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The Evolution of the Morphological Design of Plant and Animal Patterns in the Development of Corporate Brand Identity in the Art of Painting

Yutong Wang^{1*}

Abstract

This paper first clarifies the design process of corporate brand image development and utilizes BP neural network to derive the relationship between brand styling and morphological imagery of animal and plant patterns. By setting the network parameters, the brand perceptual imagery design is predicted. Then, combined with topology theory, the feature similarity between brand image and animal and plant ontology is calculated to form a topological similarity evaluation knot. Finally, the morphological matching degree is calculated based on the utilization of discrete points to represent the shape contour. The topological similarity of the brand image of the painting art enterprise after design is 7.8, and the cognitive coupling degree with the enterprise features are all above 0.7. The morphological design of animal and plant patterns improves the connotation and implication of corporate brand image development.

Keywords: BP neural network, topology theory, brand image development, flora and fauna patterns, morphological matching

Introduction

The invention of multimedia technology provides more possibilities for information communication, and traditional flat printing and solid visual information are gradually replaced by diversified media information and moving images (Adham et al., 2022). Logo, as an important visual symbol for information communication, is not only the core part of interpreting brand image design, but also an important link between the brand and the target group for two-way communication (Long, Tang, Wang, & Yu, 2021; Shi, 2017; Yuan, Lotto, & Oh, 2019). The image of the brand is related to the image of the whole enterprise, and this relationship is even more obvious in the painting art industry. Internationally famous brands, none of which do not pay attention to their own brand image, are in the image of the design up and down a great deal of effort, which is also an important factor in the brand to do enduring (Jianqing, 2021; Shiva, 2021). However, contemporary logo design in terms of its form, the shape often collects a variety of elements, the pursuit of stability and completeness, and in the connotation of the shape of the polysemous nature is often pursued. This kind of logo not only weakens the visual impact of the logo itself, but also fails to convey the core concept of the enterprise due to too many elements (J. Han, Jun, Kim, & Key, 2018; Huang, Gao, & Hsu, 2019; Oo, Jung, & Lee, 2021). Moreover, enterprises are more satisfied with the status quo of their own brand visual image, which is a worrying situation. Corporate brands tend to think that their corporate image has entered a stable period, and do not need to greatly innovate and disseminate, which harms the brand's emotions of consumers who have been innovating for a new generation (Boni, 2021). (MOUSAVI-SABET, AMOUEI, SALEHI, SALEHI-FARSANI, & HEIDARI, 2019) Nowadays is a leap of innovation period, if the brand image elements have been continued to be obsolete, and the lack of innovation consciousness, is bound to be invisible to slow down the development of corporate brand. Therefore, in the development of corporate brand in the road into the fresh blood has become the scope of today's business concerns (Hong & Yue-Jun, 2021; Hung, Lin, & Wu, 2021; Meisner & Ledbetter, 2022; Thondhlana, Chitima, & Chirikure, 2021).

In this paper, in the brand image development of painting art enterprises, the morphological design of

¹ Krirk University International Academy Doctor of fine Arts Program in Artistics, Bangkok, 10220, Thailand. **Email:** bankokwyt@126.com

animal and plant patterns is integrated. Firstly, BP neural network is used to carry out imagery analysis on the morphology, color and aesthetics of animal and plant pattern features, and from the design perspective, to determine the pattern material that matches the characteristics of various aspects of the brand of the painting art enterprise. Then, according to the topological theory, the feature similarity between the painting art enterprise brand image and the animal and plant tattoo ontology is calculated, and the topological similarity evaluation structure is formed. On this basis, the outline similarity is calculated by combining the discrete points, and the evolutionary mechanism is constructed to retain the characteristics of the biological ontology at the relative quantitative level. Finally, in the practical analysis, the reasonableness of the method of this paper is verified by the topological similarity analysis and brand effect analysis, which proves that the morphological design of plant and animal tattoos enhances the visibility of the corporate image, and can bring great social benefits and potential cooperation opportunities to enterprises (Al-Maqrashi, Al-Musalhi, Elmojtaba, & Al-Salti, 2023).

Literature Review

Fahmi, A et al. (Fahmi, Ulengin, & Kahraman, 2017) used adaptive neuro-fuzzy inference system and artificial neural network to predict the awareness of corporate brand image. Adaptive neuro-fuzzy inference system given input data creates fuzzy rules and trains the neural network. This training ability predicts the outputs of advertisement awareness. It also predicts the advertisements of brand image prior to its release and calculates the correlation between the actual data and the prediction to check the accuracy of the predicted outputs. Han, L et al. (L. Han & Han, 2021) combined with the perspective of visual recognition design to construct an intelligent system for visual recognition of brand image by utilizing the knowledge related to fuzzy theory, and laid the foundation for the application in the design of the system by collecting a large amount of information as well as the related theoretical concepts to incorporate the fuzzy reach-in network in the design of the intelligent system. The designed intelligent recognition system was tested through specific cases in the practical design. The results show that the accuracy rate is 96.08%. Among them, color recognition has the highest accuracy rate. Wang, M. (Wang, 2017) Using multimedia technology, combining the elements of poetry and painting with brand design, through the abstraction of the elements, the overall image can be abstracted to create a new art product. At the same time, the traditional elements are integrated into the design of more products. And combining with some images to give them richer aesthetic connotation can help designers to improve the design process and artistic ability of products.

