

RESEARCH ON THE CONSTRUCTION OF HUNAN REGIONAL PACKAGING DESIGN BASED ON EMOTIONAL REFLECTION IN THE DIGITAL AGE

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In the digital age, the role of packaging design in influencing consumer behavior has gained increasing importance as products vie for attention in a saturated market. Among the various elements of packaging, color stands out as a pivotal factor that not only serves aesthetic purposes but also has profound emotional and psychological impacts on consumers. This paper explores the use of color in packaging design, with a particular focus on the emotional and cultural significance of color choices in the context of Hunan regional identity. By examining the psychological effects of color, the influence of cultural symbolism, and the evolving dynamics of consumer behavior in both physical and digital environments, this research aims to offer a comprehensive framework for the effective use of color in packaging. The study draws on color psychology theories, visual perception principles, and regional cultural aesthetics to analyze how color can be strategically applied to create packaging that resonates with consumers on an emotional level, while also reflecting the unique cultural identity of the Hunan region. Furthermore, this paper addresses the challenges and opportunities of color use in the digital era, where color perception is influenced by screen-based interactions and social media trends.

Keywords: packaging design, color use, packaging effect, illusion phenomenon

INTRODUCTION

The rapid evolution of consumer culture in the digital era has led to an increasing emphasis on the role of packaging design in influencing purchasing behavior. As commodities flood the marketplace, packaging has emerged as a critical factor in distinguishing products and capturing consumer attention. While packaging serves a functional purpose—protecting and containing goods—it also functions as an essential marketing tool that shapes perceptions, enhances brand identity, and influences decision-making. Among the various elements of packaging, color holds a particular significance [Guo et al. 2022, Martinez et al. 2021, Cullere et al. 2018]. It is not only an aesthetic choice but also a powerful tool for emotional expression, consumer engagement, and cultural communication. This paper aims to explore the role of color in packaging design, specifically focusing on the emotional impact of color choices within the context of Hunan and Hunan-Sheng geographical packaging design, reflecting the regional identity, cultural significance, and consumer behavior in the digital age [Lunardo et al. 2021, Huang et al. 2019, Yang et al. 2020].

In the context of consumer products, packaging serves as a critical interface between the product and the consumer. It is the first visual experience consumers have with a product, and as such, it is vital in shaping their expectations and influencing their decisions [Chandra et al. 2018, Saghezchi et al. 2013]. In particular, color plays a central role in this process. The colors chosen for packaging have profound psychological and emotional impacts on consumers, influencing their perceptions of the product and its brand. For example, research has shown that color can evoke a range of emotions, from excitement and happiness to calmness and trust, directly influencing purchasing behavior. Thus, understanding how color functions within packaging design is essential for marketers, designers, and businesses seeking to gain a competitive edge in today's crowded marketplace.

Color, as a key design element, is closely linked to cultural contexts. In different regions, color symbolism and emotional associations may vary significantly, influenced by historical, cultural, and social factors. The Hunan region, with its rich cultural heritage and distinctive geographical identity, presents a unique case for exploring the integration of local colors and symbolism in packaging design. The region's cultural expressions, art, architecture, and natural landscapes all contribute to the collective aesthetic that shapes the visual preferences and emotional responses of its people [Zhang et al. 2024, Seifollahi, 2021]. In this sense, the application of color in packaging design becomes a conduit through which regional identity can be conveyed, offering products a distinctive, culturally resonant appeal.

The digital age has further complicated the relationship between color and consumer perception. With the rise of online shopping, product images and packaging designs are often viewed on screens where colors may appear differently from their physical counterparts [Liu et al. 2021]. Additionally, social media platforms, which heavily influence consumer trends, have accelerated the spread of color preferences, with certain colors becoming associated with specific moods or lifestyles. The rise of digital marketing means that color schemes must be versatile enough to function across various platforms, from physical stores to online listings and advertisements. This shift presents new challenges and opportunities for packaging designers, as they must now consider both the emotional impact of color in physical contexts and its visibility and appeal in digital environments.

Color psychology offers valuable insights into the ways colors influence consumer behavior and emotions. According to various psychological studies, certain colors can evoke distinct emotional responses. For instance, red is often associated with excitement, passion, and urgency, making it a popular choice for products aimed at eliciting a quick consumer reaction, such as in food and beverage packaging. On the other hand, blue is frequently linked to trustworthiness, calm, and reliability, which is why many companies in industries like finance and healthcare opt for blue hues in their branding [Barahona et al. 2021, Li et al. 2025]. Green, representing nature and health, is widely used in products related to wellness, organic food, and

environmental sustainability. The challenge for packaging designers is to select colors that not only align with the psychological effects they wish to evoke but also resonate with the cultural and regional nuances of their target audience.

