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Computer-Aided Design AND APPLICATIONS

Intelligent Colour-Matching Optimization Strategy of the Indoor Environment Under the Fusion of Big Data and CAD Technology

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Abstract. In the field of interior design, colour matching in the indoor environment is a very important link. However, in the actual design of the colour-matching process, the interior environment design scheme is dependent on the subjective preferences of designers but also depends on the personal preferences of consumers, and the final colour-matching plan is often the product of mutual compromise between designers and customers. On this basis, with the integration of big data and CAD technology, The optimization strategy of intelligent colour matching in an indoor environment is studied. Committed to developing a set of intelligent indoor environment color matching systems to assist designers in meeting customer needs to achieve the rapid generation of solutions. Firstly, through a literature survey, the paper analyzes many factors involved in intelligent colour matching of indoor environment and chooses a colour scheme that meets aesthetic conditions according to people's demand for modern indoor space. The significance of environment colour matching in interior design is analyzed from the perspectives of visual psychology and spatial expression. Big data technology is used to intelligently extract personalized colour-matching design data, summarize colour allocation and colour-matching principles, and list the methods of presenting indoor colour matching. Based on the current indoor comfort, test the application of the colour scheme. Finally, CAD technology is used to complete the calculation of colour lighting and automatic colour matching algorithm, and the intelligent colour matching optimization system is built. In the design, many factors, such as the property of color matching space, coordination effect, and color matching type are considered to provide feasible color settings for the intelligent color matching optimization system. The research results show that intelligent colour matching in indoor environments, integrating big data and CAD technology, meets the needs of the masses in terms of space comfort. At the same time, the colour-matching optimization system can quickly generate relevant interior design colour schemes according to different customer needs.

Keywords: Big Data; CAD Technology; Indoor Environment; Intelligent Colour Matching; Colour Matching Optimization System
DOI: https://doi.org/10.14733/cadaps.2025.S9.94-107

1 INTRODUCTION

In recent years, with the development of the national economy and the improvement of people's living standards, people have higher standards for the demand for housing and the beautification of the indoor environment, and residents hope to live in a comfortable, convenient and beautiful environment. Indoor environment colour matching often affects everyone's mood, causing occupants to have special emotions such as excitement, immersion, depression, and irritability, thus causing psychological reactions and changes. Colour matching is the most sensitive visual feeling of people in the indoor environment, and architectural colour is also an important attribute of in-store design. According to people's life experiences, indoor colour matching has physical effects such as cold and warm, distance, soft and hard. For example, feel warm to red, feel cold to cyan and blue [1]. Not only that, the brightness and lightness of black will also make people feel the approximation and regression of colour. When decorating the interior environment, designers need to determine the main colour scheme according to the overall design idea, taking into account the configuration of different colour schemes, and matching the colour system that is cooler or warmer in the low chroma space. In addition, the rational use of spatial environment colour can also make the entire indoor space of the house appear wider, and functionally save the investment in indoor pattern remodelling.

