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Research Article

Optimization of Dynamic Graphic Packaging Design Scheme Based on Graph Neural Network

Jie Tao

School of Art and Design, Nanchang University, Nanchang 330031, Jiangxi, China

Correspondence should be addressed to Jie Tao; taojie@ncu.edu.cn

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The traditional packaging design is inseparable from graphics, but the graphics is static, and the emergence of dynamic graphics breaks the conventional packaging design concept. This study optimized dynamic graph packaging design based on graph neural network technology. This paper first gives a brief introduction to the graph neural network, mainly to optimize the problem that the graph neural network has a large number of learning, and also expounds the principle of the graph neural network using formulas. Then this paper introduces the dynamic graphic packaging design in detail, which involves the elements of packaging design, the types of dynamic graphics, design ideas, and so on. Later, this paper tests users' attention to the product through eye movement experiment and graph neural network algorithm. The experiment showed that the dynamic graphics packaging design of product 7 was the most popular, with the dynamic graphics area users viewed it up to 93 times. It can be seen that this dynamic graphic packaging design optimization scheme is effective, and it also provides a possibility for the optimization of dynamic graphic packaging design scheme.

1. Introduction

People accept external stimuli to obtain information and then process information to get the understanding, that is, after receiving stimuli, information is processed through the interaction of sensation, perception, and cognition to get consciousness and enhance memory. When people observe the product packaging, they use their eyes to examine and obtain the product information. Eye movement records can follow the eye movement data of human psychological activities in the process of observation, which can quantify and analyze the observed psychological activities, so as to guide the design and application of dynamic graphics in product packaging. In packaging design, first, dynamic graphics has functional value, design dynamic graphics can better convey product function and taking information; second, dynamic graphics has aesthetic value, make the product packaging has formal beauty; next, dynamic graphics has humanistic value, the detail design of dynamic graphics can reflect humanistic care. Dynamic graphics can help people overcome the barriers of language and age, you can immediately understand without learning, and dynamic graphics for human visual stimulation and memory are far more than words.

Through the eye movement experimental research of dynamic graphics in product packaging, combined with the particularity of the product and the needs of the user population, it explored the method of dynamic graphics design and application method, so that the product can play the treatment effect and improve the quality and efficiency in the process of visual communication. This is the embodiment of designers' humanistic care for user groups and the reference of innovative eye tracker research methods that makes this direction worthy of research.

The innovation of this article is that of:

(1) Through eye movement exploration, this paper analyzed the dynamic graphics design and application in product packaging. It reduced the fragments and invalid dynamic graphics in the product packaging to shorten the time of the whole process of product information processing, make the product information quickly obtained and easy to understand, and facilitate the behavior process of

using the product. (2) This paper studies from both theoretical and perceptual aspects and expands and innovates the design and application of dynamic graphics in product packaging. Eye movement methods and results research open new ideas for wider and in-depth product packaging dynamic graphics design and application research in the future and provide some practice samples and practice results as reference.

2. Related Work

Many scholars have provided a lot of references for research on graph neural networks, dynamic graphics, packaging design, and program optimization.

Hu et al. proposed an efficient motion style transfer method by using deep autoencoders and spatiotemporal feature constraints. The proposed method can generate a variety of different motion styles, and the transferred motion styles are visually natural and vivid [1].

Yang et al. proposed a package design with Kelvin drain-source connections to minimize blanking time. A low parasitic inductance package with double-sided cooling is proposed to achieve fast switching speed of SiC devices without sacrificing thermal performance [2].

Axelsson et al. proposed a method that utilizes a dynamically allocated frame of reference to provide the highest possible numerical precision for all salient objects in the scene graph [3].

Piao et al. described performance optimization methods for mobile graphics applications from two dimensions: graphics processing unit (GPU) performance and image quality. He provided an adaptive level of detail (LOD) configuration method for graphics applications through the OpenGL ES API level [4].

Kwon and Hodgins introduced a control system design method that can generate animations of various behaviors, including walking, running, and various gymnastic behaviors [5].

Magro et al. introduced Regular Grid Global Illumination (RegGGI), a distributed rendering pipeline. It eliminates response delays and provides cloud-based dynamic global illumination for low-power devices such as smartphones and a class of devices commonly used in wireless VR headsets [6].

Magnus and Bruckner presented a new approach for refracted volumetric lighting, including caustics capable of interactive frame rates. By interleaving light and observing light propagation, Magnus and Bruckner technique avoids memory-intensive storage of lighting information. It is fully dynamic, and all parameters such as light position and transfer function can be modified interactively without affecting performance [7].

Roussellet et al. introduced an animation method that increases anatomical plausibility while benefiting from the advantages of implicit skinning. Roussellet et al. proposed an efficient method to model muscle primitives with implicit surfaces [8].

Subramonyam and Adar introduced SmartCues, a library that supports on-demand details through dynamically computed overlays. Subramonyam and Adar demonstrates how SmartCues can be implemented in various visualization types and shows through laboratory studies that SmartCues can be used effectively by end users [9].

Chen et al. proposed and demonstrated the effectiveness of the exponential Rosenbrock-Euler (ERE) method, which avoids artificial damping that relies on discretization. This method is relatively inexpensive and works well for the large time steps used in computer graphics. It maintains correct qualitative behavior even in challenging environments involving nonconvex elastic properties [10].

