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Computer-Aided Design AND APPLICATIONS

An Intelligent Optimization Algorithm for Enhancing the Perception of Marine Brand Image Using Computer-Aided Design and Multimedia Technology

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Abstract. With the change in consumers' consumption concepts, the traditional marine brand image lacks professionalism and diversity in the new media environment, which is not in line with the characteristics of new media information dissemination. The development of computer-aided design technology and multimedia technology broadens the ideas for marine brand image optimization. Therefore, this paper constructs a marine brand image perception model based on network text mining to understand the consumers' emotional perception of the corporate brand image from multiple aspects. The optimization of brand image is realized through an intelligent computer-aided design model. The experimental results show that the marine brand image perception model based on network text mining can effectively mine consumers' perceived emotions and recognition of the brand image. The intelligent optimization model of marine brand image perception based on visual communication can optimize the brand image according to the results of emotional analysis. The survey results show that consumers have a higher degree of recognition of the optimized brand image and deepen their cognition of corporate exclusivity, which improves the positive perceived emotion of the marine brand image.

Keywords: Computer-Aided Design; Multimedia Technology; Marine Branding; Image Perception; Intelligent Optimization
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1 INTRODUCTION

Social and economic development has promoted a change in consumers' consumption concepts, and the development of information technology and multimedia technology has changed consumers' consumption habits. Compared with the traditional consumption concept, consumers in the information age environment not only pay attention to the quality of goods and services but also pay attention to the enterprise to show the cultural image and brand image. Chan et al. [1] conducted an in-depth exploration of brand awareness in the dimension of intelligent products through computer-aided design and multimedia technology. Through CAD software, planners can accurately

construct three-dimensional models of products and simulate their development trends. This digital design approach not only improves the accuracy and efficiency of planning but also provides a more intuitive and vivid visual presentation for the shaping of product brands. In the dimension of intelligent products, the application of computer-aided design and multimedia technology has a positive impact on the recognition of product brands. Through multimedia platforms, products can spread their brand image to a wider audience, improving their visibility and influence. Finally, these technologies help to enhance citizens' sense of identification with products, further consolidating and enhancing the status and value of product brands. The brand is an important intangible asset in the process of enterprise development, which is the embodiment of corporate culture connotation, but also a powerful core force in the increasingly updated market competition. At the same time, the quality of corporate brand image design has a direct impact on the enterprise in the competitive market to show credibility and trust, which will directly affect the image of the enterprise in the minds of consumers and emotions.

Based on CAD multimedia assistance technology, designers can more efficiently achieve 3D printed fashion brand image design with multi-colour textures. Chan et al. [2] explored the use of CAD multimedia-assisted technology to create 3D-printed fashion brand images with multi-colour textures. Through CAD software, designers can easily construct 3D models and make precise adjustments to the shape, size, and details of products. Meanwhile, CAD software also provides a rich library of materials and textures, allowing designers to simulate various material effects in the real world. Multimedia-assisted technology has further improved the application value of CAD in clothing design. Multimedia-assisted technology provides designers with richer creative expression methods by integrating various media elements such as images, videos, and audio. Designers can utilize these media elements to integrate brand image, design concepts, and cultural connotations into 3D printed fashion products, enhancing the visual impact and cultural connotations of the products. With the development of network technology and multimedia technology, enterprise marketing channels are gradually digitized, changing the attributes of enterprise brand image communication. The requirements for brand image design are no longer limited to simple image design. More reflected in the connotation of the enterprise brand and the effective information conveyed in the new media environment, the original brand design generates a new brand image in the minds of consumers, thereby achieving the brand connotation goals of enterprise promotion and marketing. Multimedia technology provides a richer means of expression for tourism brand image design. Multimedia technology utilizes various media forms such as images, audio, and video to fully showcase the charm of marine culture. In the brand image design of marine cultural tourism products in coastal cities, Chen and Zhou [3] combined computer-aided design and multimedia technology to create brand image works with rich artistic and cultural content. It designed a handbag with an ocean theme, using CAD software to draw exquisite wave patterns and cleverly incorporating images of marine life into the patterns.

In brand image visual communication design, the application of computer graphics processing technology is becoming increasingly widespread, and its powerful functions and flexibility provide designers with a broader creative space. Through computer graphics processing technology, designers can create unique and attractive brand images, effectively conveying the core concepts and values of the brand. Fan and Li [4] discussed the application and advantages of computer graphics processing in brand image visual communication design. Through computer graphics processing technology, designers can precisely control and adjust the shape, colour, font, etc., of logos, achieving personalized design effects. The brand visual recognition system includes multiple elements such as logos, standard characters, standard colours, and auxiliary graphics, which need to maintain consistency and coordination. Computer graphics processing technology can help designers quickly generate and edit these elements, ensuring their visual consistency and harmony.

Augmented reality technology is gradually penetrating various fields, bringing new possibilities for brand image shaping and dissemination. Especially among young consumers, AR technology injects new vitality into brand image packaging with its unique interactivity and immersion, helping to improve negative evaluations of brands by young consumers. Due to poor communication between brands and consumers or improper brand image shaping, young consumers may sometimes have

negative evaluations of the brand. In this case, Gu et al. [5] provided a new solution for improving brand image packaging using augmented reality technology. Augmented reality technology combines virtual information with real environments, providing consumers with unprecedented interactive experiences. In brand image packaging, brands can use AR technology to create rich virtual scenes and interactive elements. The development of Internet technology and its advantages and characteristics in information interaction and communication make the brand image based on computer-aided design and multimedia technology design more conducive to communication.

