important data structure that can be used to store and manage knowledge between different levels. Xie et al. [13] are responsible for collecting data from various levels of the Internet of Things and storing it in a knowledge base. Transfer knowledge from the knowledge base to the higher-level nodes. Manage and coordinate knowledge transfer and exchange between different levels, and store them in a knowledge base. In experiential teaching, Zhang [14] believes that the starting and ending point of teaching reform is to closely integrate classroom teaching of design performance technology with teaching of design theory knowledge. At the same time, we focus on cultivating and improving students' practical innovation ability and personalized design level, so as to achieve the goal of cultivating high-quality composite material design talents.

To determine the theme and style of an animation, it is necessary to clarify the theme and style, including the type of animation, story background, character settings, and so on. This helps to better grasp the overall style and texture when making materials. In the process of qualitative planning, it is necessary to collect materials that are consistent with the theme and style of the animation. This can include different scenes, props, costumes, props, and so on. It should be noted that the quantity and type of material should match the needs of the animation. Zhao and Zhao [15] analyze and organize the collected materials to determine which materials are suitable for the theme and style of the animation, and which materials can be further processed and improved. In the process of analyzing materials, factors such as scene composition, lighting, color, texture, and the detailed design of props, clothing, props, etc. can be considered. After producing the material, it needs to be reviewed and modified. The purpose of review and modification is to ensure that the material meets the overall style and quality requirements of the animation, while also better aligning with the theme and style of the animation.

3 RELATED TECHNOLOGIES

3.1 IoT-Based Automatic Graphic Language Orchestration for Brands

In brand design, logo graphic language serves as a visual symbol that utilizes different shapes, colors, and forms of expression. Based on certain design principles and aesthetic principles, present the visual image of the brand to convey brand information and cultural value. In today's era of high-speed information circulation, graphics are widely used in brand design due to their own characteristics and advantages, making the brand more vibrant in image and culturally rich in connotation. Analyze the characteristics and design expressions of graphics from a brand perspective, in order to better serve the construction of brand image. Brand image design logo design is an important component of brand image design. A good logo carries the spirit and culture of the brand and becomes an important display tool for shaping the visual image of the brand. Brand image design refers to the effective transmission of a brand's business philosophy, brand culture, and brand value through a unified visual design to shape its image, highlighting the brand's personality and cultural differences. Simultaneously resonate with consumers to establish brand image and value. In brand image design, logos are regarded as the core elements of information communication, forming a unique visual image through different combinations of simple graphics, colors, and text. In logo design, each design element becomes a unique visual language while being endowed with emotions, affecting the cognition, behavior, and emotional generation of consumer groups. As shown in Figure 1.

IoT programs are distributed structures that include embedded software in devices, edge servers, and cloud software. Some of these software components are software components that provide services for other programs, while others are application software. The services composed of software components are called microservices, and they are called through application software. Different communication protocols and invocation methods can be used between applications and microservices. In the IoT information model, the nodes that can run programs are Active Nodes, which correspond to the physical models of all running programs in the system, corresponding to physical devices, cloud servers, or software in edge servers. And data type nodes are passive nodes.

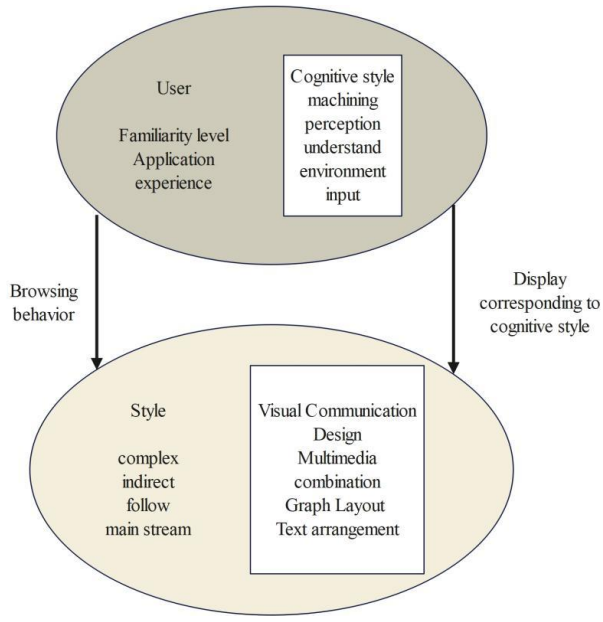

Figure 1: Framework of experimental research problem.