Jin, X. et al. (Jin, 2017) proposed a competitive analysis of corporate brand image based on the evaluation model and combining with the real conditions, starting from the three aspects of corporate conceptual identity, corporate visual identity and corporate behavioral identity, respectively, focusing on the combination of corporate general characteristics and individual culture, following the principle of unity, and emphasizing the ecological concept of public welfare, so as to further strengthen the brand image of the enterprise. It can effectively promote the shaping of corporate brand image and provide valuable references for brand building. Lourdes, G et al. (Vélez-Bermello, 2019) designed a proposal for city branding from the perspective of symbolic communication, using different research methods and techniques. The investigation helps to understand which are the representative icons of the city, the color and shape characteristics of the city, so as to energize city branding based on the design of the city branding, which will be communication, advertising, marketing and other aspects interconnected. It plays an important role as a reference for the process of creating brand concepts. Chen, G. et al. (Chen & Yan, 2017) introduced the development of brand APP and focused on the design of brand APP through the Internet and utilized the communication form of APP for brand image marketing. Combined with the survival status quo of Internet APP, the brand APP design under the background of mobile Internet is improved, which brings new development opportunities for brand communication and brand marketing and achieves good communication effect.

Constructing corporate brand image development and design model based on animal and plant pattern forms

Brand Modeling

Corporate culture and corporate products need to be shown to the public through simple and easy to understand but rich in connotation of the brand pattern, which is the first step in the formation of a

complete visual system image system. Flora and fauna patterns are one of the most important parts of traditional decorative patterns, which can be divided into patterns developed by copying specific creatures and patterns generated by people's imagination, reflecting people's aesthetic consciousness. In the design of the development of corporate brand image in the art of painting, through the observation and comprehension of the brilliant and colorful forms of animal and plant pattern motifs, the aesthetic laws of natural art are discovered, which greatly expands the free space of art (Lee & Lee, 2017; Li, 2020; Zhou, 2020). Based on this, this paper constructs a model of corporate brand image development and design, extracts the basic elements of its shape from traditional patterns, and then reconstructs and combines these extracted elements according to the laws of beauty and modern expression, derives new forms, and applies them in the design of products (Chan et al., 2020).

Figure 1 shows the design process of corporate brand image development. When determining the animal and plant patterns, in addition to fully understanding the design requirements and design objectives, it is also necessary to research and analyze the regional culture of the bionic object, the brand culture, and the target group, etc., and to use the information collected as a reference basis for selecting the animal and plant pattern prototypes. Then respectively with the brand form for analogy, association, deduction, in order to ultimately determine with the painting art enterprise brand characteristics of all aspects of the pattern material. After determining the refining mode, from the design point of view, the four aspects of animal and plant pattern characteristics of form, color, beauty, imagery for biomimicry, to explore from the whole, in order to achieve formal harmony and unity to avoid one-sided approach to the design of thinking brought about by a lack of holistic problems, and strive to use the simplest geometric features of the lines of the pattern prototype of the complexity of the features of the manifestation.

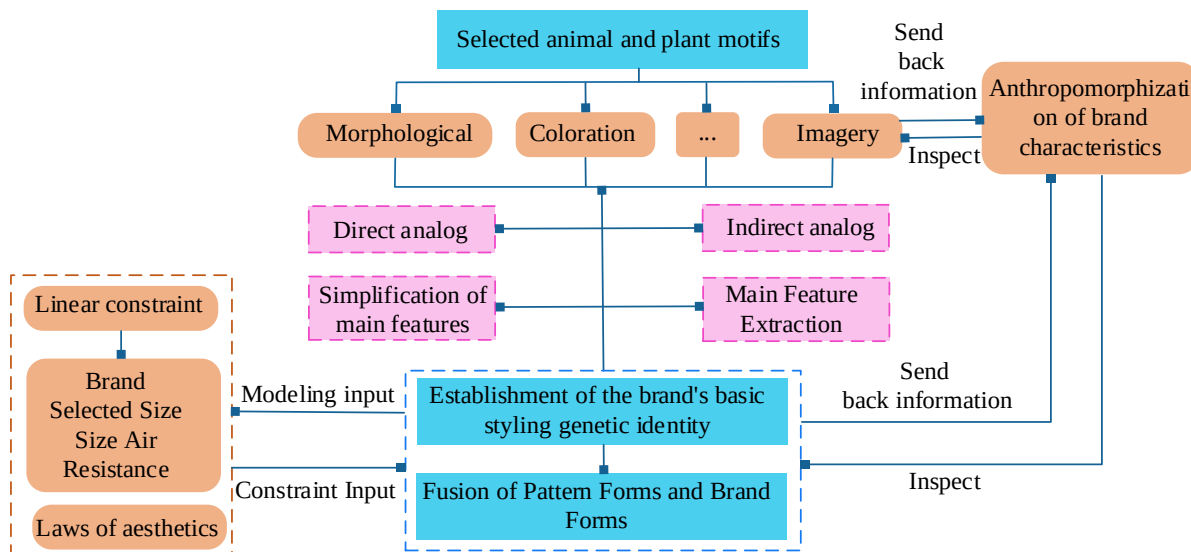


Figure 1: Design process of corporate brand image development

In the brand image development and design of the painting art enterprise, the elements of animal and plant patterns are integrated, and the language of plane composition is combined to recreate the brand image development. Analyze the patterns on the basis of understanding the elements of animal and plant patterns, discard the redundant details, and keep the unique patterns with profound cultural connotations and representativeness for re-creation. It breaks up and reorganizes between figurative and abstract, complex and simple, and meets the modern people's aesthetic pursuit of brand image design with simplicity and not simplicity. The public will pay attention to the products and culture of the enterprise after getting trust in visual response, and will contact the products or business of the enterprise while agreeing with the aesthetics and values of the enterprise, which provides a good opportunity for the long-term development of the enterprise.