Hu et al. [6] used tea packaging design as an example to explore the social semiotic methods and computer vision analysis methods of traditional Chinese brand image. Through image recognition technology, it is possible to automatically identify graphic symbols, colour combinations, and other elements in tea packaging and analyze the role of these elements in conveying brand image. In addition, through computer-aided design and multimedia technology, more consumer opinions on the corporate brand image can be obtained, and based on the obtained information, the brand image can be better improved, and design efficiency and quality can be improved. The communication design of brand image has become the key for enterprises to successfully attract consumers and establish a unique market position. Sustainable development is not only a manifestation of corporate social responsibility but also an important direction for brand image construction. Ji and Lin [7] explored how to use CAD design and multimedia technology to achieve sustainable development from the perspective of emotional visual brand image communication design. Sensory visual brand image communication design refers to the combination of visual elements and emotional expression. Communicate the core values, concepts, and culture of the brand to consumers, thereby establishing emotional connections between the brand and consumers. This design strategy can not only enhance brand awareness and reputation but also enhance consumer loyalty to the brand and promote sustainable development of the enterprise.

The ocean is an important natural resource for human society and a very desirable tourist mecca for many people, but people have relatively few opportunities to contact things related to the ocean in their daily lives and work, so compared with corporate branding in other industries, the difficulty in ocean branding design and marketing is relatively large, and the stereotypical impression of consumers is deeper. In order to improve the perception of marine brand image, this paper uses computer-aided design and multimedia technology to optimize brand intelligence. The innovation points of this paper are mainly as follows:

First of all, this paper constructs a marine brand image perception model based on network text mining and mines consumers' perceived information about marine brand image through deep learning algorithms to understand the state of the brand in the competitive market from multiple perspectives and directions.

Secondly, based on the results of consumers' perception of marine brand image, this paper uses computer-assisted technology and multimedia technology to enhance the brand image from multiple aspects such as visual effects and colour display.

Finally, this paper combines artificial intelligence, computer-aided technology and multimedia technology to realize intelligent human-machine cooperation and improve the efficiency of brand design optimization.

2 STATUS OF VISUAL DEVELOPMENT AND RESEARCH ON BRAND IDENTITY

In the digital age, multimedia technology, with its unique advantages, provides strong support for the shaping and dissemination of brand image. Among them, brand colour is an important component of brand image, and its recognition has a significant impact on brand image and loyalty. From the perspective of product and brand management, Jin et al. [8] explored how multimedia technology can enhance brand colour identity, thereby having a positive impact on brand image and loyalty. Brand colour is an important component of brand image, which can directly convey the brand's philosophy and values through visual elements. When consumers identify with brand colours, they are more likely to remember the brand and have a positive emotional connection with it. Therefore,

enhancing brand colour identity is an important way to enhance brand image and loyalty. Multimedia technology can utilize rich colours and image effects to make brand colours more vivid and prominent. Through high-definition images, dynamic videos, and other forms, brand colours can be more intuitively displayed in front of consumers, thereby enhancing their visual perception and identification with brand colours.

With the rapid development of multimedia technology, visual elements are playing an increasingly important role in brand communication. Among them, the visual asymmetry effect, as a unique visual expression technique, plays an important role in logo design and brand personality shaping. Luffarelli et al. [9] explored the impact of visual asymmetry on logo design and brand personality under multimedia technology, as well as how these elements work together on brand perception. The visual asymmetry effect refers to the creation of a unique visual tension and dynamic feeling by breaking the conventional symmetrical composition. In logo design, the application of visual asymmetry can make the logo more recognizable and attractive. By cleverly utilizing visual elements such as colour, shape, and lines, designers can create distinctive and distinctive logo images, enabling brands to stand out in the fierce market competition. Mitra and Jenamani [10] proposed a computational model based on CAD-assisted design and multimedia technology to analyze information in online consumer reviews and estimate brand image. CAD-assisted design has significant advantages in product design, manufacturing, and visualization. In the brand image calculation model, CAD-assisted design is mainly used to construct three-dimensional models of products and simulate their display effects in different scenarios. Through CAD, we can obtain detailed dimensions, materials, and appearance information of the product, providing accurate data support for subsequent multimedia processing and brand image analysis. Integrate CAD model information with multimedia processing results to extract feature vectors that reflect the brand image. Then, machine learning algorithms are used to train and classify feature vectors in order to estimate brand image. CAD intelligent image perception technology provides a new perspective for the image shaping and dissemination of online clothing brands by capturing and analyzing consumer visual attention and behaviour. Mo et al. [11] aim to explore the relationship and impact between visual attention and the behaviour of consumer brand image in online clothing under CAD intelligent image perception. Consumer visual attention is a key factor in brand image communication. The visual attention of consumers is often influenced by brand image elements, such as brand logos, colour matching, product display, etc. Through CAD intelligent image perception technology, we can analyze the visual attention distribution of consumers when browsing clothing products, understand which elements attract their attention the most, and optimize brand image design. By using CAD intelligent image perception technology to capture consumer visual attention data, we can predict their purchase intention and behaviour and provide targeted marketing strategies for brands.