The use of color in packaging design also draws from theories of visual perception and contrast. Colors interact with each other in various ways to create visual harmony or contrast, which can influence how products are perceived. For example, complementary color schemes, which combine opposite colors on the color wheel, tend to create a dynamic and eye-catching visual effect. This can help products stand out on crowded store shelves or in online listings. In contrast, analogous colors, which are adjacent to each other on the color wheel, create a more harmonious and unified look. Understanding how these interactions work is crucial for designers looking to create packaging that not only attracts attention but also communicates the right message to consumers [Wang, Liu & Zhang, 2023].

Moreover, color in packaging is not merely a cosmetic element; it is intrinsically tied to branding and product identity. The strategic use of color in packaging design can reinforce a brand's message, communicate its values, and even influence the perceived quality of the product. For example, luxury brands often use rich, deep colors like gold, black, or dark purple to convey sophistication and exclusivity, while brands targeting younger consumers may use brighter, bolder colors to convey energy and playfulness. The careful selection of color in packaging, therefore, becomes a crucial part of brand development, with each color choice contributing to the overall narrative of the product and its brand.

In the context of Hunan regional identity, the exploration of local color traditions offers an opportunity to merge cultural heritage with contemporary design practices. Traditional Hunan art, with its use of vibrant reds, deep blues, and earthy tones, provides a rich palette that can be leveraged in packaging design to evoke a sense of place and history. By integrating these regional color schemes into modern packaging, designers can create a unique fusion of tradition and innovation, offering consumers a visual connection to the local culture while maintaining a contemporary aesthetic. The goal of this research is to identify how these regional influences can be utilized in the development of packaging designs that resonate with both local consumers and a global market.

This study will examine the role of color in packaging design, particularly focusing on the emotional and cultural aspects of color use in the context of Hunan regional packaging. Through an analysis of color psychology, cultural influences, and visual design principles, this research aims to propose a comprehensive framework for constructing packaging designs that not only reflect the regional identity but also cater to the emotional and psychological needs of modern consumers in the digital age. In doing so, it seeks to contribute to the understanding of how packaging color can serve as a powerful tool for product differentiation, brand building, and consumer engagement in the context of contemporary market dynamics.

COLOR USE AND PACKAGING EFFECT

The basic theory of color

Color representation

Color is divided into colored and achromatic, and achromatic, or non-colored, refers to white, black and various shades of gray that do not exist on the visible spectrum. However, these non-colors have an important function in the use of color emotion and color psychology, so in the current color research, achromatic colors are also regarded as important colors in the color system.

Hue, lightness and purity are the three properties that colors have. Hue is used to distinguish various color differences among the three attributes of color. Colors have a bias toward red, yellow or green due to the different wavelengths of light, and black and white have no hue. Depending on the ability of an object's surface to reflect light, the degree of lightness or darkness presented by a color is called luminosity. The purity of color indicates the degree of difference between color and non-color, i.e., the color degree.

Most of the world's color system to hue, lightness, purity of the three attributes of color as the basis of support, the three standard color system commonly used internationally are the United States of America's Munsell color system (MUNSELL), the Japanese Color Institute color system (PCCs), and Germany's Oswald color system (OSTWALD). China's industrial authorities since the 1980s also put forward and established standards related to color, such as GB3182-82 color classification naming and model, GB3977-83 color representation, GB3979-83 object color measurement methods, GB5698-85 color terminology, GB6749-86 paint film to warm color representation methods.

Color psychology

Goethe said: "A house framed in pure blue will look a certain degree of generosity, but in reality it seems empty and cold", which shows that color will to a certain extent have an impact on people's psychology. The effect of color in visual communication determines the success or failure of the design. As a designer, you must fully grasp the various effects of color on people's emotions and psychology, understand the audience's needs for color and preferences formed by long-term experience and apply it well.