Brand modeling imagery

In product styling design, product styling is combined with product imagery and product user satisfaction, and with the help of perceptual engineering, quantitative theory and other methods, artificial neural networks are used for training and prediction, so as to derive the relationship between product styling and

product imagery. In this paper, the relationship between perceptual vocabulary and physical elements of product styling is established through BP neural network, and the settings of BP neural network parameters are used to predict product perceptual imagery design.

Figure 2 shows the BP neural network prediction structure, which consists of an input layer, an implicit layer, and an output layer. The nodes of the implied layer are generally composed of type S activation functions, and the nodes of the out layer are generally linear functions. The connection weight between the j nd node of the implied layer and the i rd node of the input layer is W_{ji} ($i = 1, 2, \dots, n_1; j = 1, 2, \dots, n_2$). The connection weight between the k th node of the output layer and the j th node of the implied layer is W_{kj} ($j = 1, 2, \dots, n_2; k = 1, 2, \dots, n_3$).

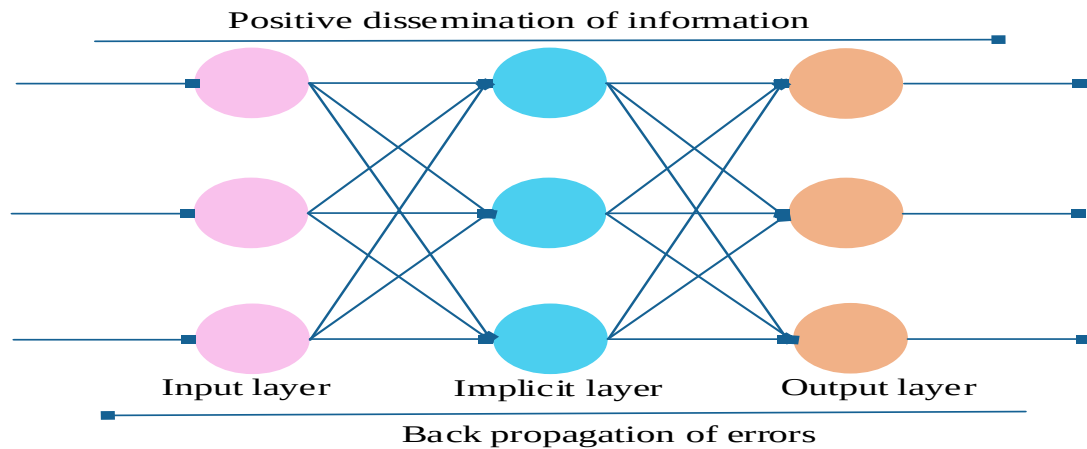


Figure 2: BP neural network prediction structure

Assume that the BP neural network has N node per layer, a nonlinear activation function of $f(x) = 1/(1 + e^{-x})$, and that the prediction set consists of M sample patterns (X_p, Y_p) . For the P th product sample $P = 1, 2, \dots, M$, the sum of the inputs to node j is denoted as net_{pj} and the output is denoted as O_{pj} . Then:

$$net_{pj} = \sum_{j=0}^N W_{ji} O_{pj} \quad (1)$$

$$O_{pj} = f(net_{pj}) \quad (2)$$

As a result the initial weights of the network are set arbitrarily, then for each input sample P , the error between the network output and the desired output d_{pj} is:

$$E = \sum E_p = (d_{pj} - O_{pj})^2 / 2 \quad (3)$$

The weight correction formula for the BP network is:

$$W_{pj} = \left[\frac{f(net_{pj})(d_{pj} - O_{pj})}{f(net_{pj}) \sum_k W_{pk} W_{kj}} \right] \quad (4)$$

In the above equation, the prediction rate Z is introduced to speed up the convergence of the network. Usually an inertia parameter a is also added to the weight correction equation, i.e:

$$W_{ji} = W_{ji}(t) + ZW_{pj}O_{pj} + a(W_{ji}(t) - W_{ji}(t-1)) \quad (5)$$

where a is a constant term that determines the effect of the previous weights on the current weights. When W_{ji} is far from the stabilization point, Z takes a larger value. And when it approaches the stabilization point, Z takes a smaller value. The relationship between the imagery vocabulary and the physical elements of the product is established using BP neural network, and the relationship between the design elements, the product image and the shape generation is constructed.

Flora and fauna pattern form design

Feature recognition

In order to better control the brand morphology bionic design at a quantitative level, this paper utilizes the topology theory to design the evolution of the brand's flora and fauna pattern morphology. From the perspective of human cognition, the feature similarity between the brand image of the painting art enterprise and the animal and plant pattern ontology is calculated to form a topological similarity evaluation structure. Then the contour similarity is calculated by combining discrete points to construct an evolutionary mechanism that preserves the characteristics of the biological ontology at a relatively quantitative level.