Artificial intelligence and big data technology are gradually becoming important tools in the field of digital brand marketing. They provide brands with more precise and efficient market analysis and marketing strategies, enabling them to better interact with consumers and enhance brand image and marketing effectiveness. The appearance design of a product plays a crucial role in attracting consumer attention, enhancing brand image, and enhancing market competitiveness. Especially when it comes to the emotional image of consumers, product appearance design needs to be more refined and creative. With the development of technology, computer-aided design (CAD) and multimedia technology have provided powerful tools for product appearance design, helping to enhance the emotional image of consumers. Wu [12] utilized computer-aided design and multimedia technology to design the appearance of products based on the emotional image of consumers. This design approach can not only significantly improve design efficiency, but also ensure the accuracy and feasibility of the design. Artificial intelligence can analyze a large amount of content data, extract key information and trends, and provide inspiration for brand content creativity. In addition, through the analysis of advertising data, artificial intelligence can optimize advertising placement strategies and improve advertising effectiveness and conversion rates. Computer perception image systems are playing an increasingly important role in the design and evaluation of cultural brand image and creative products. The system utilizes advanced image recognition and processing technology to automatically extract, analyze, and evaluate product design elements, providing designers with

objective and scientific evaluation criteria and promoting the optimization and innovation of cultural brand image and creative products. The evaluation of cultural brand image and creative product design is an important link to ensure that product design conforms to brand image and cultural connotation. Xu and Zheng [13] timely identify problems and deficiencies in product design through evaluation. At the same time, evaluation also helps designers understand consumers' understanding and acceptance of brand image, providing strong support for the shaping and promotion of brand image.

In order to more accurately convey a brand image, many companies have begun to use computer-aided brand image perception development systems. In these systems, product element recognition is a core link, which is of great significance for improving the efficiency and accuracy of brand image communication. Yang et al. [14] explored the relevant research on product element recognition in computer-aided brand image perception development systems. The computer-aided brand image perception development system usually consists of modules such as image acquisition, preprocessing, primitive recognition, feature extraction, and brand image generation. Among them, the product primitive recognition module is the core part of the entire system, responsible for identifying and extracting key primitives from preprocessed product images. This provides basic data for subsequent feature extraction and brand image generation. Product element recognition has broad application value in brand image perception development. Brand packaging design, as an important means of product promotion and marketing, its green transformation not only helps to reduce environmental pollution but also enhances brand image enhances consumer identification and favorability towards the brand. As an important tool in modern packaging design, computer-aided design (CAD) technology is increasingly widely used in green packaging design. Yu and Sinigh [15] discussed the application and advantages of CAD based on green concepts in brand packaging design. CAD technology has rich graphic processing functions and can design green packaging patterns that match the brand image. Designers can use the drawing tools of CAD software, combined with green and environmentally friendly elements, to create packaging patterns with visual impact and environmental concepts. Green packaging design is of great significance for achieving sustainable development and promoting green consumption, and is also an important way for enterprises to fulfill social responsibilities and enhance brand image.

3 INTELLIGENT OPTIMIZATION ALGORITHM FOR MARINE BRAND IMAGE PERCEPTION BASED ON COMPUTER-AIDED DESIGN AND MULTIMEDIA TECHNOLOGY

3.1 A Marine Brand Image Perception Model Based on Web Text Mining

The Internet in the information age has built a fast, effective, and equal communication bridge between enterprises and consumers, which enables enterprises to obtain corresponding feedback from consumers for the first time and understand the status of brand image in the hearts of consumers. At the same time, the Internet is also an important way for consumers to perceive the brand image, record their experiences, and express their emotions, and it is an important way for other consumers to understand further or accept the corresponding information of the brand, so the consumer's perception of the brand image can be obtained by mining consumer network text information. However, due to the obvious differences in consumers' language expression, language use level, language application habits, cognitive feelings, etc., there are also certain differences in the language standardization, structure, logic, and accuracy of the online text content that enterprises can obtain, and there are greater difficulties in data processing. In order to improve the efficiency and accuracy of network text mining, this paper constructs a deep learning-based network text mining model for marine brand image perception. The model is able to extract the corresponding data information based on temporal semantic features. The model can be divided into an embedding layer that can process the text and images contained in the multimodal form of presentation of network information, a coding layer that encodes the representation results obtained from the embedding layer at three levels, and obtains the global, local, and temporal information needed in the detection layer of brand image perception; and a detection layer that calculates the prediction likelihood of the

composite representation of the output of the coding layer and further determines the results of the consumer's perception of the brand image. In the embedding layer, the network information is embedded in order to transform it into embeddable vectors, and the text feature extraction in this part will be done by BERT.

Let the collection of posts be $q_1,q_2,\ldots,q_T$, where the first t post is denoted as q_t and the text word it contains is denoted as $a_t = v_{t1},v_{t2},\ldots,v_{ti}$. The layer encoder is a bi-directional transformation whose input is the result of splicing of word, sentence, and position embeddings, and the word embeddings are transformed into the corresponding word vectors to obtain the key information of the text words, which are described as shown in (1):

$$B_{tok_t} = V_{[cls]},V_{t1},V_{t2},..,V_{ti} \tag{1}$$

Where the special token in the sentence that expresses that the classification model contains the feature is $[cls]$, and its corresponding word embedding vector is expressed as $V_{[cls]}$, and those that do not belong to the classification model do not have the token.