$$\min = (m-1)Y + h \tag{1}$$

$$G = (Q, AG, CG) \tag{2}$$

$$AG = \left\{ s \middle| \ s\left(q_1, q_2, n\right); q_1 \in Q, q_2 \in Q \right\} \tag{3}$$

In Eq. (3):s is used to describe the connection relations between graph elements, including two kinds of connection relations, Cfrom and Cto. Cfrom is the connection from q2 to q1, q1 represents the present stage graph element, Cto is used to describe the connection from q1 to q2; n is a natural number to describe the multiplicity of connections. CG is used to describe the detailed:

$$CG = \{(q, render, layout)\, p \in P, \ \text{render} \in L\} \tag{4}$$

In equation (4), R is used to describe the set of graphical appearance types; L is used to describe the set of graphical location relations; render is used to describe the correlation between graphical elements; layout is used to describe different graphical classes; and P is used to describe the graphical symbol system. computer-based systems that can be used in practical communication design. ASM belongs to dynamic algebra, and the algebra can be defined on some alphabet Σ with the expression

$$\Sigma = \left\{ f_1^0, f_2^0, \cdots, f_{\mathrm{kL}}^0, f_{\mathrm{L}}^1, f_{\mathrm{kv}}^{\pi} \right\} \tag{5}$$

In formula (5):f0 is used to describe the m-element function symbols, the function symbols include static and dynamic, the 0-element static function symbols are called constants, and the 0-element dynamic function symbols are called program variables; the subscript kL indicates the state of the algebra, L indicates static constants, and kv indicates dynamic constants. It is assumed that all the alphabet containing static constants are Boolean truth values to facilitate the description of partial functions.

For a discrete probability distribution, it is defined as follows:

$$D_{KL}(P \parallel Q) = \sum_{i} P(i) \log \frac{P(i)}{Q(i)} \tag{6}$$

The state v on ∑ is an interpretation of the nonempty set D with ∑, where D is the super-domain of v. Assuming that f ∈ ∑ is an m-element function symbol, then f is a function fv from Dm to D. The 0-element function symbol is used to describe a constant of D, usually noted as |v|.

$$L(\theta) = L\left(x_1, x_2, \ldots, x_n\right) = \prod_{i=1}^{n} p\left(x_i; \theta\right) \tag{7}$$

A super-domain is usually partitioned into several subdomains, and the partitioning of subdomains is usually described using eigenfunctions. if f defines a domain, the element a is not in that domain when and only when f(a) = undef. A change of the interpretation of the partial function at the partial point. the update of the state by ASM is done by using the migration rules, which are detailed as follows

$$L\left(x_1, x_2, \ldots, x_n; \hat{\theta}\right) = \max_{\theta} L\left(x_1, x_2, \ldots, x_n; \theta\right) \tag{8}$$

That is, when the parameter 0 = f, the likelihood function can take the maximum value, then it is called the great likelihood estimate of é. Applying the maximum likelihood estimation to generative adversarial, a probability distribution function Peoa(x6) is first defined for the generative model, i.e., the distribution function has parameter 0 determined. And in practice, the parameters are continuously tuned, which in turn makes the obtained probability distribution function of the generative model as close as possible to the real data distribution.

3.2 Computer-Aided Visual Communication Brand Design

When the mediating effect is significant, an effect size less than 20% is classified as a low weak effect, an effect size between 20% and 50% is classified as a medium effect, and an effect size greater than 80% is classified as a large effect. The following formula is used here in this study for effect size calculation:

$$R^2_{\text{med}} = r^2_{MY} - \left(R^2_{Y,\,MX} - r^2_{XY}\right) \tag{9}$$

It is noteworthy that basic psychological needs fully mediated the role of technology-enhanced classroom social environments and deep learning in the self-domain. Meaning, the effect of the technology-enhanced classroom social environment on deep learning in the self-domain is achieved exclusively through the satisfaction of basic psychological needs. Every individual who meets

$$g(v) = true \tag{10}$$

In order to obtain its formal semantics, the auxiliary language Z' needs to be chosen, while there exists an accurate semantic definition of Z', that is, the Z' semantic domain J', and the mappings M'j from grammatical concepts to semantic domains are all accurately defined. Then the semantics of Z is defined by Z', and the detailed process is as follows. The inverse direction of the function gradient updates the model parameters, and the process can be expressed as Eq. 11. where w denotes the model parameters, J() denotes the loss function, ɑ denotes the learning rate, and t denotes the number of rounds, which controls the parameter update step for each round of iterative training.