Behrendt et al. proposed a combination of visualization, filtering, and interaction techniques for exploratory analysis of blood flow, focusing on the relationship between local surface parameters and underlying flow structures. Coherent pathway bundles can be interactively selected according to their relationship to vessel wall features and further refined according to their own hemodynamic characteristics [11].

Jang and Lee proposed a new framework. The framework consists of a two-stage regressor for finding correlations between body shape and landmark locations at both body part and global scales [12].

The data of these studies are not comprehensive, and the results are questionable, so they cannot be recognized by the public and thus popularized and applied.

3. Graph Neural Network

Graph neural network is a neural network model for graph structure data. The working principle is to transfer the corresponding information to the neighboring nodes in the iterative form of the recurrent neural architecture and learn the representation of the target nodes in this way until it tends to equilibrium and reaches a stable state. The disadvantage of the original graph neural network is the huge workload during the training process. To solve this problem, the original graph neural network has undergone a revolution. Inspired by convolutional neural networks, many techniques and methods for redefining the concept of convolution for graph data appear, and they are all included in the application scope of graph convolutional neural networks. Figure 1 shows 2 D convolution, and Figure 2 shows graph convolution.

Graph neural networks can be classified as graph convolutional networks, graph attention networks, graph self-encoders, graph generative networks, and graph spatio-temporal networks. The classification of the graph neural networks is shown in Figure 3.

The relationship between the individual classification of the graph neural networks is shown in Figure 4.

The algorithm used in this study is a graph convolutional network with the convolution operation.

$$\Omega_1 * \Omega_2 = \Phi\left(\left(\Phi^{\zeta}\Omega_1\right) \oplus \left(\Phi^{\zeta}\Omega_2\right)\right). \tag{1}$$

where Ω_1, Ω_2 are the signal on the node and Φ is the eigenvectors of the Laplacian matrix Γ.

Filter the signal:

$$\Omega' = \Phi \Xi \Phi^{\zeta} \Omega. \tag{2}$$

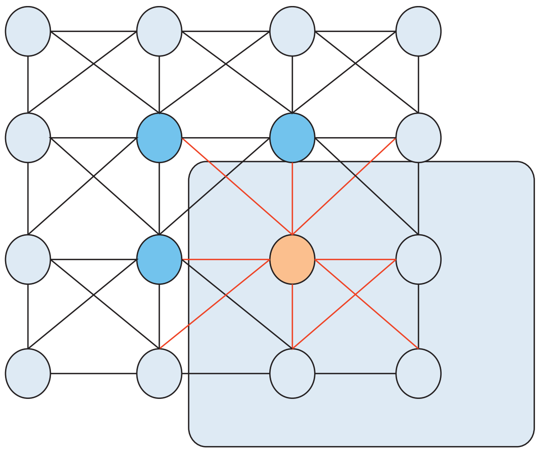

Figure 1: 2D convolution.

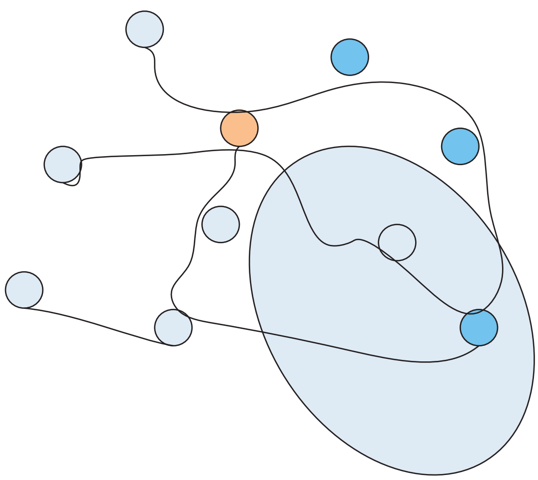

Figure 2: Graph convolution.

Convolutional layers are defined by applying different filters to different input and output signals:

$$\Omega_{\nu}^{\varepsilon+1} = \eta\left(\sum_{\mu=1}^{\delta_{\varepsilon}} \Phi \Xi_{\mu,\nu}^{\varepsilon} \Phi^{\zeta} \Omega_{\mu}^{\varepsilon}\right), \quad \nu = 1, \dots, \delta_{\varepsilon+1}, \tag{3}$$

where ε is the number of layers.

Polynomial filter:

$$\Xi(A) = \sum_{\varpi=0}^{\omega} \rho_{\varpi} A^{\varpi}, \tag{4}$$

where A is the eigenvalue of the Laplacian matrix and ω as polynomial order.

No feature decomposition is used:

$$\Xi(A) = \sum_{\varpi=0}^{\omega} \rho_{\varpi} \zeta_{\varpi}(\bar{A}). \tag{5}$$

$$\bar{A} = \frac{2A}{\theta_{\max}} - \vartheta. \tag{6}$$

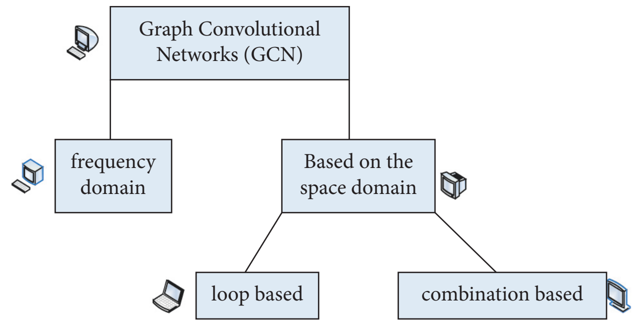

Figure 3: Classification of graph neural networks.