The cold and warm colors of color

The sense of lightness of color is a subjective illusion brought about by the psychological effects of people. The lightness of color is to a certain extent related to the warmth and coldness of color. Cool colors can bring people the feeling of less density, visual contraction, high transparency, dryness and lightness of the object itself, while warm colors can give people the feeling of greater density, strong sense of expansion, low transparency, wetness and heaviness, and heaviness. For example, in gouache painting cool colors jump up and forward, while warm colors are thick and heavy and sink. In addition, the lightness and purity of the colors are also related to the lightness and purity of the colors. The colors with different purity of the same hue, the colors with higher purity look clean and light, while the colors with lower purity look chaotic and heavy. The order of several common color lightness and heaviness is shown in Table 1, with 1 indicating the lightest and 7 indicating the heaviest.

Table 1: Order of color lightness and heaviness

White	Yellow	Green	Purple	Cyan	Red	Black
1	2	3	3	5	5	7

Packaging design and the use of color

Packaging design is a comprehensive and systematic work, which organically combines brand, text message, pattern, color, shape, material and other elements according to different purposes, so that the visual symbol of the brand is maximized into the packaging design. "Packaging design is the design of the shape, frame and beautification of the product's packaging, packaging is a combination of experience to make the product protected, convenient in the process of storage and transportation and reduce loss, easy to use purposes; "the

formation of a unique brand personality, while distinguishing competitive products and companies, this is packaging design.

Packaging design can be thought of as the selection of packaging colors, packaging graphic elements, packaging shapes, packaging materials, etc. for the appearance of goods to design with, clever and reasonable use. There are many reasons for the direction of packaging design, whether it is to launch new products or to upgrade and replace the original products, the purpose of the design is strong, and it is crucial to fully understand the preferences of the consumer. Packaging design should be simple, clear and fast in the process of communication, and the design ideas expressed should have a strong uniqueness.

The Munsell color harmony theory is based on Munsell color space, which can quantitatively analyze the harmony relationship from the three attributes of hue (H), lightness (V) and color (C), and is in line with the characteristics of color psychology. The conversion was done by using Photoshop software. Then, the L^*, a^*, b^* values of colors were converted into H, V, C values by using the Sadojian conversion formula, and the conversion formulae (1)~(3).

$$V = 0.12L^* - 1.60, \quad (1)$$

$$H = -0.06L^* + 0.02663\gamma - 14.30\theta - 0.0913\gamma\theta + 14.826, \quad (2)$$

$$C = 0.1439\gamma + 1.054\theta - 1.022\theta^2 + 0.0497\gamma\theta - 0.167, \quad (3)$$

where, $\theta = \arctan(a^*/b^*)$ and $\gamma = (a^2 + b^2)^{1/2}$.

Monsignor's theory of color harmony mainly includes the interval classification of hue (H), lightness (V) and color (C) attributes and the relationship of harmony, which points out that the color interval can be divided into the same color harmony zone, contrast harmony zone, similar harmony zone, the first ambiguous zone and the second ambiguous zone. Hue difference, lightness difference, saturation difference in different interval range corresponds to different order factor values.

Packaging design color characteristics

With the change of the season and various activities, companies usually seize the opportunity to spend effort to design seasonal packaging items to promote consumption. Therefore, packaging designers need to fully consider the seasonality of color, and grasp the audience's consumer psychology, for the seasonal changes and the atmosphere of different holidays to design packaging colors. Sixth, metaphorical. Color can enhance the perceptiveness of the visual senses, thus triggering the relevant physiological and psychological reactions of people and promoting different imaginations according to life experiences, social civilization norms, natural landscapes and other elements.

German mathematician Birkhoff proposed a mathematical model to represent formal beauty, which is widely used in the evaluation of beauty in many design fields such as clothing, products and environment. In this study, the model was applied to evaluate the beauty of color palette. In the case of color matching with color differences, the O value is the sum of the order factors matched by hue polarity (O_h), lightness polarity (O_v) and color polarity (O_c). In the case of color matching without color difference, the order factor is $O_g=1$.

Combining the subjective aesthetic rating research to analyze the two sets of beauty values of M_2, M_3 , it can be seen that the reconciliation theory after correcting the order factor values can satisfy people's subjective aesthetic needs to a greater extent, and construct a quantitative model of the beauty of the color scheme of the furniture under the bed table (Figure 1).