Figure 3 shows the topology of morphological features of plant and animal tattoos, and the layers of the topology are sorted according to the stability of morphological features of plant and animal objects in cognition, with the first level being the overall organization of F , i.e., the archetypal plant and animal forms, which are grasped by the audience's perception. The second level is the salient feature structure, i.e., the local feature structure of plant and animal patterns that is easy to establish morphological cognition, the third level is the main topological structure of plant and animal phyla A_n , and the fourth level is the secondary feature structure of plant and animal patterns B_n , which represents the local feature of each topological structure as a whole, and has its own morphological features compared with the same universally cognizable benchmark organisms. The fifth level is the tertiary feature structure C_n , which represents the detailed features that characterize the morphology of the plant and animal pattern in comparison with the benchmark organisms of the same family (Röst & Sadeghimanesh, 2021).

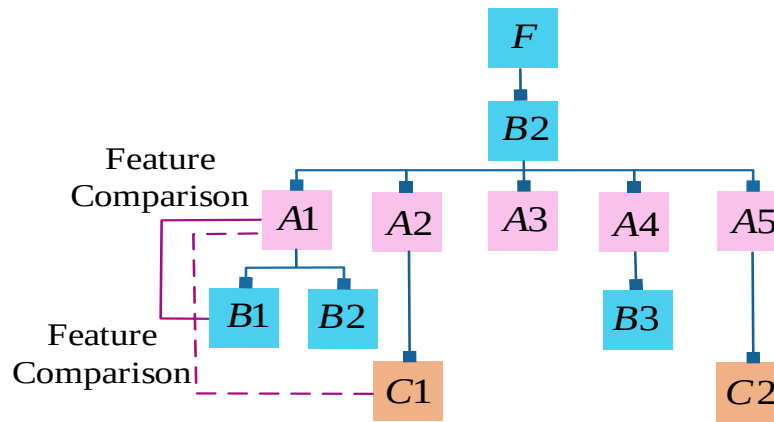


Figure 3: Topography of morphological features of plant and animal patterns

The topological relationship of spatial objects is more complex, in order to make the description clearer, the introduction of notation O , P respectively denotes the morphological structure of the object between the go also brand image and the plant and animal pattern elements without loss of generality. O_a , O_b respectively denotes the interior and the boundary of O , and the topological relationship between O and P can be expressed as follows:

$$\begin{bmatrix} O_a \cap P_b, O_b \cap P_a \\ O_a \cap P_b, O_a \cap P_a \end{bmatrix} \quad (6)$$

In this paper, the morphological contour lines of animal and plant tattoos are taken as the research object, and the feature nodes and feature structure lines in the feature elements are extracted by calculating the topological weights, then the feature topological weights are shown as follows:

$$S(ip, mq) = \sum_{k=m}^j Ik \times \lambda \times Mk(ip, mq) \quad (7)$$

where i , m denotes the layer where the feature object p , q is located, respectively, and $i, m, j \in N$ $i \leq m \leq j$ $i, m, j \leq Q$, Q are the highest layers. k denotes the layer level, $S(ip, mq)$ denotes the total topological weights from layer m to j layers ip and mq , $Mk(ip, mq)$ refers to the topological weights of ip and Mk in layer k , Ik is the layer coefficient of layer k , and $Ik = 2^{k-1}$; $\lambda = 1/(2^{\Delta k})$. λ is the attenuation coefficient, and Δk denotes the number of layers in the interval between ip and mq .

According to the calculation results of topological weights, the importance of bionic object features and feature relationships in the overall cognition can be intuitively derived, and the structural elements with higher topological weights are the feature elements of animal and plant pattern forms.

In the brand image design of painting enterprises, keeping the topological similarity of animal and plant characteristic structural lines helps to maintain the recognize ability of bionic object characteristics, so as to effectively carry out the morphological design. The topological similarity is measured by fluttering the structural distance, then the topological similarity and structural distance similarity between the animal and plant pattern and the corresponding brand feature structure is calculated as:

$$TSDIS(L_a, L_b) = D_d(L_a, L_b) \times \frac{1}{3} + D_a(L_a, L_b) \times \frac{1}{3} + D_t(L_a, L_b) \times \frac{1}{3} \quad (8)$$

$$TSIM(L_a, L_b) = 1 - N(TSDIS(L_a, L_b)) \quad (9)$$

Where, L_a, L_b is the animal and plant object feature structure line and product feature structure line, $D_a(L_a, L_b)$ is the corner similarity of the structure line, $D_d(L_a, L_b)$ is the direction similarity, and $D_t(L_a, L_b)$ is the position similarity. $N(x)$ is the normalized function of distance, and the larger value of $TSIM(L_a, L_b)$ indicates that the feature structure lines L_a, L_b are more similar, and vice versa, the less similar.

The similarity of the corner reflects the turning change characteristics within the structural line. The structural corner β is the steering angle of the neighboring structural segments, which reflects the turning trend of the structural segments, and the value is determined by the turning direction of the structural segments, which specifies that the outward turning angle β_1 is positive and the inward turning angle β_2 is negative.

The angle of adjacent structural segments at the sampling feature node is ϕ , u , v is its neighboring edge, and w is its opposite edge. Then the structural similarity, structural corner and corner similarity are shown below:

$$\phi = \arccos((u^2 + v^2 - w^2)/2uv) \quad (10)$$

$$\beta = \begin{cases} \pi - \phi, \vec{u} \times \vec{v} \geq 0 \\ \phi - \pi, \vec{u} \times \vec{v} < 0 \end{cases} \quad (11)$$

$$D_a(L_a, L_b) = \frac{\sum_1^{\min(P(L_a), P(L_b))} (|\beta_a - \beta_b| / (|\beta_a| + |\beta_b|))}{P(L_a) + P(L_b)} \quad (12)$$

Where $P(x)$ denotes the number of feature points in the structure line. If each corner of the two structure lines matches, $D_a(L_a, L_b)$ is 0. If each corner is in the opposite direction to each other, i.e., the two structure lines are oppositely jagged, then $D_a(L_a, L_b)$ is 1.