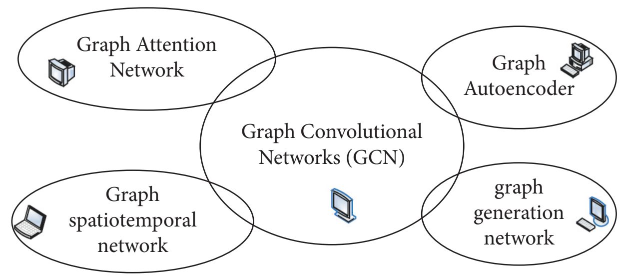

Figure 4: The relationship between the various categories of the graph neural network.

where $\overline{A}$ is the normalized eigenvalues, $\theta_{\max}$ is the largest eigenvalue, ϑ is for the degree matrix, and $\zeta_{\varpi}(\alpha)$ is a polynomial of order ϖ.

$$\Omega' = \sum_{\varpi=0}^{\omega} \rho_{\varpi} \bar{\Omega}_{\varpi}. \tag{7}$$

Among:

$$\bar{\Omega}_{\varpi} = \zeta_{\varpi}(\bar{\Gamma})\Omega. \tag{8}$$

$$\bar{\Gamma} = \frac{2\Gamma}{\theta_{\max}} - \vartheta. \tag{9}$$

$$\zeta_{\varpi}(\alpha) = 2\alpha\zeta_{\varpi-1}(\alpha) - \zeta_{\varpi-2}(\alpha). \tag{10}$$

$$\zeta_{0}(\alpha) = 1. \tag{11}$$

$$\zeta_{1}(\alpha) = \alpha. \tag{12}$$

That is

$$\bar{\Omega}_{\varpi} = 2\bar{\Gamma}\bar{\Omega}_{\varpi-1} - \bar{\Omega}_{\varpi-2}. \tag{13}$$

Among:

$$\bar{\Omega}_{0} = \Omega. \tag{14}$$

$$\bar{\Omega}_{1} = \bar{\Gamma}\Omega. \tag{15}$$

The attention network γ considers the effects of both nodes simultaneously:

$$\kappa_{\mu\nu} = \gamma\left(\psi\overrightarrow{\lambda_\mu}, \psi\overrightarrow{\lambda_\nu}\right), \tag{16}$$

where $\overrightarrow{\lambda_\mu}$, $\overrightarrow{\lambda_\nu}$ are the representation of nodes μ and nodes ν, respectively, and ψ is a projection matrix.

Normalized attention weights:

$$\beta_{\mu\nu} = \frac{\exp\left(\kappa_{\mu\nu}\right)}{\sum_{\varpi\in\mu}\exp\left(\kappa_{\mu\nu}\right)}. \tag{17}$$

Full picture attention:

$$\beta_{\mu\nu} = \frac{\overrightarrow{\gamma^{\zeta}}\left[\psi\overrightarrow{\lambda_\mu}||\psi\overrightarrow{\lambda_\nu}\right]}{\sum_{\varpi\in\mu}\overrightarrow{\gamma^{\zeta}}\left[\psi\overrightarrow{\lambda_\mu}||\psi\overrightarrow{\lambda_\nu}\right]}. \tag{18}$$

$$\overrightarrow{\lambda'_\mu} = \sum_{\nu\in\mu}\beta_{\mu\nu}\psi\overrightarrow{\lambda_\nu}. \tag{19}$$

Output Results:

$$\overrightarrow{\lambda'_\mu} =_{\varpi=1}^{\omega} \sum_{\nu\in\mu}\beta^{\varpi}_{\mu\nu}\psi^{\varpi}\overrightarrow{\lambda_\nu}. \tag{20}$$

The research uses graph neural network to learn various dynamic graphic packaging design schemes and optimizes the packaging design schemes according to the weights of various factors in these schemes.

4. Application of Graph Neural Network in Dynamic Graphic Packaging Design

Dynamic graphics can not only convey information but also express thinking and ideas in visual design. As one of the important visual languages, dynamic graphics is a form of visual communication and a more direct and accurate communication medium in the process of visual communication. With the development of product economy, the application of dynamic graphics in product packaging makes the promotion function of packaging more played. In the process of constantly improving the function, structure, and environmental protection of packaging design, the visual communication of packaging is also constantly pursuing the humanized development. Product packaging is the composition of product function and value, and dynamic graphic design is one of the important elements of product packaging [13, 14].

Dynamic graphics cannot convey product information incorrectly, and the efficacy of the product can not be exaggerated. Therefore, there are many special requirements in the dynamic graphics design. The effective transmission of dynamic graphics to product information is reflected in the following three aspects (Figure 5):

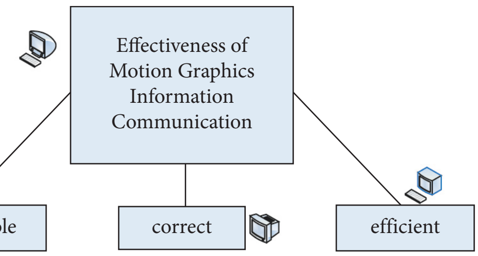

Figure 5: Dynamic graphics effectively convey product information.