Different colour schemes will have different effects on time, place, conditions, and personal preferences. The temperature of the colour can also make the room appear relaxed, happy and hopeful. In colour matching, white and blue mainly play a cool role, making people feel pure and quiet. This colour is mostly suitable for people with strict temperament, strict and reliable, and more thinking. Purple and green can make a room fresh and profound. In addition, regional differences, such as the colour scheme produced by the North and the South, are also different. The south generally uses cool colours, while the north mostly uses warm colours [2]. The stronger the colour of the colour match, the greater the stimulation of people, it will produce fatigue, so in the optimization of the indoor environment, it is necessary to take into account the living comfort of the masses and reduce the appearance of this fatigue [3]. However, for rooms with special functional needs, such as newlyweds, warm red tones are needed to dress up a passionate and joyful atmosphere. In general, the colour design of the indoor environment is still based on the overall function of the room. Due to the needs and types of different people, indoor environment colour and colour matching often need to face more problems of feature data processing [4]. In order to solve this problem, the integration of big data and CAD technology has changed people's design methods and concepts. The application of big data and CAD technology has also brought new technical support to the indoor environment colour-matching industry. In the early years, interior colour schemes were mostly hand-painted, and designers were also experts in this industry [5]. Until the beginning of the 20th century, big data technology and CAD technology were gradually applied to interior design, and the development of computer products began to appear in more high-end interior design companies, which also made the interior colour-matching link more perfect. In addition, in the process of display and generation, the traditional colour-matching design style of the indoor environment can only be displayed through two-dimensional effects, and the actual application of the generation scheme cannot be fully understood. Big data and CAD technology can be used to build a virtual environment and intelligent colour-matching system and carry out colour design on the real three-dimensional space on the network. Customers can not only have a comprehensive understanding of the structure and colour matching of the house but also understand the relationship between colours in colour design [6]. Customers can feel the real effect of space and environment colour matching without leaving the house. Based on the above background, this paper also analyzes indoor environment colour matching under the integration of big data and CAD technology and then generates an intelligent colour-matching optimization system to help the interior colour design industry develop new [7].

In the vast field of architectural design, architects not only pursue the optimization of spatial layout, but also increasingly focus on the colour matching of indoor environments to create a more comfortable, harmonious, and emotional spatial experience [8]. Through machine learning algorithms, the system can learn and understand the rules and trends of colour matching in different scenarios, and automatically generate multiple sets of colour schemes that meet the requirements for specific design projects. In the process of colour optimization, the system can set multiple optimization objectives, such as colour coordination, visual comfort, spatial perception, emotional expression, etc. On the basis of the IDOME system, big data analysis technology is introduced to collect and analyze multi-dimensional information such as massive indoor environment colour matching cases, user preference data, lighting conditions, material texture, etc. These solutions not only meet the basic principles of colour harmony but also fully consider the personalized needs of users and the functional requirements of the environment [9]. Users can easily adjust colour parameters such as hue, saturation, brightness, etc. through the interactive interface provided by the system, and the system will provide real-time feedback on the adjusted visual effects, greatly accelerating the iteration and optimization process of the colour scheme. Through multi-objective optimization algorithms, automatically recommend the optimal or suboptimal colour scheme while satisfying all constraints. In order to further enhance the efficiency and effectiveness of this complex process, we can combine the concept of the IDOME system with the "Intelligent Color Matching Optimization Strategy for Indoor Environment under the Integration of Big Data and CAD Technology" to conduct more in-depth exploration. Combining the precise modelling capabilities of CAD technology, the IDOME system can apply colour schemes in real-time to 3D spatial models, allowing architects to intuitively see the indoor effects under different colour schemes. This intelligent recommendation mechanism not only improves design efficiency but also ensures a balance between scientific and artistic colour schemes.

2 DEVELOPMENT STATUS OF BIG DATA AND CAD TECHNOLOGY AT HOME AND ABROAD

At present, in the field of interior design, whether it involves spatial structure matching or colour optimization, big data technology and CAD computer intelligent assistance technology need to be applied. They are used in the middle and later stages of design, mainly selecting materials and rendering based on actual size and space. The application and performance of big data have promoted the development of design technology, but CAD technology still has advantages in colour matching experience and colour virtual simulation. Therefore, Lin et al. [10] combined the two to optimize the design of indoor environments jointly. In the popularization process of various sensors in the Internet and cloud computing, massive data has penetrated all aspects of life, and the depth of data also profoundly affects every industry, becoming the main factor affecting productivity and design. When users have diverse and personalized requirements for indoor environment colour-matching design, it is particularly important to maintain the design's aesthetic appeal while meeting functional requirements. This requires designers to overturn traditional design thinking, use visual data to edit colour schemes and communicate with each other to reach a consensus on big data platforms. In addition, two-dimensional images bring a lot of monotonous and vivid image information in interior design, which requires the use of big data to complete colour-matching analysis. Liu et al. [11] extracted colour schemes of interest to users through big data analysis results and then added them to the intelligent model to complete the construction of an intelligent colour optimization system. Researchers in the United States and other countries are relatively advanced in the development of big data technology, and they believe that virtual experiences are also relatively crucial in indoor environment colour matching. The use of big data information to establish product displays and trade fairs can allow the public to deeply experience the effect of optimizing indoor environmental colours. Advocate for consumer experience and feelings as the main development direction, creating a livable environment and surrounding spatial atmosphere.