The purpose of sentence embedding is to distinguish two sentences in the text, and its embedding vector has only two values to indicate the word attributed to the sentence respectively then the expression of the corresponding sentence embedding vector for each word is shown in (2):

$$B_{seg_t} = 0,\ldots,0,1,\ldots,1 \tag{2}$$

The purpose of positional embedding is to obtain the corresponding position of the corresponding word in the sentence and to capture the word order. This part eventually leads to an embedding lookup table, where each row represents the embedding position of a word, and words in the same position have consistency in their vector representation even in different sequences, as shown in (3):

$$B_{pos_t} = r_0,r_1,r_2,\ldots,r_i \tag{3}$$

The final text embedding vector can be obtained by stitching the above vectors as shown in (4):

$$B_t = B_{tok_t} + B_{seg_t} + B_{pos_t} \tag{4}$$

The lack of ability of the bidirectional conversion encoder in the coding layer to be informed about the order information of the input sequence can be solved by adding the position information of the words, but there is a discrepancy between it and the form of absolute position information encoded in the embedding layer, which is relative and is computed by the trigonometric function of the frequency inconsistency, as shown in (5):

$$\begin{cases} E_{(pos,2o)} = \sin\left(\dfrac{pos}{10000^{2o/l_{\mathrm{m}}}}\right) \\ E_{(pos,2o+1)} = \sin\left(\dfrac{pos}{10000^{2o/l_{\mathrm{m}}}}\right) \end{cases} \tag{5}$$

where the full word vector dimension is expressed as l_{m} , the output word vector dimension of the embedding layer is expressed as o , and the word position in the sentence is noted as pos .

The location encoding is obtained and fused with word embedding vectors as input to the multi-head attention layer, which is characterized as shown in (6):

$$M_{b_t} = B_t + E \tag{6}$$

The multi-head attention layer is its choice of dot product as a similarity function between the query vector and the key vector for scaling the dot product attention, and it needs to process the dot product of the query and all the keys before performing the weight calculation, as shown in (7):

$$\begin{cases} I = Linear(M_{b_t}) \\ J = Linear(M_{b_t}) \\ Z = Linear(M_{b_t}) \\ A_s = soft\max\left(\dfrac{IJ^T}{\sqrt{l_J}}\right)\cdot Z \end{cases} \tag{7}$$

Where the dimension of the key vector is denoted as l_J, and its root result plays the role of regulating the size of the inner product.

The three vectors in the original dimension are transformed to compute the attention, e.g., the first t heads are computed as shown in (8):

$$\begin{cases} I_t = IW_t^I \\ J_t = JW_t^J \\ Z_t = ZW_t^Z \end{cases} \tag{8}$$

Where $W_t^I \in R^{l_m \times l_J}$, $W_t^J \in R^{l_m \times l_J}$, $W_t^Z \in R^{l_m \times l_Z}$ and all three are denoted as parameter matrices.

Attention value is calculated as:

$$H_t = soft\max\left(\frac{I_t J_t^T}{\sqrt{l_J}}\right)\cdot Z_t \tag{9}$$

The result of the fusion of multiple attention values is shown in (10):

$$MultiM(I,J,Z) = Concat(H_1,...H_m)W^O \tag{10}$$

where the total number of heads is denoted as m.

The output of the multi-head attention layer needs to undergo a feed-forward neural network nonlinear transformation, i.e., q_t The content characterization is shown in (11):

$$\begin{cases} M = LayerNorm\ M_t + MultiM(I,J,Z) \\ q_{s_t} = (\mathrm{Re}LU(MW_1 + c_1)W_2 + c_2 \end{cases} \tag{11}$$

The post-feature extraction layer structure incorporated into BERT is shown in Figure 1.

3.2 Intelligent Optimization Model for Marine Brand Image Perception Based on Visual Communication

Based on the data obtained on consumers' perception of marine brand image, this paper will combine computer-aided technology and multimedia technology to achieve the purpose of visual communication optimization for brand image. Brand image design enhancement should be realized according to consumers' image perception results, psychological needs, and visual communication characteristics, which include the enhancement of colour, text, and graphics. Colour is one of the most intuitive and important form elements of brand image visual information communication, which can influence consumers' first perception of corporate brand image [20]. There is a difference between the colour model in the computer image and the colour perception of the human eye, and if the difference is large, it will directly affect the human eye perception, so it is necessary to quantify the colour value and the conversion of the colour space. The image is composed of multiple colour pixels, in which the pixels of the main colour appear most frequently; let there are m data points in the initial dataset, randomly select g data points as the comparison target, and obtain the data with the highest degree of similarity from the rest of the data points and form a new cluster. The degree

of similarity can be described by the distance between the data, and the calculation formula is shown in (12):