$$w_t = w_{t-1} - \alpha * \nabla J\left(w_{t-1}\right) \tag{11}$$

An improved method is to introduce momentum to update the parameters, which takes the form of the average of the moving exponents of the negative gradient at each step, and it can effectively suppress oscillations and improve the convergence speed. Establish the state M:A→A' of the mapping

from the grammar A of Z to the grammar A' of Z', which describes the mapping of all elements in A to all elements in A'.

$$w_t = w_{t-1} - \frac{\alpha}{B} \sum_{i=1}^{B} \nabla J\left(w_{t-1}; x_t\right) \tag{12}$$

Get the mapping Ms→M's of Z grammar concepts to semantic domains. in practice, M is mainly used to establish the mapping of Z grammar A to the semantic domain J' of Z. The main idea of Adam's algorithm is to introduce the first-order exponential smoothing of the historical gradient and the squared historical gradient, which corrects the current gradient and makes each parameter by a different learning rate. Compared with the SGD method, the Adam method has a faster convergence rate. The overall flow of federation learning is shown in Figure 2. During the initial operation of the system, the parameter server randomly initializes the global model parameters, and in several subsequent communication rounds, the server sends down the global model to the participating devices.

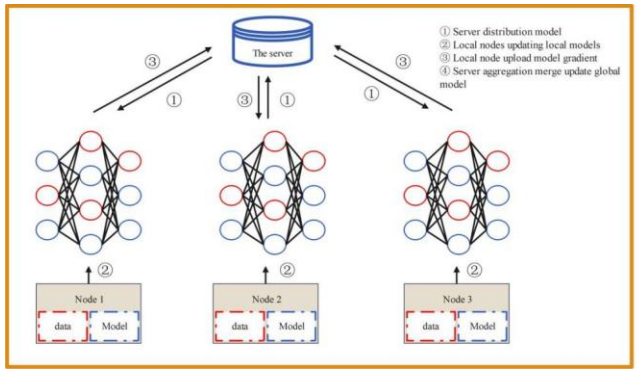

Figure 2: Schematic diagram of the federated learning framework.

Consider a network with N device nodes, where each node i in the network processes their private dataset D; and their dataset size is |D;|.

$$F(w) = \frac{1}{\sum_{i=1}^{|N|} \left|\mathcal{D}_i\right|} \sum_{i=1}^{|N|} \sum_{\{x,\, y\} \in D_i} f(w, x, y) \tag{13}$$

where f(w,x,y) is the compound loss of the training samples {x,y}. For the FL problem in

$$\bar{y} / \sum_{j=1}^{C} \bar{y}_j = 1, \bar{y}_j \geq 0, \forall j \in [C] \tag{14}$$

Separating multiple lanes of interaction in visual communication design, each graphical language automatically choreographs activities to take place within a lane, thus highlighting the participants in the activity. There is no constraint on the direction of the lanes, which can be either vertical or horizontal.

$$F(w) = \sum_{i=1}^{|N|} \frac{D_i}{\sum_{i=1}^{|N|} \left|D_i\right|} F_i(w) \tag{15}$$

4 EXPERIMENTAL RESULTS AND ANALYSIS

4.1 Test of Automatic Arrangement Algorithm

The experimental test was conducted under the environment of IntelP4.3G. The experiments were tested with the literature algorithm as a comparison, and the results are depicted in Figure 3.

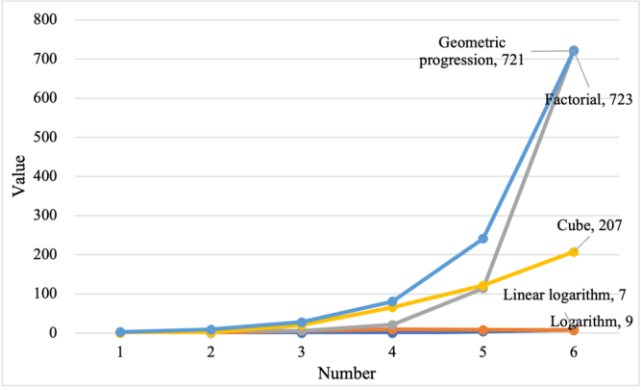

Figure 3: Graphical language layout result of the proposed algorithm.