4.1. Correct. The correct transmission of product information by dynamic graphics is the primary factor of effectiveness, which reflects the professional and rigorous characteristics of product packaging design. Only in the process of dynamic graphics design to select the right dynamic graphics for artistic processing and correctly convey the product related information, this design is the right design.

4.2. Efficient. The efficiency of information transmission is one of the important manifestations of the effectiveness of dynamic graphics on product information transmission. Its function is reflected in the correct expression of product information by dynamic graphics, whether the transmission speed of the product information is quickly received. The high efficiency of the dynamic graphics to the product information transmission can be specifically evaluated by the first-view time of the dynamic graphics in the product packaging.

4.3. Comfort. The effective transmission of dynamic graphics to product information requires that dynamic graphics be received in a pleasing form, that is, the content, form and color of dynamic graphics must conform to the visual aesthetic. Appropriate dynamic graphics being conveyed in a pleasing form can increase the viewing time of the product packaging and promote the effective transmission of product information.

In the dynamic graphic design of product packaging, we must first investigate the product, such as product attributes, functions, use methods, precautions, and other comprehensive analysis. Second, according to the dynamic graphics design method, dig out the excitation points available for the design conception, capture the clues, repeatedly deliberate, ponder, and gradually brew and mature. Objective and scientific design process is possible to produce reasonable and valuable design. Third, the particularity of products requires designers to understand the product packaging standards and design principles, and the product packaging should be strictly in accordance with the standard requirements. At the completion of the design, eye movement experiment can also be used to test the design dynamic graphics and evaluate the design scheme. Therefore, the specific process of dynamic graphic design in product packaging is as follows:

(1) Preparation before design: preliminary research: the research work before the design should first make clear the design purpose, and the dynamic graphics design is above the square inch, so it is impossible to

cover everything. The design purpose affects the value embodiment of dynamic graphics in the packaging and determines the functional, decorative, humanistic, and brand design tendency of dynamic graphics in the product packaging. Research and analysis include two aspects.

Grasp the design influencing factors: the dynamic graphics design influencing factors in the product packaging include the product category characteristics segmentation, listed group characteristics of the main users, other visual elements in the product packaging, and packaging costs.

(2) Dynamic graphics design process: refining the design and application method: according to the particularity of products and the characteristics of the user group analysis, get the most suitable dynamic graphics content and form design direction. In the application of the design of dynamic graphics, the hierarchical relationship of dynamic graphics is the scientific method to make the reasonable application of the design of dynamic graphics.

Design sketch: sketch is the first stage of the creative process and one of the ways to show their abilities. Experienced designers will sketch out the creative ideas, and then deeply conceive, deliberate, try, and solve problems. Sketching of the scheme is a necessary process to get accurate design results. Without repeated modification and attempt of the sketch, the cost of trial and error will be very high.

Standardized drawing: hand-drawn drawing can produce a better plan, usually called the first draft. The first draft is standardized because it reflects the designer's professionalism and accurate results.

(3) Design results test: the eye tracker is introduced as the research method of dynamic graph design in the product packaging and the first viewing time, viewing time, and backviewing times and time can be seen from the analysis of eye movement dynamic graph data. Through the optimal design of dynamic graphics, the efficiency of product information can be improved and reduce visual fatigue. That is to analyze the role of dynamic graphics in product packaging from eye movement theory and scientifically quantify the evaluation of dynamic graphics design effect in product packaging from eye movement.

The dynamic graphics design in product packaging can be summarized as the content, form, color, and texture design of dynamic graphics. From these aspects, the design of dynamic graphics can be reasonably executed step by step.

4.3.1. Design of the Dynamic Graphics Content. The design of dynamic graphic content is the graphic expression of the concept, in order to improve the language ability of dynamic graphics. The specific and feasible design methods are

(1) Symbol of Dynamic Graphic Design. The design of symbolic dynamic graphics is to use association, symbol, replacement techniques so that the recipient can see at a glance. Through the existing experience, it can directly cause association and quickly transform into cognition, which can easily understand the meaning of dynamic graphics. Symbolic dynamic graphic design is the visual expression of concrete concepts. Specific design method can be divided into expression of single concept dynamic graph and expression of corresponding concept dynamic graph. In the expression of a single concept, its conceptual object is positive, clear, and fixed; the expression of the corresponding concept is the corresponding information in the process of comparison, and its conceptual object is symbolic and not unique. It can also be a kind of visual dynamic graphics of feeling, to achieve the consistent interval with the user's feeling and to produce resonance to highlight the effect of the product. The corresponding concept dynamic graph can also use the psychological phenomena of interactions between various senses to exert the stimulating effect of one sense to trigger another.

(2) Dynamic Graphic Symbol Design. The dynamic graphic symbol in product packaging refers to the symbolic dynamic graphic with conveying transmission as the main function. The simplified, endowed, and general design techniques make the dynamic graphic form easy to understand and easy to distinguish and have general knowledge in the same cultural background. The universal symbol of internationalization spans the limitations of space and time and geography. It enables people of different ages and social backgrounds to quickly accept its pointing significance. In the product packaging, the dynamic graphics symbol design can be divided into indication dynamic graphics and symbol dynamic graphics. Dynamic graphic symbols can also guide the user in the product packaging, indicating the opening and closing mode of special packaging. In today's aging society, for the elderly with weak physical and cognitive abilities, dynamic graphic symbols are relatively effective communication tools.