$$l = \sqrt{(x - x_1)^2 + (y - y_1)^2 + (z - z_1)^2} \tag{12}$$

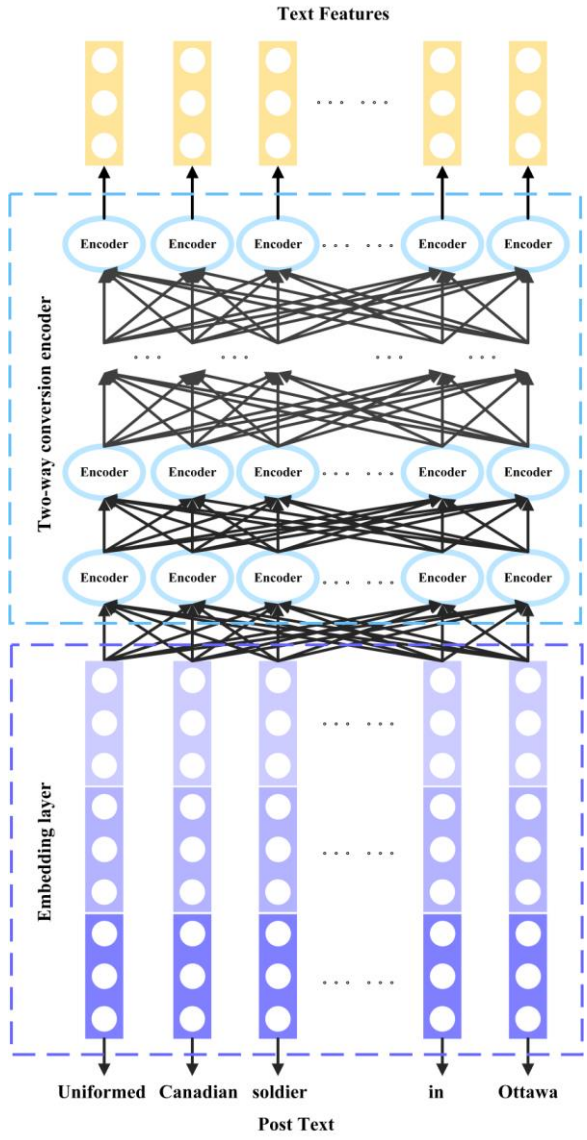

Figure 1: Post Feature Extraction Layer Structure Incorporated into BERT.

The corresponding value of the colour pixel point in the spatial coordinates of Eq. is expressed as x, y, z .

The computer displays colour space for RGB, which presents a certain gap between the colour and the human eye to see colour. HSV colour space is through the chromaticity, nominal and saturation of the three indicators to show the color, which is closer to the human visual cognitive

effect, as shown in Figure 2. According to the above formula can be achieved by the conversion of the two colour spaces, but it also needs dead colour planning and reconciliation to achieve the overall visual colour balance and comfort to improve the brand image design colour effect.

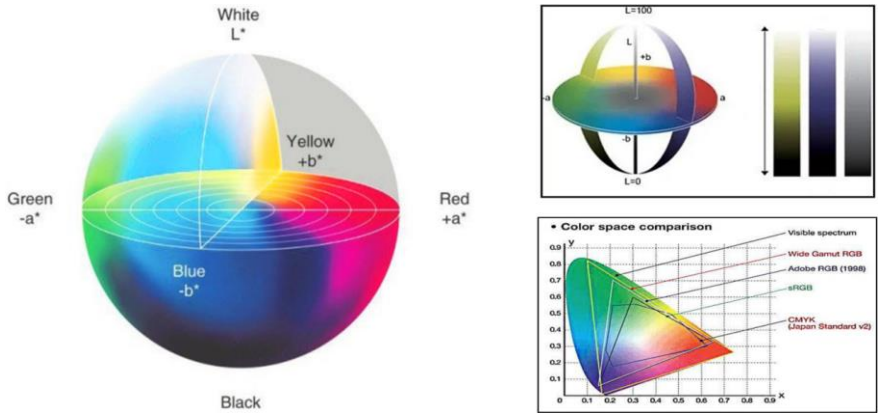

Figure 2: Schematic diagram of HSV colour space.

The words and images in the brand image are the condensed and concrete expression of the enterprise's connotation, and different text designs need to be changed according to their own characteristics and the corresponding images. Similarly, the image design needs to be modified according to the actual situation and actual needs, which requires relatively high experience of the designer. Different designers have different cognition, experience, professional level and design concepts, etc., in the design process, it is difficult to achieve the desired design effect in a short time. Therefore, this paper combines visual communication in computer-aided design to construct an intelligent design optimization process, i.e., the designer analyzes the marine brand image and sets the corresponding optimization instructions according to the brand perception results obtained from the consumer's network text mining and the high intellectual activity elements in the intelligent human-computer collaborative visual optimization system enter into the optimization state of creation after obtaining the information through the video camera to realize the design based on the experts' experience and design knowledge, then the design can be realized by using the expert experience and design knowledge as the basis. Based on the expert experience and design knowledge to realize the design, and then through the designers of the system to provide the basic visual design solutions for the overall screening, until the final design optimization to achieve the purpose. This optimization process can improve the efficiency of recognition and the effectiveness of its work, as shown in Equation (13), which is the formula for calculating the recognition efficiency of the system:

$$\varepsilon = N/t \tag{13}$$

where the recognition rate is denoted as ε, the amount of image data is denoted as N, and the recognition time is denoted as t.

In order to meet the needs of different situations, the rational selection and installation of the camera in the system is very important, so the actual work process needs to be based on the distance and the actual reserved space for the calculation of the focal length of the lens, as shown in equations (14)-(17):

$$M_i = \frac{H_i}{H_0} = \frac{D_i}{D_0} \tag{14}$$

$$D_0 = \frac{F(1+M_i)}{M_i} \tag{15}$$

$$F = \frac{D_0 \cdot M_i}{1+M_i} \tag{16}$$

$$L_E = D_i - F = M_i \cdot F \tag{17}$$

Where M_i denotes magnification, H_i and D_i denote image height and image distance respectively, H_0 and D_0 denote object height and object distance respectively, F denotes lens focal length, and L_E denotes lens range.

As shown in Figure 3 is a flowchart of the visual messaging.