Two-dimensional space corresponds to the principle of graphic design, three-dimensional space corresponds to the principle of spatial environment design, and four-dimensional space corresponds to the principle of virtual design, animation and image design. For designers, media fusion expands the creative space of information communication, enriches the design language, and enables the expression of design to be innovative, rich and diverse, presenting diversified sensory stimulation.

With β=0.2, the accuracy of the method in this paper is about 8% higher than FedAvg on the CIFAR-10 dataset, and about 6% higher than FedAvg on the CIFAR-100 dataset. The user's degree of attention to visual area Hxy and the affiliation of user's cognitive style Cxy are divided by the corresponding area adjustment coefficient αxy in turn to obtain the first adjustment values BHxy and BCxy, and then BHxy and BCxy are divided by VHx and VCx in turn, that is, the values of AHxy and ACxy are obtained, and the data results are depicted in Figure 4 below.

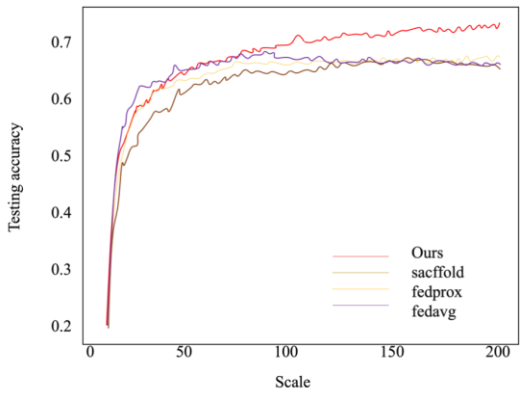

Figure 4: Curves of model accuracy under different scene scale data configurations.

4.2 User Evaluation Results Testing

Figure 5 shows the specific information of the research subjects. The comparison results of the proposed algorithm, literature algorithm average gaze amount and gaze time are depicted in Figure 5. The analysis of Figure 5 shows that compared with the literature algorithm, the average amount of attention and attention time of the proposed algorithm are greatly improved, which indicates that the automatic graphic language arrangement obtained by using the proposed algorithm is more effective.

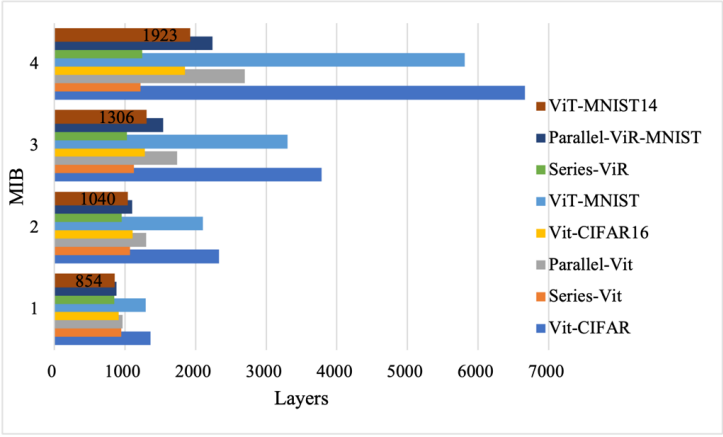

Figure 5: Comparison of convergence accuracy with the graphical language orchestration results of literature algorithms.

The evaluation results are divided into four levels. A represents very satisfied, with scores between 8 and 10; B represents satisfied, with scores between 5 and 7; C represents more satisfied, with scores between 3 and 4; D represents unsatisfied, with scores between 0 and 2. Si represents the satisfaction coefficient, and the satisfaction coefficients of A, B, C and D are 1, 0.75, 0.35 and 0, respectively; n denotes the number of visual communication designs; i denotes the counter. Based on equation (12), the proposed algorithm, literature algorithm graphic language automatic arrangement results user satisfaction test, the results are shown in Figure 6.