(3) Abstract Dynamic Graphics Design. Abstract dynamic graphics in product packaging is the use of points, lines, surfaces, and their combination of methods to guide users' imagination and feelings. Abstract dynamic graphics are also verbal. For example, the size and density of the points, the shape of the line, the surface, the space, and the trajectory and composition of the combined dynamic graphics convey the rhythm, and the rhythm indicates a certain feeling. The integrity and ductility design of abstract dynamic graphics can also be used in the packaging of series products, so that dynamic graphics in independent packaging and can form new, smooth, and aesthetic dynamic graphics in the combination and stitching of

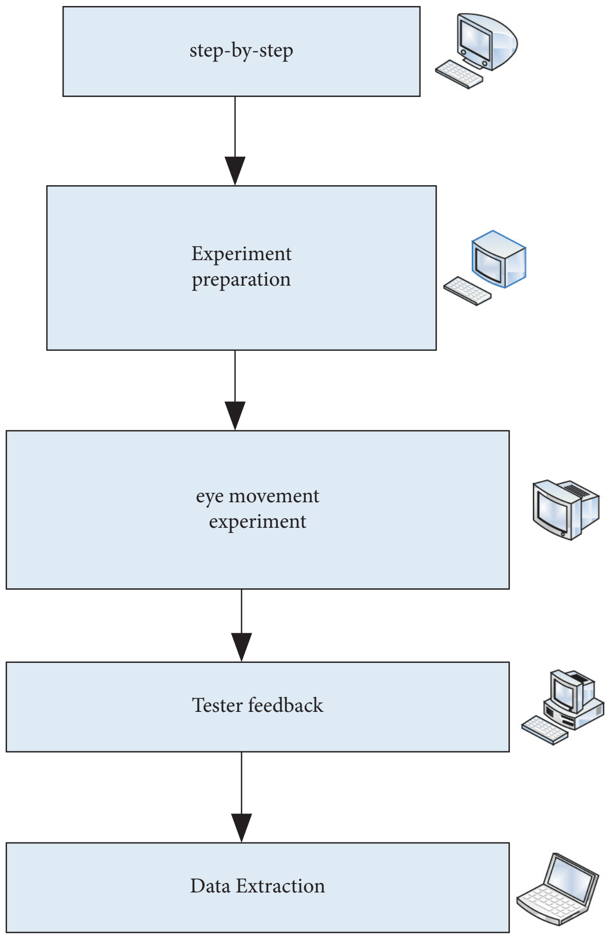

Figure 6: Test flow.

series packaging. The integrity and ductility of abstract dynamic graphic design are mutually supporting and corresponding, which is a design method flexibly used according to the needs of products. It will also produce some creative points and infect people in details. The ductility of the series of dynamic graphics also largely represents the improvement of the coordination degree of modern packaging creative design and packaging printing process, which is the embodiment of the progress of the packaging industry. Abstract dynamic graphics are free and rich and can play in product packaging design.

(4) Design in the Dynamic Graphics Form. Product packaging dynamic graphics form can be divided into perceptual dynamic graphics and rational dynamic graphics for detailed design, following the law of formal beauty. The design of perceptual dynamic graphics can be expressed through the rhythm and rhythm of dynamic graphics, using the virtual and real and density, change and unity, gradient, and deliberate formal construction methods. Rational dynamic graphics can scale and scale of the formal construction methods, such as whole and local, symmetry, and equilibrium.

(5) Dynamic Graphic Color Design. The most important color aspect of daily life may be the most ambiguous and variable aspect. It involves both aesthetic and psychological responses to color. Factors such as age, mental health, and mood can affect the colors we see. Symbols with strong emotional connotations can affect color perception, the psychological perception of color is subjective, and only general comments on its characteristics and uses are proposed.

Dynamic graphic design color selection in product packaging can be designed from two directions: dynamic graphic color design should be coordinated with product attributes to make the product category clear at a glance and consider suitable color scheme for target groups to help designers better choose or not using specific colors.

The optimization of dynamic graphic packaging design scheme is to train and learn many packaging design schemes through a graph neural network and finally form an automatic network. And that only need to input the designed packaging design scheme into the network, the network will automatically optimize the scheme according to the learning results, and output the optimized scheme.

5. Simulation Experiment of Dynamic Graphic Packaging Design

5.1. Experimental Sample. I purchased nine different packages of a certain product. Then the outer box of the product is expanded and scanned, and the picture is set with the PS tool to match the picture size of the eye moving host (and the picture and text content are clearly visible) as the experimental sample.

5.2. Subjects. Testers were randomly searched in the campus, and 22 testers of different ages and subject backgrounds were selected, including 10 males and 12 women.

5.3. Experimental Instrument. The Tobii eye-tracking system was used in this experiment. Connect the eye monitor to the main test machine, and then connect the main and subject machines. The main machine was loaded with Tobii Studio software to edit the experimental procedures and steps, record and store the eye movement data, and briefly process the experimental data. For the sample used for presenting the subject experiment, combined with the eye movement experiment, the types and characteristics of dynamic graphics in the product packaging are tested by eye-tracking technology, and the design and application of dynamic graphics are compared and evaluated.