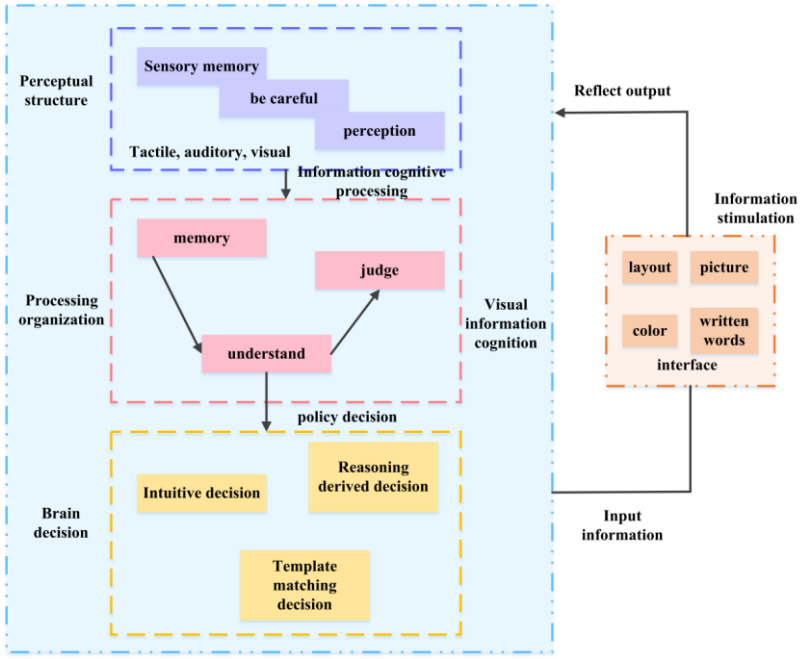

Figure 3: Visual information communication flow chart.

4 EXPERIMENTAL RESULTS OF INTELLIGENT OPTIMIZATION OF MARINE BRAND IMAGE PERCEPTION BASED ON COMPUTER-AIDED DESIGN AND MULTIMEDIA TECHNOLOGY

Consumers' original perception of marine brand image is important basic data for optimizing the brand image, so in order to verify the performance of the marine brand image perception model based on network text mining, this paper chooses another four models for performance comparison experiments, which contain SVM model, CNN model, GRU model and MKEMN model, and the results are shown in Figure 4. The data in the figure shows that the model in this paper has a clear advantage over the other four models in all aspects of performance index performance; that is, it shows that the model has a better effect on the mining and recognition of network text. In addition, the attention mechanism and multi-layer coding strategy added in the model effectively improve the performance of the model text feature extraction, improve the overall performance of the model, and provide accurate and effective basic data for image optimization afterward.

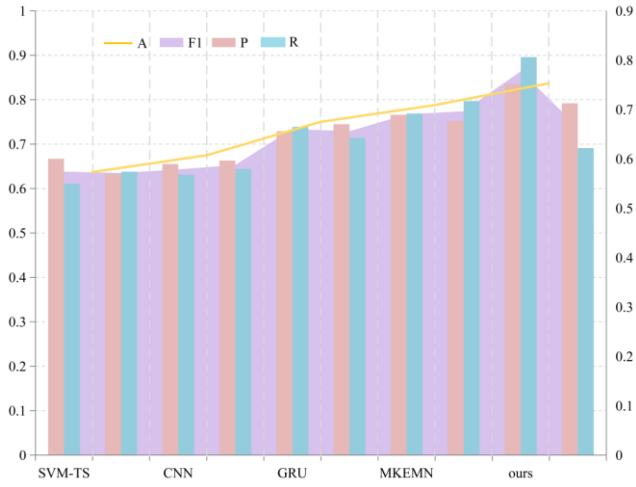

Figure 4: Performance Comparison of Five Marine Brand Image Perception Models.

In order to better verify the effect of intelligent optimization of marine brand image perception based on computer-aided design and multimedia technology, this paper selects a seafood product enterprise for brand image optimization and, at the same time, obtains the consumers' emotional perception of the brand image before and after optimization using questionnaire survey. As shown in Figure 5 is the semantic network diagram of consumers' brand image perception of this seafood product enterprise. From the semantic network diagram, it can be seen that the high-frequency words searched by consumers for the brand image of this enterprise mainly center around "quality," "freshness," "service," "taste," "ocean," "ready-to-eat" and "portion." Combined with consumers' comments, it can be seen that before brand image optimization, consumers' perception of corporate brand image focuses on the quality and effect of seafood products; the impression of corporate brand image has certain limitations and the sense of belonging and brand sense is relatively weak, and most of the trust between consumers and the enterprise comes from the seafood products themselves, and the emotions and trust projected by consumers to the enterprise are limited.

The results of the analysis of consumers' emotional image of the corporate brand are shown in Figure 6, from which it can be seen that consumers' emotions are divided into positive, neutral and negative emotions, and each of these emotions is divided into high, medium and average. Most consumers' perceived emotion of the corporate brand image is neutral; that is, consumers' impression of its brand image is relatively fixed and not deep. This part of the consumer's perceived emotion can be converted to positive or negative emotion at any time, and the results show that more than 72% of the consumer's emotion can be converted to positive emotion. The number of consumers with positive and negative emotions towards the corporate brand image is relatively small, among which the number of consumers with positive emotions is relatively large, and the number of consumers with more than moderate consumption is relatively large, and this part of the consumers has a deeper impression of the corporate brand image and has a certain degree of understanding and cognition of the enterprise. Consumers with negative emotions have a deep and bad impression of the corporate brand image, and there is a certain bias in their understanding of the company. However, on the whole, the brand image of the seafood enterprise performs relatively well in consumers' psychology and has a large optimization potential.