Based on the topological property of focusing on the positional relationship between features, topological similarity is used to calculate the degree of similarity between the structural relationship of each feature node and the distribution of the feature structure lines of the product morphology and the bionic plant and animal features, so as to quantify the cognitive distance between the two, and to control the matching process at a quantitative level.

Morphological integration

Many corporate brand morphology designs are based on shape improvement designs. In this paper, discrete points are utilized to represent the shape contours, and logarithmic polar coordinates are used to represent the positional relationship of the remaining points with the selected points in order to compute the match between the two corporate brands and the plant and animal pattern contours. Input the sample of plant and animal pattern I , and extract the contour points C , $C = \{c_i\} \mid i \in [0, \dots, N-1]$ for I . Where N is the number of samples. $c_i = (x, y)$, is the coordinates in the sample coordinate system. The more sampling points, the more accurate the shape representation.

For each $c_i \in C$, compute the shape context $h_i(k)$, $h_i(k) = \{j \neq i; (c_j - c_i) \in \text{bin}(k)\}$, where $\text{bin}(k)$ denotes a uniform distribution interval in a log-polar coordinate system with c_i as the origin. Given p, q

two points and a normalized histogram g_k, h_k , since g_k, h_k is actually a probability distribution, the cost between the two points can be computed using the χ^2 test, i.e:

$$C_{p,q} = \frac{1}{2} \sum_{k=1}^K \frac{[g_k - h_k]^2}{g_k + h_k} \quad (13)$$

Find the matching π that minimizes the total cost, i.e., $\min_{\pi} \sum_i C(p_i, q_{\pi(i)})$, which can be achieved using the Hungarian algorithm with a time complexity of $O(N^3)$. The final shape distance can be expressed as a weighted average of the three distances:

$$dist = D_{SC} + W_{SC} + D_{BE} \times W_{BE} + D_{IA} \times W_{IA} \quad (14)$$

Where, W_* is the weight of each distance, SCD is the transformed distance sum of matching points. BE is the transformed distance and IA is the distance between the transformed images, which is calculated as follows:

$$D_{SC}(P, Q) = \frac{1}{n} \sum_{p \in P} \arg \min_{q \in Q} (p, T(q)) + \frac{1}{m} \sum_{q \in Q} \arg \min_{p \in P} (p, T(q)) \quad (15)$$

In Equation (10), $D_{SC}(P, Q)$ is the shape distance and T is the estimated value of the degree of transformation. Then the appearance distance between the pattern element and the corporate brand is:

$$D_{IA}(P, Q) = \frac{1}{n} \sum_{i=1}^n \sum_{\Delta \in Z^2} G(\Delta) [I_P(p_i + \Delta) - I_Q(Tq_{\pi(i)} + \Delta)]^2 \quad (16)$$

In the above equation, G is the Gaussian window function, I_P and I_Q are the image of P and the transformed image of Q , respectively.

In this paper, morphology matching is used to select the creatures that are similar to the product morphology, which maintains the consistency of the user's perception of the morphology, improves the recognize ability of the plant and animal patterns in the case of the limited variable range of the brand morphology of the painting art enterprise, and allows for the self-selection of the number of feature points and bionic parts in the fusion of the features.

Practical analysis of corporate brand image development and design models

Topological similarity analysis

Painting art enterprises mainly create and produce various forms of visual art works, so the corporate brand image needs to be extraordinarily eye-catching to leave a deep impression on customers. In order to feedback the feasibility of the brand form development and design model designed in this paper, this paper conducts a practical analysis in the year 2020, by selecting a painting art enterprise and developing and designing a new image for the brand of this enterprise. By comparing the topological similarity between the previous brand logo of this enterprise and the plants and animals themselves, and analyzing the economic benefits of this enterprise. Table 1 shows the results of analyzing the economic benefits and topological similarity of this enterprise, whose main business scope is illustration, animation and comics. The enterprise's brand logo in the early stage is mainly based on raw pictures of plants and animals, although the raw pictures can highlight the characteristics of the enterprise in a more graphic way, but the form is more common, the coupling with the painting art itself is low, and the brand effect is not enough, so the economic benefits of the cooperation is not ideal, and the units that cooperated with the enterprise are not more than 85. After this, the enterprise has adopted the image to highlight the enterprise culture, although the cooperation units are raised to 105, but the topological similarity is still only 3.6, which is not suitable for the long-term development of the enterprise. The enterprise later adopts the method of this paper, using the abstract form design of animal and plant patterns, focusing on highlighting the characteristics of the enterprise, and the topological similarity with the enterprise brand image reaches 7.8, with more than 200 cooperative units. The method of this paper decomposes the original pattern, extracts part of the elements with artistic forms, and transforms them into new graphics through decomposition, and the redesigned pattern is more adapted to the decorative objects.