CAD computer-aided technology is mainly used for architecture and design. Regarding the development of CAD technology, Livshits et al. [12] referred to this batch of software as the first generation of architectural software in China. For example, the CAD-assisted software launched by the Beijing Architectural Design Institute can provide a graphic design environment to meet the requirements of indoor space matching. Due to the rapid development of interior decoration and colour design, it is constantly updated, especially in terms of material and colour preferences. To cope with this rapidly changing situation, it is essential to use CAD computer-aided technology to construct intelligent colour-matching models. In the study by Tzima et al. [13], we also found that Japanese scholars applied CAD technology in decorative colour-matching perspective drawings and used software to display the perspective drawings on computer screens. Customers independently completed various colour adjustments on the screen according to their own needs until they were satisfied. This functional software is not limited by user expertise, and the system can provide them with reasonable colour schemes, reducing obstacles caused by a lack of colour-matching experience and lack of professionalism, and completing self-matching user needs. In addition, Italian researchers have also applied CAD technology to colour-tone design systems. With the help of computer assistance, adjust colour tone, brightness, chromaticity, monochrome, and colour-matching methods. The colour tone is determined by the wavelength, and the brightness reflects the light reflected by the colour. The system they generated can be adjusted based on parameters to achieve different degrees and colour selections. Based on special effects, this system is very practical and can select harmonious matching effects according to the colour difference of the design scheme. We can provide solutions for users who lack knowledge of colour matching and also offer a colour-matching interface to give users the final decision-making power.

The introduction of big data technology has made indoor colour matching no longer limited to traditional design experiences or single aesthetic preferences. Wang [14] analyzed the emotional response to colours when capturing users' visual trajectories and stops while browsing different colour schemes, providing a scientific basis for optimizing colour schemes. Through multiple iterations of optimization, the colour parameters are continuously adjusted until the optimal balance is achieved. By collecting and analyzing multidimensional information such as user behaviour data, environmental lighting conditions, spatial functional requirements, and users' emotional responses to colours, combined with the precise modelling capabilities of CAD technology, highly personalized colour schemes can be generated. Yang et al. [15] used machine learning algorithms to learn and understand the emotional preferences of different user groups for colours and their correlation with environmental factors, thereby intelligently recommending colour schemes that meet users' personalized needs and are low-carbon and environmentally friendly. By combining entropy weight and other comprehensive evaluation methods, the system can comprehensively consider multiple dimensions of colour schemes, including aesthetics, functionality, emotional preferences, and low-carbon environmental friendliness, to conduct a comprehensive evaluation of colour schemes. These solutions not only meet visual aesthetics, but also effectively regulate indoor light distribution, improve living comfort, and consider the use of low-carbon and environmentally friendly coatings and materials, indirectly promoting carbon dioxide emissions reduction. This intelligent colour-matching optimization strategy based on big data and CAD technology not only improves design efficiency but also ensures the scientific and practical nature of the final solution.