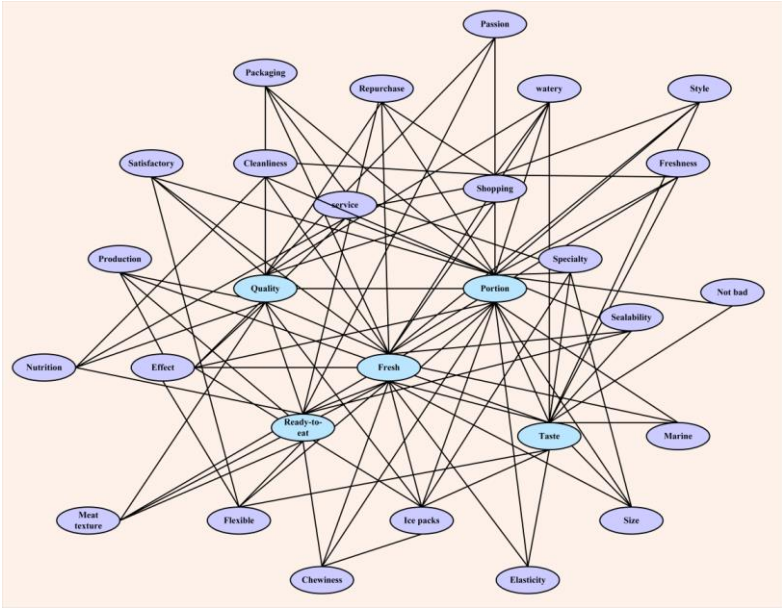

Figure 5: Semantic network diagram of consumers' perception of the brand image of this seafood product company.

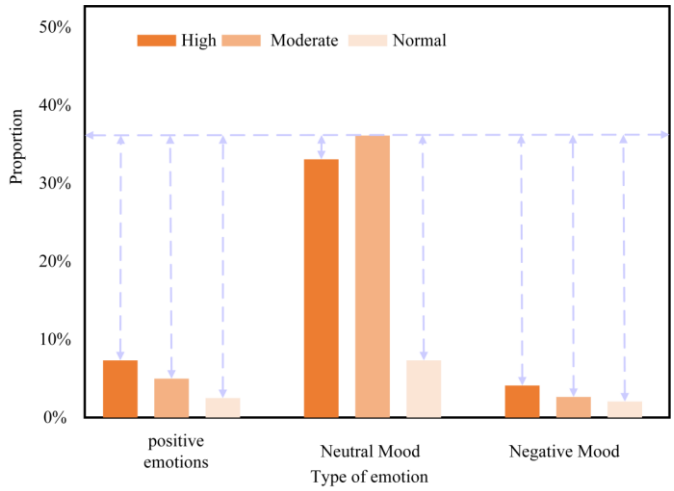

Figure 6: Results of the analysis of consumers' emotional image of the company's brand.

According to the results of the analysis of consumers' emotions towards the corporate brand image above, this paper completes the optimization of the marine brand image through the intelligent optimization model of marine brand image perception based on visual communication, as shown in Figure 7 for the consumers' emotions towards the corporate brand image perception after the optimization of the marine brand image. From the results in the figure, it can be seen that the consumers' positive emotions towards the brand image after optimization increased significantly, the proportion of neutral emotions had a relatively large reduction, and the magnitude of the change in the proportion of negative emotions was not obvious. In addition, the number of consumers with

positive emotions who approve of the colour and graphics of the brand image is higher, and the number of consumers who think the optimized image is better is relatively high. The number of consumers with neutral emotions who preferred positive emotions was relatively high, and the number of those who preferred negative emotions decreased by a certain magnitude compared to the number before optimization. This indicates that consumers have relatively higher recognition of the brand image after intelligent optimization, and there is a significant shift in brand image perception. In addition to this, the optimization of the brand image has led to more consumers having an enhanced impression of the seafood product company's exclusivity, i.e., there is an improvement in the psychological perception of its professionalism.

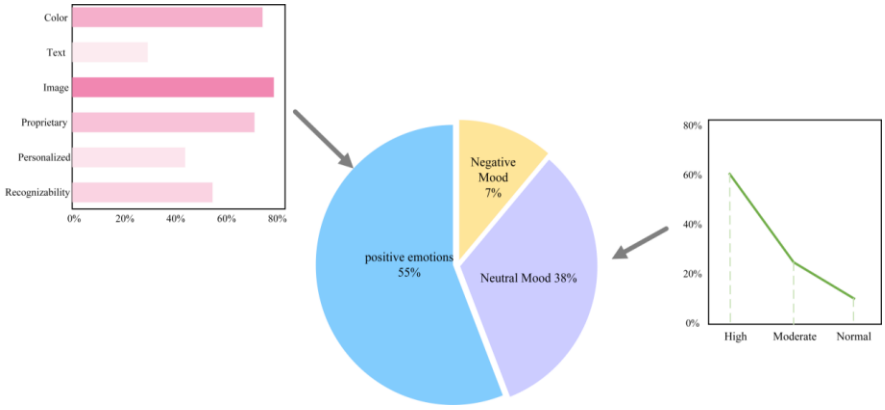

Figure 7: Consumer Perceived Emotions of Corporate Brand Image after Marine Brand Image Optimization.