5.4. Experimental Programming. Use Tobii Studio software to conduct experiments. First, ten experimental samples are imported into the test interface, and then the attributes of the control are modified: the experimental name, subject number, test duration of each sample, press the space bar to

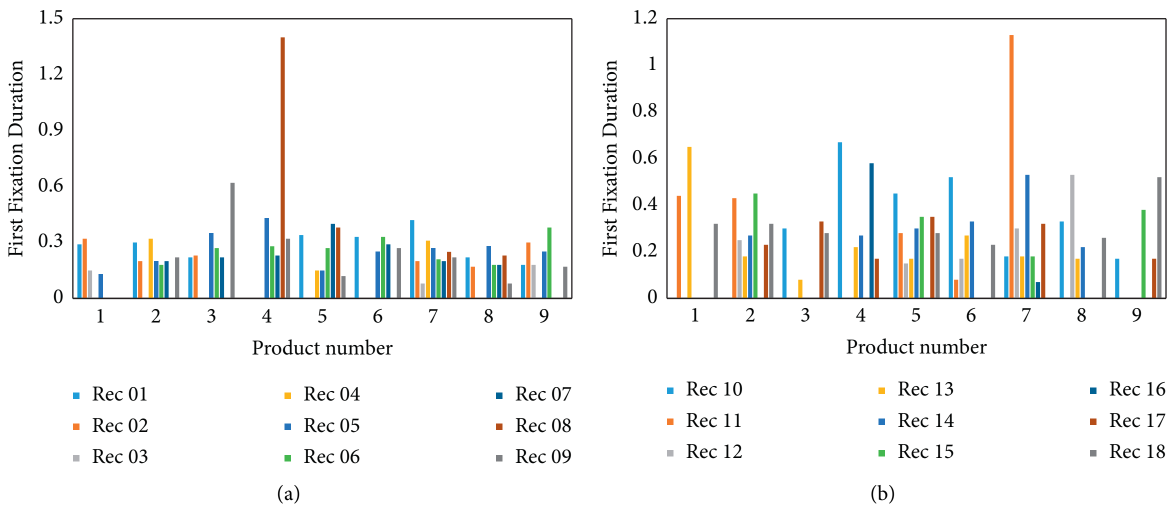

Figure 7: Statistical results of the first-view duration in the dynamic graphics area.

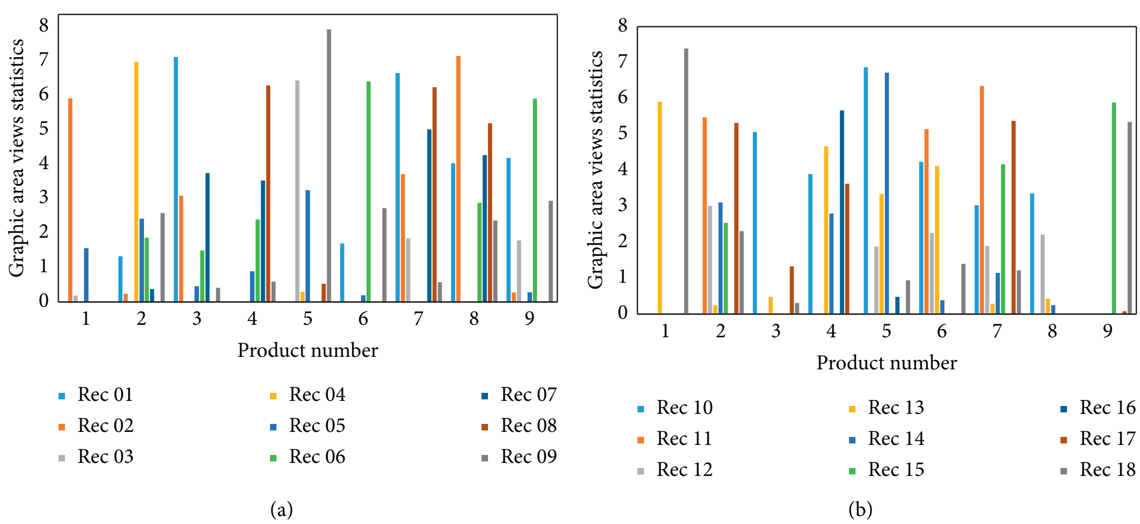

Figure 8: Statistics results of the first-view time in the dynamic graphics area.

enter the next sample in advance, etc., to realize the specific requirements of experimental operation.

The test process (Figure 6) is as follows:

Step guide: inform the tester that the sample is the product packaging plan, each picture is set to 8 seconds, then free observation, no blank page is set in the middle of the picture. If you feel no obvious fixation point in the sample picture, press the space bar to enter the next one early.

Experimental preparation: before the eye movement test, the tester must complete the three steps of eye calibration verification, eye calibration verification, and eye calibration verification in order. The first step is the eye calibration validation (calibrate), confirm the tester stable gaze on the sample, the second step is the eye calibration (validate), let the tester under the guidance of the main screen, eyeball as the main machine random nine points follow move, eye tracker record and set program, when the average error is less than 0.5% is calibrated, the data are accepted. A third step eyeball calibration validation (calibrate) was followed to reconfirm the stabilization of fixation.

Eye movement experiment: after confirming that the error of eye calibration and calibration verification reaches the acceptable range, you will officially enter the experiment. Test is each picture sample presented for 8 seconds.

Feedback on the experimental picture: after each tester completes the eye movement experiment, that is, the tester should recall the seen picture information, and interview the information of the dynamic graphics separately, to record the memory degree of the tester to the sample pictures.

Data extraction: screen the eye movement data, remove the data with too large visual field drift and visual field loss, and finally leave 18 valid experimental records.