3 RESEARCH ON INTELLIGENT COLOUR MATCHING OPTIMIZATION OF INDOOR ENVIRONMENT BASED ON INTEGRATION OF BIG DATA AND CAD TECHNOLOGY

3.1 Research on Indoor Environment Intelligent Colour Matching Computing Analysis and Comfort Detection Based on Big Data Technology

Among the various elements of interior environment design, colour matching has a strong visual impact effect. A good colour relationship can not only highlight the beauty of material, structure and space but also strengthen the environmental atmosphere. Colour matching is one of the most practical decoration materials, the same furniture decoration, different colour decoration effects are different. Therefore, colour optimization and design have become an important part of indoor environment matching. In the analysis of colour-matching elements and features, massive data scales and rapidly changing information characteristics have brought certain obstacles to the analysis. This paper uses big data technology to calculate and analyze the diversified indoor environment colour matching, which breaks the problem of limited data in the traditional sense. At the same time, the construction and storage of a large number of databases are used to efficiently screen the schemes that meet the intelligent colour matching of the indoor environment, and these design schemes are presented on the basis of sharing and visualization. When using big data to analyze the colour-matching characteristics of the indoor environment, 12 of them affect the colour presentation through the way of sorting and spectrum. The three primary colours and the intermediate colours are not harmonized colours and exist independently. Through the matching between the three primary colours, it becomes the colourful colours that people see in their eyes. We use feature maps to show the internal composition of the three primary and secondary colours, as follows:

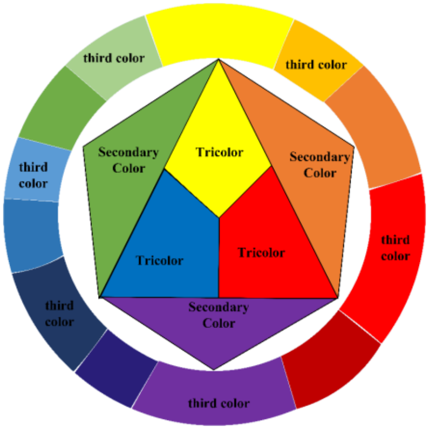

Figure 1: Internal composition of primary colours and intermediate colours.

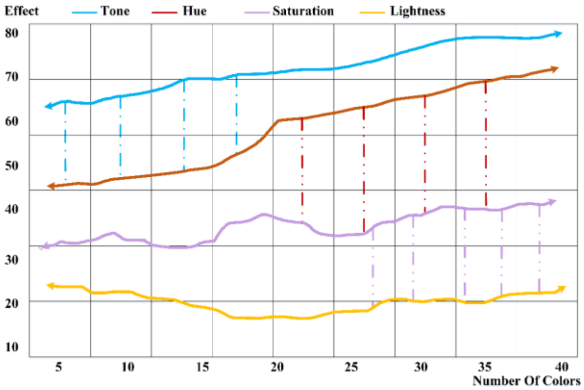

Figure 2: The influence of four elements on indoor environment colour matching.

As can be seen from Figure 1, red, yellow and blue are the three basic colours in colour theory. After the colours are blended with each other, they form three intermediate colours, also called secondary colours, which are a kind of synthesis. However, the colours that surround people are not the six basic colours. In order to better understand the colour structure, we gradually decompose the colour ring and look for pictures related to intermediate colours in daily life as a reference. In addition, indoor environment colour-matching elements also include hue, lightness, tone, and chroma. We used big data analysis to explore the influence of four elements on indoor environment colour matching, as shown in Figure 2.

As can be seen from Figure 2, among all colours, hue and hue have a greater influence. Second is chrominance and lightness. It can be seen that colour is the most obvious influence in the interior space, which can directly or indirectly change the psychological and physiological feelings of the masses. Colour is also an important element in the physical environment, which is a tactile environment and a synthesis of art and architecture. Colour has a certain ability to adjust the expansion and contraction of space, and changes people's cognition of space. In daily life, it is not difficult to find that the indoor environment if the reasonable use of colour changes at the spatial level, mutual penetration, can increase the overall design sense and comfort. Next, we use big data analysis to test the comfort of indoor environment colour matching, which can fully help residents and designers understand whether the interior environment design is meaningful. The amplitude and phase data with obvious characteristics are extracted, and the characteristics of signal data are filtered to obtain stable and noiseless environment information. On this basis, a data analysis model is established. The flow chart of the indoor comfort detection model is shown as follows.