Table 1: Results of the analysis of economic efficiency and topological similarity

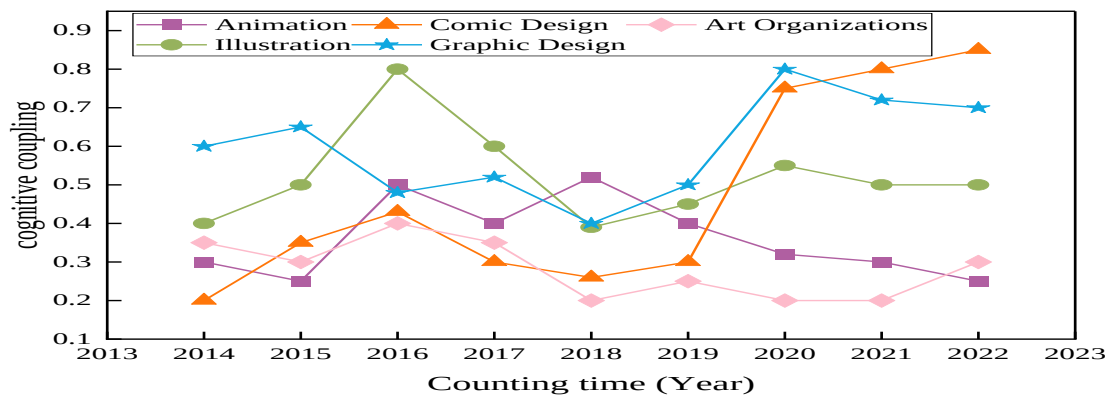
Brand identity	Scope of business	Topological similarity	Cooperative unit
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Drawings	Illustrations,	Japanese	1.2	Less than 85
Imagery	manga, Anime		3.6	Below 105
Abstract pattern			7.8	200+

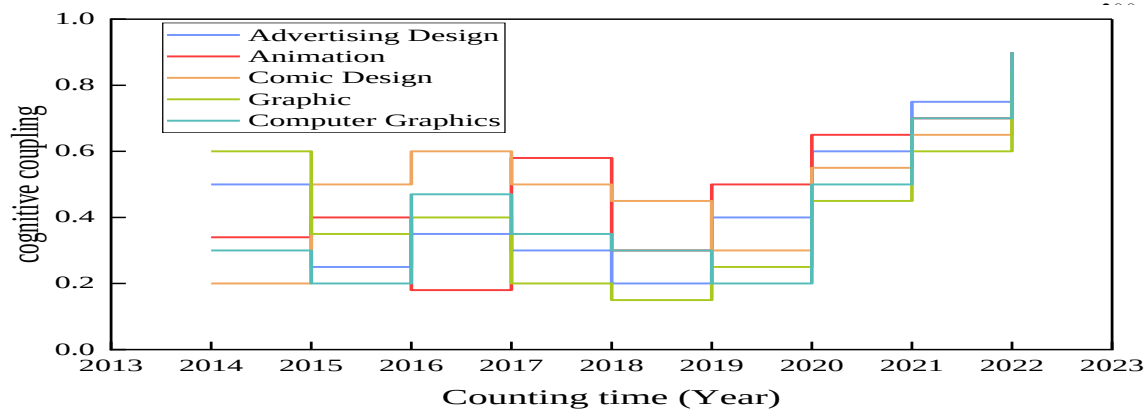
In order to more clearly reflect the evolution of the morphological design of animal and plant patterns in the development of corporate brand image, this paper selects 10 painting art enterprises, divides them into two groups, and utilizes the traditional brand design model as well as the method of this paper to improve the design of the brand image according to the cultural characteristics of the enterprises. By comparing the coupling relationship between the characteristics of the two groups and the brand image before and after the improvement, we can more clearly distinguish the form design that meets the corporate image. Figure 4 shows the results of the coupling degree measurement.

Figure 4(a) shows the results of the evaluation of the brand cognitive coupling degree of the enterprises in the control group, which is mainly improved by the traditional brand design model of the drawing art enterprises, the method is to utilize the combination of images and words for brand design. Among them, the cognitive coupling degree of the cartoon enterprise was 0.2 in 2014, and after the design through the traditional brand design model, the cognitive coupling degree reached 0.85 in 2022, indicating that the design method is more in line with the cultural characteristics of the enterprise. As for the art teaching organization and the animation design enterprise, the cognitive coupling degree does not have an upward trend after the image improvement, and is only around 0.3. It indicates that the method has limitations and is not suitable for all painting art enterprises.

Figure 4(b) shows the results of brand cognitive coupling for the experimental group of enterprises, which utilizes the brand development and design model constructed in this paper for image improvement, combined with the morphological design of animal and plant patterns, and the brand development and design effectively retains the original general characteristic elements of animals and plants and vividly and imaginatively interprets the characteristics of the enterprise. The cognitive coupling degree of the enterprises in this group reaches above 0.7, among which the cognitive coupling degree of the brand image and enterprise characteristics of the computer graphic design company reaches 0.9 after improvement, which indicates that the method of this paper utilizes the compositional expression and modeling characteristics of animal and plant patterns, and carries out reasonable abstract deformation of the images to be portrayed, so as to improve the connotation and implication of the brand image design.



(a) Measurement results of brand cognitive coupling in control group companies



(b) Measurement of cognitive coupling in the experimental group

Figure 4: Coupling Measurement Results

Brand Effect Analysis

Brand strategy is of great significance to enterprises, and without image strategy, the whole brand strategy loses its foundation. In order to verify the effectiveness of the enterprise brand form design model based on animal and plant patterns, this paper, in 2020, through the traditional brand design model, the enterprise brand network development platform and the model of this paper, respectively, A, B, C three art painting enterprises according to the enterprise's cultural characteristics, its brand image development and design, to enhance the influence of the enterprise. Figure 5 shows the results of the analysis of the three enterprises' popularity in recent years, in which an enterprise through the traditional brand design model of the enterprise's brand image design, before 2020, the highest recognition of the painting art enterprise is 45%, after the design of the enterprise's brand image, the popularity did not rise but declined, so the method is not reasonable.