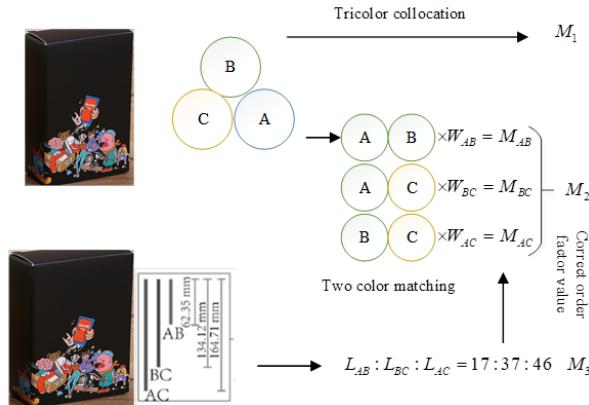


Figure 1: Construction and analysis of beauty quantitative model

The application of color contrast in packaging design

Different colors in the same picture have a certain connection with each other, and the contrast of different colors can bring people different feelings. Color contrast is the difference produced by different colors in the same picture, which can play an important role in packaging design. Color purity contrast refers to the contrast state of colors of different purity. For example, if a certain purity of the color around the other colors of high purity, then the purity of this color looks relatively low. Brightness contrast is the difference between the brightness of different colors caused by the contrast between the degree of color light and dark state. For example, a paint package (Figure 2) uses yellow as the background color and uses blue for contrast. This color combination not only meets the product characteristics of bright paint colors, but also can quickly attract consumers' attention from the visual point of view.



Figure 2: A paint package uses yellow as the background color and uses blue for contrast

CASE STUDY

Everyone's color preferences are different, and people's living environment, age, gender, age, etc. will also have an impact on their own color preferences, so the study of packaging color aesthetic law, seeking a specific consumer group on the color aesthetic law will become cumbersome, but still can find a certain color aesthetic law in the diversity of the public aesthetic.

A random sample of 150 Shanghai consumers was selected to investigate the reasons for color preference.

The top three influencing factors were gender, age and regional differences, as shown in Table 2, and the proportion of each reason is shown in Figure 3.

Table 2: Reasons affecting color preference

Reasons for Influence	Age	Gender	Geography	Herd mentality	Other reasons
Cumulative number of votes/vote	92	79	63	35	23
Percentage of votes/%	61.3	52.7	42.0	23.3	15.3

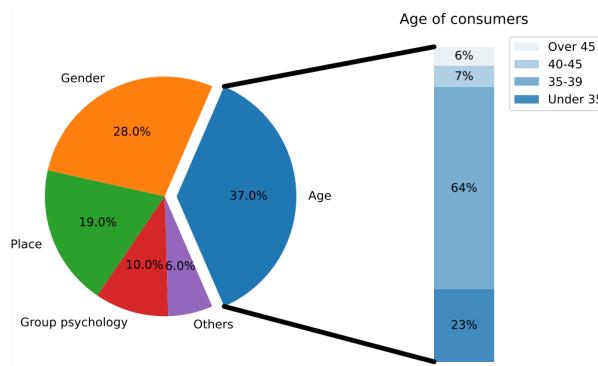


Figure 3: The proportion of each reason

It can be seen through Table 2 and Figure 3 that the three factors of age, gender, and regional differences are the main reasons affecting the color aesthetic law of the public. If we want to get the love of the mass consumption crowd and improve the visual aesthetics of packaging, we need to find the relationship between these three factors and the color aesthetic law.

In today's highly targeted market, neglecting to apply the aesthetic laws of color can result in most packaging colors being close to each other, causing aesthetic visual fatigue for consumers. Therefore, it is necessary to ensure that the correct product information is conveyed while making reasonable use of color schemes to impress consumers and provide them with a sense of freshness.

According to the 150 respondents' choice of natural packaging colors, each respondent could choose multiple colors at the same time, with white, green and blue being the most common colors used. However, almost no natural packaging uses these three colors together. The results of the natural packaging color research and the proportion of color research results are shown in Table 3 and Figure 4.

Table 3: Research results of natural s packaging colors

Color Options	White	Green	Blue	Yellow	Red	Purple	Other colors
Cumulative number of votes/vote	91	88	79	52	11	9	21
Percentage/%	60.7	58.7	52.7	34.7	7.3	6.0	14.0

Packaging using a variety of color matching compared to a single color is more attractive, the white, blue and green 3 colors together, giving people a fresh and pure visual effect, can promote the recognition of s and enhance the brand image, to do the brand color packaging is different.