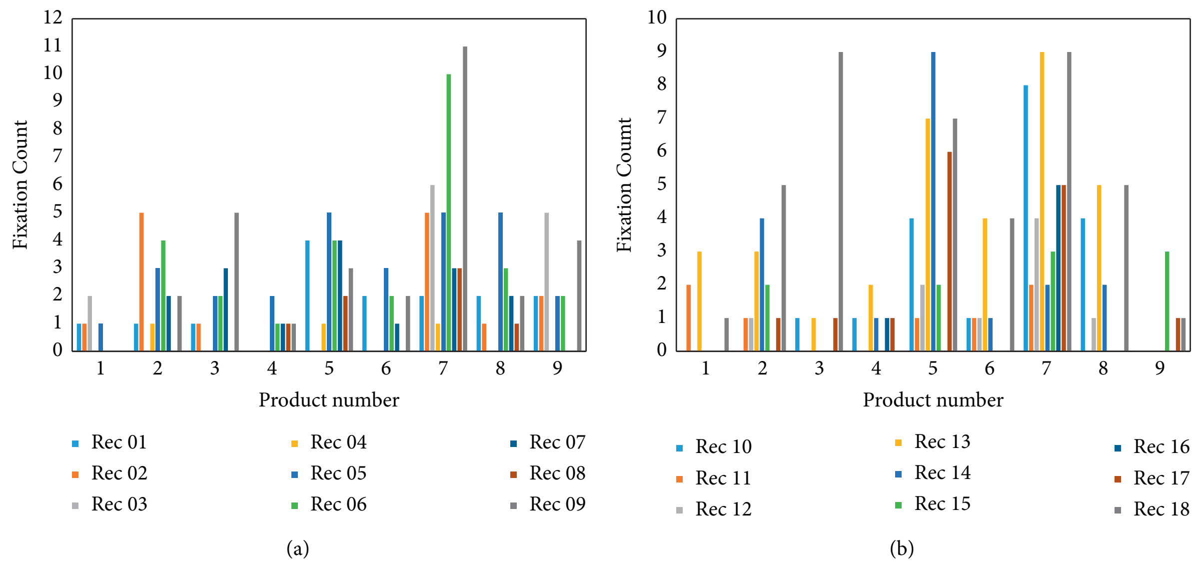

Figure 9: Statistical results of views in motion graphics area.

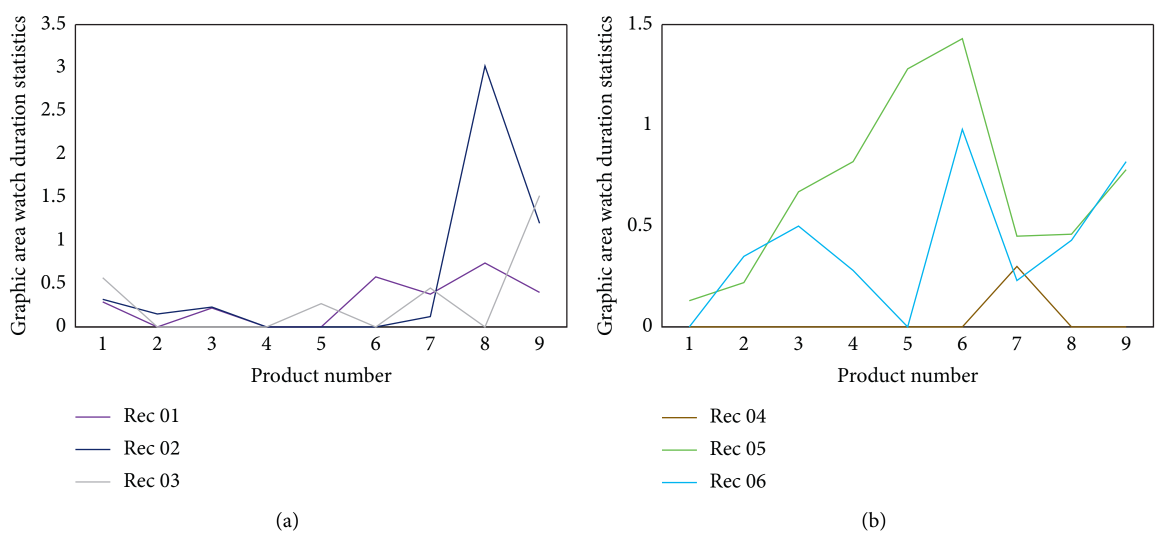

Figure 10: Statistical results of viewing duration in the dynamic graphics area.

Data analysis of the experimental eye movement time: data on the first viewing time, viewing time, viewing times and total viewing time of the dynamic graph area. The shorter the first viewing time, the earlier the tester noticed the area. The longer a single viewing indicates, the higher is the attention of the region. The more times of viewing during the test, the longer the more attention turned back from other areas, the longer the duration, the more interest. The results of the first-view duration statistics of the dynamic graph region are shown in Figure 7.

Figure 7 shows the user' longest first view of product 7, which shows that product 7 is most attracted to the attention of the user. In addition, the data in record 8 indicate that the product is also a potential product to attract the user attention.

The results of the first-view time statistics of the dynamic graph region are shown in Figure 8.

Figure 8 shows that the product 5 has the longest first-view time of 8.06 s. Although this has only appeared once, the first time is far beyond the first time of other products, which fully shows that the packaging design of product 5 has certain advantages.