B enterprise is to use the enterprise brand network development platform, to innovate its own image, to enhance the influence of the enterprise. Platform to innovate its own image, the design in 2020, the visibility of enterprise B increased by 21%, but in 2021 there is a decline to 50%, so that the enterprise in the public's impression is not stable enough. While enterprise C uses the method of this paper to design its corporate brand, the visibility grows from 30% in 2015 to 86% in 2022. It can be seen that the integration of plant and animal pattern elements in the brand image development and design of the painting art enterprise to enhance the visibility of the enterprise image can bring great social benefits and potential cooperation opportunities to the enterprise.

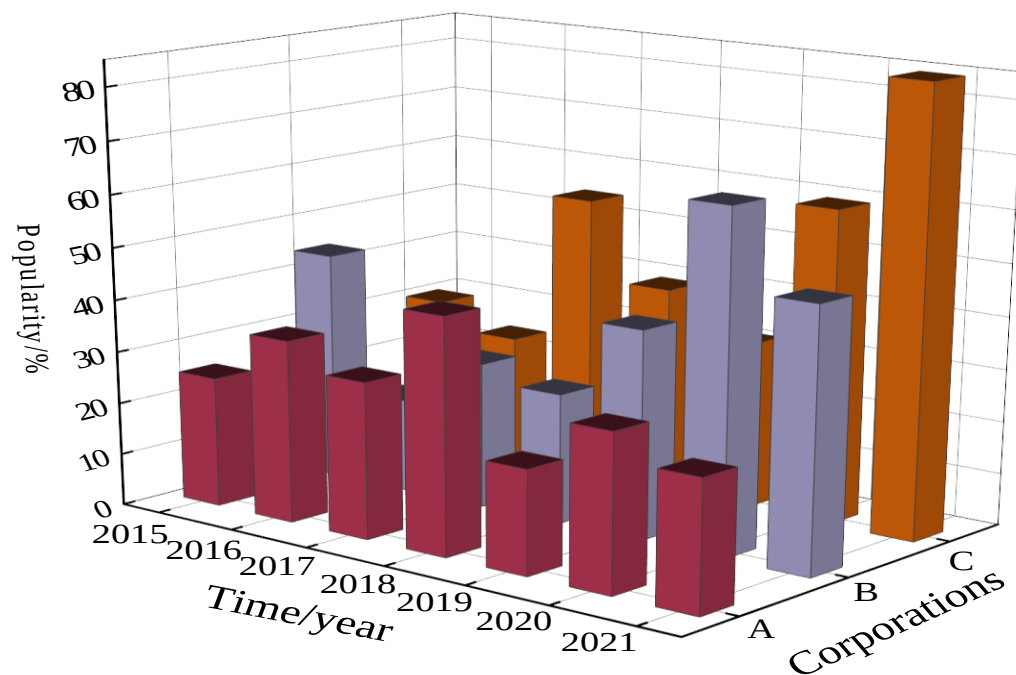


Figure 5: Results of the analysis of the three companies' recognition in recent years

In corporate image development and design, it is necessary to determine the prominent features to convey information to consumers. This paper analyzes and simplifies the morphological features of animal and plant patterns, and combines them with the public's awareness to design a reasonable brand image for a painting enterprise. In order to further analyze the reasonableness of each brand design model, Table 2 shows the annual revenue changes of three enterprises A, B and C. The annual revenue of enterprise A has increased in the range of branding.

The annual revenue of enterprise A has not increased but decreased by 19.5 thousand RMB after the brand image improvement, and the annual revenue of enterprise B has increased, but only by 1.4% compared with the previous one, and the annual revenue of enterprise C has increased by 273.7 thousand RMB, which is twice as much as the previous one, after the brand image improvement. It can be seen that the design method of this paper improves the image of the enterprise and at the same time, it can provide a new impetus for the development of the enterprise by providing huge revenue.

Table 2 Changes in annual corporate earnings.

Corporations	Design Methodology	Annual income/ten thousand dollars	
		Pre-improvement	Post-improvement
A	Traditional Brand Design Model	15.23	13.28
B	Corporate Branding Web Development Platform	23.65	27.39
C	Flora and fauna pattern design model	21.57	48.94

Conclusion

This paper takes the brand image development of painting art enterprise as the research purpose, from the cognitive point of view, integrates the morphological design of animal and plant patterns, and constructs a brand image development design model. In order to verify the reasonableness of the method of this paper, in the practical analysis, by comparing with the traditional brand design model and enterprise brand network development platform, the conclusions are as follows:

(1) In the analysis of topological similarity, the corporate brand image evolves gradually from the previous raw map model to abstract animal and plant patterns, and the topological similarity with the brand features reaches 7.8, with more than 200 cooperative units. The cognitive coupling degree of all the corporate brand images designed by this method reaches more than 0.7.

(2) Compared with the traditional brand design model, corporate brand network development platform, the brand image designed in this paper is painting art corporate awareness increased by 50%, and the annual revenue compared to the improvement of the previous two times as much. It shows that in the corporate image development and design, the evolution of animal and plant pattern form design, so that the enterprise by their own brand characteristics, enhance the brand image in the public's heart.