We select representative packaging designs and explore them in terms of their color usage characteristics and actual advertising effects. Color can be divided into colorless system and colored system, colorless system refers to white, black and various shades of gray formed by the white black blend. Each color brings a

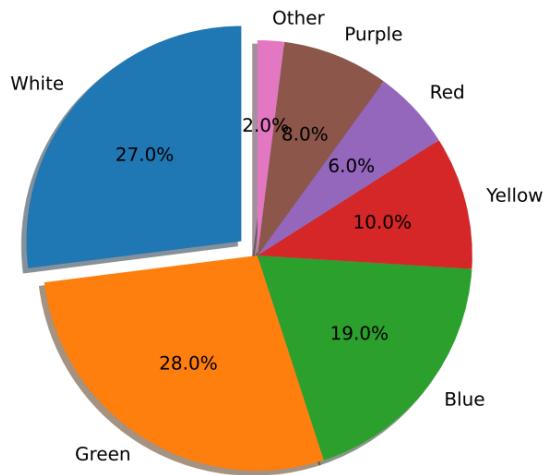


Figure 4: Proportion of natural color survey results

different feeling and role, distinguish and correct use of color for commodity packaging to bring twice the result with half the effort.

White is a symbol of purity, giving a sense of elegance and lightness, and can also leave endless possibilities and imagination. For example, in the West wedding dresses are white, wearing a white wedding dress as beautiful as a blooming lily, is the protagonist of the wedding day, is the happiest person in the world; hospitals, whether it is the clothing of doctors and nurses or walls, medical facilities, etc. are white, not only can give people a clean feeling, but also can calm people's emotions, see Figure 5.



Figure 5: White simple packing box

Black is a representative of maturity, stability and solemnity. People at funerals are dressed in black, both to show respect for the deceased, but also in the solemn expression of human grief. In some business negotiations, major meetings, grand ceremonies in the leader's clothes are also mostly black. Red is the most festive

and auspicious color in China, and is the most powerful color, giving people a sense of youthful energy, enthusiasm and positivity. In ancient China, all clothing and utensils should be red when getting married to give people a sense of joy, enthusiasm and festivity. For example, the famous actress Fan Bingbing, when attending a famous fashion week event abroad, used red lips to attract people's attention, making the world exclaim "Oriental beauty!", see Figure 6.



Figure 6: Black high-end packing box

Orange is milder, a very lively and brilliant color, rich and happy. When it comes to orange, people may first think of autumn, warm weather, fruitful, harvest season. I am afraid the most common is a variety of fast food restaurants, snack stores are mostly decorated with orange, which can attract customers and stimulate people's appetite through visuals.

Blue is a symbol of courage, sanity and calmness. When talking about blue, people generally think of the vastness of the blue sky and the boundlessness of the sea. In many countries police uniforms are blue, so blue also has the meaning of loyalty. The bottle of a certain deep-sea fish oil is made of dark blue, which makes people feel that it is a gift from the deep sea, see Figure 7.

Green is the most vital color, representing youthful vitality. The grass and trees in nature are all green. For example, green vegetables and pollution-free vegetables are very popular among people. In terms of technology, green software is also software without viruses and malicious plug-ins, see Figure 8.

With the development of many media such as television, newspapers and the Internet, commodity packaging is becoming more and more developed, the more sophisticated and creative it is, the more interesting the packaging becomes. What cannot be ignored is that the visual effect of color gives people psychological and emotional fluctuations, so to sum up the characteristics of the visual effect of color in commodity packaging is functional and emotional [Zhou et al. 2023].



Figure 7: Blue stable packing box



Figure 8: Green vitality packing box

Functionality

When we look at the commodity packaging to see the packaging and use of the characteristics of the goods, then this refers to the functional image and use of the color visual effects in commodity packaging.

Image refers to the use of color visual effects in commodity packaging, the bold use of a color, so that we have a deep impression of the appearance of a commodity or packaging, for example, Yanghe produced the sea of blue wine, and the name of the product consistent with the atmosphere of calm blue packaging so that we immediately remember the goods; "cool, heart soaring" Sprite soft drink (Figure 9). The green bottle gives people a feeling of vitality, like the vibrant nature; the beautiful red bottle of the shampoo of Sephora, as if people are walking in the forest full of red camellia flowers, the fragrance is overflowing (Figure 10); the bottle of the perfume of the little daisy designed by the design genius Marc Jacobs with quite bright and vivid colors, as if injecting new opportunities into life and bringing people a perfect and comfortable feeling (Figure 11).