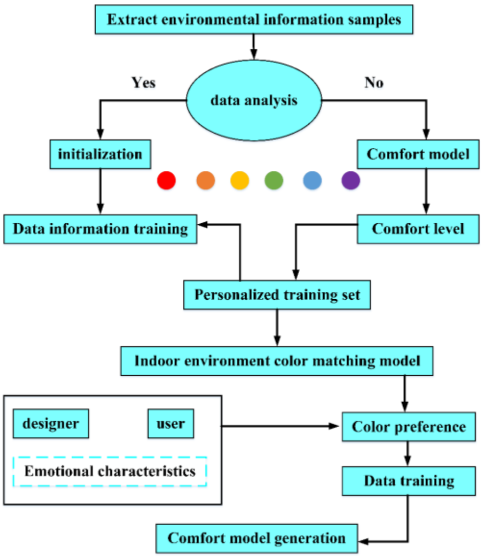

Figure 3: Indoor comfort detection model.

As can be seen from Figure 3, samples of environmental information are extracted first, and a comfort model is determined whether to initialize the comfort model according to data analysis. After training the data information, a colour-matching model of the indoor environment is generated by combining the personality training set and comfort level. In the indoor environment colour-matching model, the emotional characteristics and colour-matching tendencies of designers and residential users are added, and the final summary data is input into the data analysis training set to complete the generation of the comfort model. In order to obtain high-precision data, we need to calculate the distance within the space when capturing indoor environmental information. The formula is as follows:

$$D = \frac{cx}{2cw} + \frac{c(N\pi + A\varpi)}{4\pi} \tag{1}$$

$$D_2 = U(N + \sigma N) + \frac{c(N + cw_t)}{2r} \tag{2}$$

In the formula, x the sum of the phases of the data analysis signal to and from here. The device pulse is used to capture the reflected data information, and the identified object objective function is input into the receiving device. The identification calculation formula is as follows:

$$R = \frac{cT}{2_w} \tag{3}$$

In the formula, c identify the round-trip time for the signal. Next, the skew variance calculation formula is used to calculate the characteristic value of the environmental colour matching:

$$s_{jk} = \frac{1}{n-1}\sum_{k=1}^{n}(x_k - x_i)(x_j - x_i) \tag{4}$$

$$\delta_i = \lambda_i / \sum_{k=1} \lambda_k \tag{5}$$

Then, the obtained characteristic values are arranged from large to small, and the colour-matching tendency of the indoor environment is determined according to the main elements, finally, reliable information is provided for the designer.

3.2 Optimization of an Intelligent Colour-Matching System for Interior Environment Design Based on CAD Technology Fusion

Indoor environment colour matching needs to conform to traditional colour-matching rules to avoid obtrusive feelings. But also in line with people's innovative needs for modern design, the use of appropriate colour aesthetic rules. The colour configuration of the interior environment is used to present the cultural and spiritual meanings, so as to deepen the design theme and meet people's expectations for the space atmosphere. When further improving the quality of indoor environment colour matching design, data analysis and colour matching feature extraction should be fully carried out in the early stage, and the interaction of light and colour should be used to complete a harmonious colour matching and create a natural and fresh environment. For indoor environment colour matching, colour is not an abstract concept, but a real existence against the material. Traditional indoor environment colour matching design follows the basic three primary colours. In this paper, we use CAD technology and big data integration to achieve intelligent colour-matching optimization of indoor environment. Due to the wide application of CAD computer-aided technology in indoor environment design, we use this to explore the number of changes of CAD technology in indoor environment intelligent colour matching applications at home and abroad.

Since 2015, China has applied CAD computer-aided technology in environmentally intelligent colour matching and colour design, and its related research results have further improved the span. Before using auxiliary software to generate an environmentally intelligent colour-matching optimization system, we found that different regions, ages, and nationalities have different preferences for colour. Interior colour-matching design is bound to be influenced by designers and residents. Therefore, we use a questionnaire survey to collect the colour-matching preferences of different regions and label the forbidden colours, as shown in Table 1.