Reference

- Adham, A., Othman, A., Karim, S., George, A., Natalie, S., Rabih, A., & Efthymios, D. (2022). Acute Deep Vein Thrombosis Involving the Inferior Vena Cava: Interventional Perspectives. *vascular & endovascular review*, 5.
- Al-Maqrashi, K., Al-Musalhi, F., Elmojtaba, I., & Al-Salti, N. (2023). Mathematical Analysis and Parameter Estimation of a Two-Patch Zika Model. *Letters in Biomathematics*, 10(1), 29–41-29–41.
- Boni, A. A. (2021). The Code Breaker: Jennifer Doudna, gene editing, and the future of the human race. *Journal of Commercial Biotechnology*, 26(2). doi:<https://doi.org/10.5912/jcb988>
- Chan, C., Sounderajah, V., Acharya, A., Normahani, P., Bicknell, C., & Riga, C. (2020). The role of wearable technologies and telemonitoring in managing vascular disease. *Vasc. Endovasc. Rev.*, 3.
- Chen, G., & Yan, F. (2017). Research on the brand app design under the horizon of mobile internet. *Revista de la Facultad de Ingenieria*, 32(12), 644-649.
- Fahmi, A., Ulengin, K. B., & Kahraman, C. (2017). Analysis of brand image effect on advertising awareness using a neuro-fuzzy and a neural network prediction models. *International Journal of Computational Intelligence Systems*.
- Han, J., Jun, M., Kim, M., & Key, S. (2018). Influence of Congruency between Ideal Self and Brand Image on Sustainable Happiness. *Sustainability*, 10(11), 4076.
- Han, L., & Han, L. (2021). Research on visual recognition intelligent system of city brand image based on fuzzy theory and regional culture. *Journal of Intelligent & Fuzzy Systems*(Preprint), 1-9.
- Hong, S.-Q., & Yue-Jun, H. (2021). Relationship among reverse logistics, corporate image and social impact in medical device industry. *Revista de Cercetare și Intervenție Socială*, 72, 109-121.
- Huang, L. C., Gao, M., & Hsu, P. F. (2019). A study on the effect of brand image on perceived value and repurchase intention in ecotourism industry. *Ekoloji*, 28(107), 283-287.
- Hung, K.-Y., Lin, M.-H., & Wu, S.-M. (2021). Effects of social responsibility and corporate image on online word of mouth in cultural and creative MICE industry. *Revista de Cercetare și Intervenție Socială*, 72, 175-186.
- Jianqing, L. (2021). An Empirical Study of Green Marketing on Perceived Value based on Brand Image in Smart Health Care Industry. *Revista de Cercetare și Intervenție Socială*(72), 149-161.
- Jin, X. (2017). Brand Image Design and Competitive Analysis of Energy Enterprises Based on the Evaluation Model.
- Lee, C. S., & Lee, J. R. (2017). An exploratory empirical study on effects of corporate image and trust toward country image of Korea. *International Journal of Production Economics*, 139(1), 237-246.
- Li, B. (2020). The Application of Ocean Environmental Art Design Based on Traditional

- Dwelling Decoration. *Journal of Coastal Research*, 104(SI), 930-934.
- Long, Y., Tang, P., Wang, H., & Yu, J. (2021). Improving reasoning with contrastive visual information for visual question answering. *Electronics Letters*, 57(20), 758-760.
- Meisner, C., & Ledbetter, A. M. (2022). Participatory branding on social media: The affordances of live streaming for creative labor. *New Media & Society*, 24(5), 1179-1195.
- MOUSAVI-SABET, H., AMOUEI, M., SALEHI, M., SALEHI-FARSANI, A., & HEIDARI, A. (2019). Range extension and a new locality for the lake goby *Rhinogobius lindbergi* Berg, 1933 in the upper Tigris River drainage, Iran. *FishTaxa*, 4(1), 9-12.
- Oo, T. H., Jung, S.-H., & Lee, K.-H. (2021). The Antecedents and Consequences of Korean Brand Equity in Myanmar: Focusing on Country of Origin Image and Advertising Awareness. *Journal of Korea Trade*, 25(3), 87-115.
- Röst, G., & Sadeghimanesh, A. (2021). Unidirectional migration of populations with Allee effect. *FishTaxa*, 2021.2006. 2024.449708.
- Shi, W. (2017). Design of web interface based on visual information communication. *Revista de la Facultad de Ingenieria*, 32(11), 679-684.
- Shiva, H. K. (2021). Increasing the brand image of the client companies. *International Journal of Management Reviews*, 7(7), 303-312.
- Thondhlana, T. P., Chitima, S. S., & Chirikure, S. (2021). Nation branding in Zimbabwe: Archaeological heritage, national cohesion, and corporate identities. *Journal of Social Archaeology*, 21(3), 283-305.
- Vélez-Bermello, G. L. (2019). Análisis de la propuesta diseño de Marca Ciudad para manta. *Killkana sociales: Revista de Investigación Científica*, 3(3), 33-38.
- Wang, M. (2017). Application and embodiment of poetry and painting elements in brand design from multimedia perspective. *Boletín Técnico/Technical Bulletin*, 55(18), 207-213.
- Yuan, Y., Lotto, A., & Oh, Y. (2019). Temporal cues from visual information benefit speech perception in noise. *The Journal of the Acoustical Society of America*, 146(4), 3056-3056.
- Zhou, Y. (2020). Brand design of coastal eco-tourism products based on cultural creativity. *Journal of Coastal Research*, 112(SI), 306-310.