Figure 9: Packaging of Sprite drinks



Figure 10: Shampoo packaging



Figure 11: Packaging of Daisy perfume

Usability refers to the use of color to let people understand the characteristics of the product, with gorgeous colors to improve the grade and taste of the product, for example, from five kinds of grain, six kinds of tonic made of gold wine, the golden color gives people a sense of Chinese royalty, but also a sense of simplicity

from the land, but also to meet the needs of the elderly to strengthen their bodies; fashion industry leader Louis Vuitton packaging is the simplest black and white to create the highest end is the atmosphere, in addition, there are upscale posters, so that people are attracted to; high-grade solid wood furniture is mostly date red or dark brown, high-grade cars are mostly black, white, red three colors.

CONCLUSION

The design of packaging color is an inevitable trend in the development of design, in the future design, should be more directly combined with the direct interests of people and long-term interests. The application and realization of the concept of rational color design in packaging design has largely improved the effect of packaging, thus improving our sales environment and giving us a greater sense of space and choice. The concept of harmony between man and nature is strengthened, our living environment will be better improved, the concept of color design of packaging is not only integrated into the design, but also continues to penetrate into all areas of sales, not only to reflect the contemporary economic conditions, but also to express the spirit of the times and artistic style.

REFERENCES

Guo X, Wang J, Huang J, Wan X. Influence of different cues on the color-flavor incongruity effect during packaging searching. *Food Quality and Preference*. 2022 Jun 1;98:104521.

Martinez LM, Rando B, Agante L, Abreu AM. True colors: Consumers' packaging choices depend on the color of retail environment. *Journal of Retailing and Consumer Services*. 2021 Mar 1;59:102372.

Cullere M, Dalle Zotte A, Tasoniero G, Giaccone V, Szendrő Z, Szín M, Odermatt M, Gerencsér Z, Dal Bosco A, Maticz Z. Effect of diet and packaging system on the microbial status, pH, color and sensory traits of rabbit meat evaluated during chilled storage. *Meat Science*. 2018 Jul 1;141:36-43.

Lunardo R, Saintives C, Chaney D. Food packaging and the color red: How negative cognitive associations influence feelings of guilt. *Journal of Business Research*. 2021 Sep 1;134:589-600.

Huang M, Wang J, Zhuang H, Yan W, Zhao J, Zhang J. Effect of in-package high voltage dielectric barrier discharge on microbiological, color and oxidation properties of pork in modified atmosphere packaging during storage. *Meat science*. 2019 Mar 1;149:107-13.

Yang X, Luo X, Zhang Y, Hopkins DL, Liang R, Dong P, Zhu L. Effects of microbiota dynamics on the color stability of chilled beef steaks stored in high oxygen and carbon monoxide packaging. *Food Research International*. 2020 Aug 1;134:109215.

Chandra K, Marcano AS, Mumtaz S, Prasad RV, Christiansen HL. Unveiling capacity gains in ultradense networks: using mm-wave NOMA. *IEEE Vehicular Technology Magazine*. 2018 Apr 24;13(2):75-83.

Saghezchi FB, Radwan A, Rodriguez J, Dagiuklas T. Coalition formation game toward green mobile terminals in heterogeneous wireless networks. *IEEE Wireless Communications*. 2013 Nov 14;20(5):85-91.

Zhang C, Shan G, Roh BH. Fair federated learning for multi-task 6G NWDAF network anomaly detection. *IEEE Transactions on Intelligent Transportation Systems*. 2024 Sep 25.

Seifollahi N. Investigating the Effect of Packaging of Agricultural Products on the Consumer's Purchase Intention. *Iranian Journal of Agricultural Economics & Development Research (IJAEDR)*. 2021 Sep 1;52(3).

Liu Q, Liu C, Wang Y. etc. Integrating external dictionary knowledge in conference scenarios the field of personalized machine translation method. *Journal of Chinese Informatics*. 2019;33(10):31-7.

Barahona M, Campo MD, Hachemi MA, González MD, Olleta JL. Feeding, muscle and packaging effects on lipid oxidation and color of Avileña Negra-Ibérica beef. *Animals*. 2021 Sep 30;11(10):2863.

Li C, Yu Y, Hu Z. Study on image processing-based visual perception control of new energy vehicle motor system. *Mari Papel Y Corrugado*. 2025;2025(1):1-7.

Wang X, Liu J, Zhang C. Network intrusion detection based on multi-domain data and ensemble-bidirectional LSTM. *EURASIP Journal on Information Security*. 2023 Jun 26;2023(1):5.

Zhou J, Li B, Zhang D, Yuan J, Zhang W, Cai Z, Shi J. UGIF-Net: An efficient fully guided information flow network for underwater image enhancement. *IEEE Transactions on Geoscience and Remote Sensing*. 2023 Jul 10;61:1-7.

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