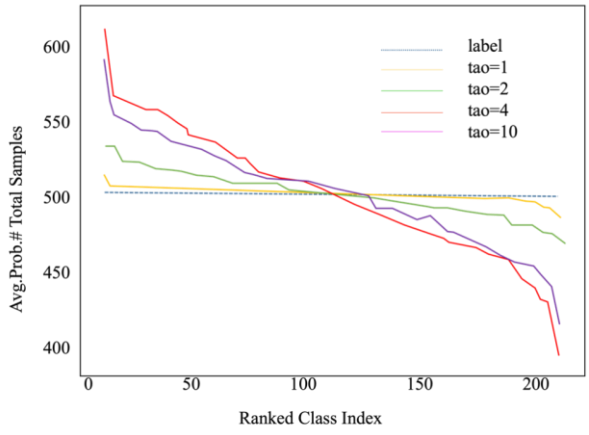

Figure 6: Performance metrics of the IoT device-based system.

Figure 6 shows the convergence accuracy curves of the two methods on the CIFAR-100 dataset at different pruning rates p, where the parameters in the legend successively denote p and y. Again, the convergence performance of the system is as expected at p of 0.5 to 0.8, while the convergence slows down and jitter exists at p of 0.9. For the memory usage, the storage usage of a single device is only about 2.5% of the total, leaving a lot of redundancy, indicating that this small CNN model does not put a big burden on the device. The upload communication latency and single local training time of the device will be different compared to the service cluster, with the single local training time being about 5 times that of the service cluster and the upload communication latency being about 10 times that of the service cluster, which is caused by the computational power and communication bandwidth gap between the two, but it is acceptable for edge computing devices.

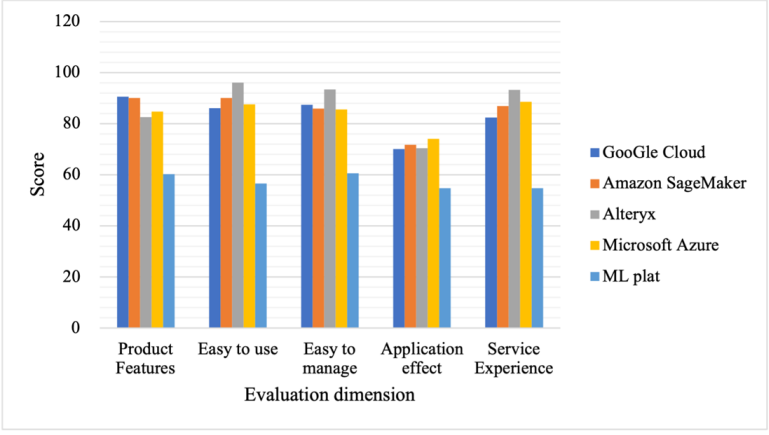

Figure 7: User satisfaction test of the three algorithms.

Analysis of Figure 7 shows that the mean value of user satisfaction of the proposed algorithm is 7.792, which is significantly better than the literature algorithm, indicating that users are more satisfied. With the help of IoT it is possible to meet the audience's increasingly personalized information communication needs and make the information effectively communicated on multiple platforms with multiple drop points and forms. Smartphone as the terminal of information communication not only makes the connection more ubiquitous, but also makes the information communication more targeted. The target audience can control the mobile terminal independently to choose whether to receive and respond to the information, and the audience can also participate in the design of information content and interface according to their own preferences, making the visual presentation of information more personalized.

5 CONCLUSION

One important task of brand design in the overall corporate image is to convey the company's philosophy. Brand design needs to fully leverage the informational characteristics of brand graphics and use concise visual images to showcase the cultural connotations of a brand. In addition to accepting this image, the audience can also accept the cultural language contained inside, which will definitely add points to the promotion and promotion of this brand. Graphics are a language and a way of communication between people. Graphics are the most easily recognizable and memorable information carriers. The visual characteristics and infectious effects of graphics. Make it the most recognizable and memorable form of information dissemination. Many contemporary enterprises widely use the VI system based on their understanding of the function of image language to improve the recognition rate of enterprises and products in the minds of consumers, enhance memory, and

thus gain promotion and win the market. The pace of economic and social development is constantly accelerating, the renewal of products is constantly in progress, there is always a new design to replace the obsolete, the concept of visual communication design in brand design is always in the process of updating, need to constantly comply with the development trend of the times, constantly carry out technological innovation, integration of modern scientific and technological means, focus on the concept of green development, the enterprise can maintain its own competitiveness, can have the brand effect, in Competition in the continuous development and progress, so as to obtain the corresponding economic benefits. In this way, the country's visual communication design will continue to progress and gain breakthroughs.

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