5 CONCLUSIONS

Brand image is a tangible expression of an enterprise's cultural connotation and development concept, and high-quality brand image design can help the enterprise to draw closer to the emotions of consumers and improve its attention and competitiveness in the market. The traditional marine brand image design lacks a certain degree of professionalism, and the presentation of a single form is serious, and there is a certain gap between the new media communication needs. Therefore, this paper uses computer-aided technology and multimedia technology to carry out intelligent optimization of marine brand image, introduces a deep learning algorithm to realize the digging bureau of consumers' network text information, and combines visual communication technology to realize intelligent optimization of brand image. The experimental results show that the marine brand image perception model based on network text mining can effectively mine and analyze the results of consumers' image perception and more comprehensively and multi-directionally understand the consumers' recognition of the corporate brand image. The intelligent optimization model of marine brand image perception based on visual communication can optimize the brand image in a targeted way according to the results of sentiment analysis. The results of the marine brand image optimization survey show that the optimized brand image can help enterprises change consumers' perceived emotions and improve consumers' recognition and attention to the brand image. This paper mainly uses computer-aided technology and multimedia technology to achieve the optimization of brand image in the research process due to the conditions showing that some of the data have limitations. The subsequent research should increase the consumer cognitive factors of brand image, improve the intelligence and professionalism of the intelligent optimization model, and improve the optimization effect.

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REFERENCES

[1] Chan, C.-S.; Peters, M.; Pikkemaat, B.: Investigating visitors' perception of smart city dimensions for city branding in Hong Kong, International Journal of Tourism Cities, 5(4), 2019, 620-638. https://doi.org/10.1108/IJTC-07-2019-0101

[2] Chan, I.; Au, J.; Ho, C.; Lam, J.: Creation of 3D printed fashion prototype with multi-coloured texture: a practice-based approach, International Journal of Fashion Design, Technology and Education, 14(1), 2021, 78-90. https://doi.org/10.1080/17543266.2020.1861342

[3] Chen, L.; Zhou, X.: Tourism product packaging design based on marine culture in coastal cities, Journal of Coastal Research, 112(SI), 2020, 128-131. https://doi.org/10.2112/JCR-SI112-037.1

[4] Fan, M.; Li, Y.: The application of computer graphics processing in visual communication design, Journal of Intelligent & Fuzzy Systems, 39(4), 2020, 5183-5191. https://doi.org/10.3233/JIFS-189003

[5] Gu, C.; Huang, T.; Wei, W.; Yang, C.; Chen, J.; Miao, W.; Sun, J.: The effect of using augmented reality technology in takeaway food packaging to improve young consumers' negative evaluations, Agriculture, 13(2), 2023, 335. https://doi.org/10.3390/agriculture13020335

[6] Hu, B.; Zelenko, O.; Pinxit, V.; Buys, L.: A social semiotic approach and a visual analysis approach for Chinese traditional visual language: a case of tea packaging design, Theory and Practice in Language Studies, 9(2), 2019, 168-177. http://dx.doi.org/10.17507/tpls.0902.06

[7] Ji, S.; Lin, P.-S.: Aesthetics of sustainability: research on the design strategies for emotionally durable visual communication design, Sustainability, 14(8), 2022, 4649. https://doi.org/10.3390/su14084649

[8] Jin, C.; Yoon, M.; Lee, J.: The influence of brand color identity on brand association and loyalty, Journal of Product & Brand Management, 28(1), 2019, 50-62. https://doi.org/10.1108/JPBM-09-2017-1587

[9] Luffarelli, J.; Stamatogiannakis, A.; Yang, H.: The visual asymmetry effect: An interplay of logo design and brand personality on brand equity, Journal of Marketing Research, 56(1), 2019, 89-103. https://doi.org/10.1177/0022243718820548

[10] Mitra, S.; Jenamani, M.: OBIM: A computational model to estimate brand image from online consumer review, Journal of Business Research, 114(1), 2020, 213-226. https://doi.org/10.1016/j.jbusres.2020.04.003

[11] Mo, X.; Sun, E.; Yang, X.: Consumer visual attention and behaviour of online clothing, International Journal of Clothing Science and Technology, 33(3), 2021, 305-320. https://doi.org/10.1108/IJCST-02-2020-0029

[12] Wu, Y.: Product appearance design based on consumers' Kansei image and fuzzy kano model satisfaction evaluation-case study of air purifier, Computer-Aided Design and Applications, 18(6), 2021, 1186-1209. https://doi.org/10.14733/cadaps.2021.1186-1209

[13] Xu, X.; Zheng, J.: Evaluation of cultural creative product design based on computer-aided perceptual imagery system, Computer-Aided Design & Applications, 19(S3), 2022, 142-152. https://doi.org/10.14733/cadaps.2022.S3.142-152

[14] Yang, W.; Su, J.; Zhang, X.; Qiu, K.; Zhang, S.: Research on product primitives recognition in a computer-aided brand product development system, Computer-Aided Design & Applications, 18(6), 2021, 1146-1166. https://doi.org/10.14733/cadaps.2021.1146-1166

[15] Yu, W.; Sinigh, P.: Application of CAD in product packaging design based on green concept, Computer-Aided Design and Applications, 19(S2), 2021, 124-133. https://doi.org/10.14733/cadaps.2022.S2.124-133