The statistics of dynamic graphics areas are shown in Figure 9.

Figure 9 shows that the number of views in the packaging design area of product 7 is far ahead of other products, but the number of views of product 1 is far more frequent than other products, which indirectly indicates that the packaging design of product 1 needs to be improved.

The results of the viewing duration statistics of the dynamic graph areas are shown in Figure 10.

Table 1: Statistical results of viewing duration in the dynamic graphics area.

	4	7	8
Rec 07	0.15	0.28	0.58
Rec 08	1.3	1.04	0.27
Rec 09	0.41	2.15	0.31

Table 2: Statistical results of viewing duration in the dynamic graphics area.

	6	7	8
Rec 10	0.48	0.32	0.67
Rec 11	0.08	1.58	0.33
Rec 12	0.22	1.79	0.53

Figure 10 shows that although data records are recorded for the viewing duration of the first six dynamic graphics areas of product 7. But overall, the total viewing duration of the first six dynamic graphics areas of product 8 is the longest. This indicates that some of the dynamic graphics packaging design of product 8 is more popular, while all of the dynamic graphics packaging design of product 7 is very concerned.

The results of the other 12 groups are shown in Tables 1–5.

The data in Tables 1–5 show that the dynamic graphic packaging design of product 2 received the least attention. In addition, except for the longest dynamic graphics area viewing duration in product 7, the dynamic graphics area viewing duration of other products is relatively close, which also shows that the dynamic graphics packaging design of these products is still desirable.

Dynamic graphics are an important visual element in product packaging. The information quantity of dynamic graphics and the form and color of dynamic graphics will affect people's viewing and viewing behavior. The purposeful design of dynamic graphics is conducive to the identification of product properties and makes the viewpoint of the tester present regularity.

The trajectory and time of the dynamic graphic viewing can be used as a reference for the optimized design. The first viewing time, viewing time, and backviewing time of the dynamic graphics area are the quantitative data of the dynamic graphic design test of the product packaging. In the actual design process, we can intentionally control the first viewing time and viewing time of dynamic graphics, rationally and scientifically optimize the dynamic graphics design in product packaging, improve the efficiency of product information transmission, and reduce useless design. This can reduce people's visual fatigue, make the visual viewing process more smooth, reduce the obstacles of visual recognition of the product, and even unconsciously make the viewer's mood more comfortable.

The first viewing time and viewing time of the dynamic graphics in the product packaging can be reflected in whether the product is easy to find in the viewing of the general query mode, but it is not equivalent to the guiding cognition and use of the product. Therefore, the acceptance characteristics of the target population should also be taken into account.

Table 3: Statistical results of viewing duration in the dynamic graphics area.

	6	7	8
Rec 13	1.02	1.41	1.12
Rec 14	0.29	0.64	1.54
Rec 15	0.07	0.43	0.08

Table 4: Statistical results of viewing duration in the dynamic graphics area.

	2	3	4
Rec 16	0.34	0.09	0.62
Rec 17	0.1	0.43	0.22
Rec 18	0.44	3.34	0.12

Table 5: Statistical results of viewing duration in the dynamic graphics area.

	5	6	7
Rec 16	0.51	0.08	0.23
Rec 17	0.81	0.07	0.29
Rec 18	1.23	1.45	0.73

6. Discussion

A graph neural network is a connectionist model that captures graph dependencies through message passing between graph nodes. Unlike standard neural networks, graph neural networks retain a state that can represent information from its neighbors of arbitrary depth.

In general, the reason for the difference in viewing time comes from the individual characteristics of the tester, which is related to the individual's ability and way to process information. On the one hand, the design and application method of product packaging dynamic graphics can guide the rational and objective design of dynamic graphics according to the scientific nature of eye movement theory. On the other hand, eye movement information can subtly reflect the process and rules of information extraction and selection, express the brain collection and screening of specific groups, explore the preferences and needs of the test population, and guide the design of dynamic graphics in product packaging.

The design of dynamic graphics in product packaging is to make dynamic graphics in the identification, use, and memory of the product. The tester's eye movement following of dynamic graphics can quantify the rationality of dynamic graph design, and the eye movement experiment of dynamic graphics in product packaging can scientifically analyze the problems existing in dynamic graphics design in product packaging, and put forward specific optimization goals. The experimental sample used in this experiment is small, and it is recommended to expand the experimental size so that the experiment will not be subject to chance.

7. Conclusion

This paper sorts out the theory of dynamic graphics, eye movement, and product packaging and proposes that the process of watching dynamic graphics is a process of vision from "transmission" to "reaching." That is, the process of the eye communicating the dynamic figure to the nerve center and the specific behavior of the dynamic graph can be quantified by tracking the movement of the eye. Based on the acceptance of dynamic graphics, this paper summarizes the value of dynamic graphics in product packaging in detail and analyzes the factors of product characteristics, user needs, and the influence of dynamic graphics design in product packaging. Based on the value and influencing factors of dynamic graphic design in product packaging, dynamic graphic designed programming. According to the basic method of dynamic graphics design and product particularity, this paper analyzes the content, form, and color of dynamic graphics in product packaging. In addition, it proposes the hierarchical application method of dynamic graphics elements and the evaluation of product packaging dynamic graphics based on eye movement experiment. However, the number of samples learned through the graph neural network is too small, so increasing the number of training samples makes the experimental conclusions more explanatory.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest.

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