Area	*Preference*	*Taboo*
Beijing	Red, Yellow, Green, Green	Black And White
Inner Mongolia	Orange Yellow, Blue, Purple Red	White
Yunnan	Black, White, Blue	Vermilion
Guangzhou	Red, Green, Pink, Blue	Black And White
Guangxi	Sky Blue	White
Shanxi	Red, Yellow, Green	Black And White
Xizang	Black, Purple, Brown Red	White

Liaoning	Bright Yellow, Pink, Blue	Black And White
Shandong	Yellow, Reddish Brown, Light Purple	White

Table 1: Colour preferences of different regions.

It can be seen from Table 1 that most of the living areas in Beijing, for example, are Han people, who prefer red, yellow, green and blue colours, while black and white are forbidden colours. In Inner Mongolia, for example, the living areas prefer orange, blue and purple. The region led by Yunnan, is influenced by the integration of Dai, Zhuang, Hui and other ethnic groups, like black, white, blue and other colours. According to the questionnaire, different regions, different nationalities, and different cultures will put forward certain requirements for the colour design of the indoor environment. Therefore, we need to consider the problems of multi-ethnic characteristics and multi-regional characteristics when we generate the environment intelligent colour matching optimization system by CAD technology. The structure of the generated CAD indoor environment intelligent colour-matching optimization system is shown in Figure 4.

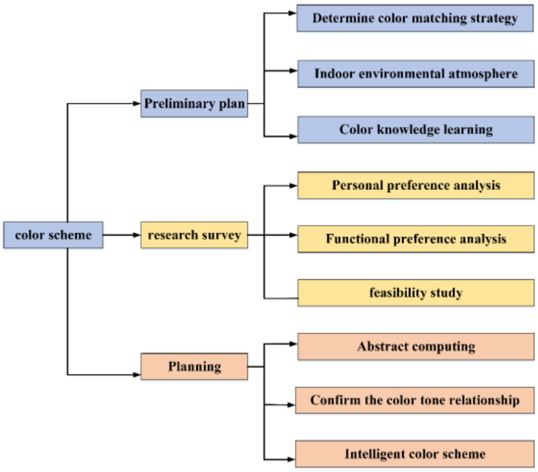

Figure 4: Structure of CAD indoor environment intelligent colour matching optimization system.

As can be seen from Figure 4, the process of colour-matching planning can be divided into three modules: preliminary planning, research investigation and detailed planning. In the initial intelligent colour-matching optimization module, the colour-matching strategy and the atmosphere of the indoor environment are determined. In the research and investigation module, the personal preferences and functional preferences of residents are analyzed, feasible schemes are discussed, and colour characteristics of intelligent colour matching are confirmed. Finally, in the detailed plan, the abstract calculation of the colour scheme, confirms the relationship between tones and finally outputs the intelligent colour scheme. Next, we elaborate on the calculation process of the intelligent colour-matching optimization system of the indoor environment after the integration of CAD technology and big data. In all colour-matching models, the set of colours is the corresponding colour space. We use the formula to represent each feature point in the colour space:

$$x = [R_x, G_x, B_x]^T \tag{6}$$

$$D[x, y] = \| E \| = \| X - Y \| \tag{7}$$

Multiple colour similarity, calculated using vector difference range:

$$d = \sqrt{(R_X - R_Y)_2 + (G - G)_2 + (B_X - B_Y)_2} \tag{8}$$

Among them, d Representing the colour distance, the Euclidean norm is expressed as:

$$L = 116(\frac{Y}{Y_0^i}) - 16 \tag{9}$$

Usually, the smaller the distance between a variety of colours, the closer the colours are, and they will interfere with each other in intelligent colour-matching optimization. Although it is non-linear uniform data, there are obvious visual differences. So we redefined it in terms of brightness and modulation:

$$z = \frac{1}{n}\sum_{x=i} x, j(j,1,2,\ldots,n) \tag{10}$$

Use big data technology to merge the computational generation process. The new clustering values are sampled to describe all pixels:

$$D = (z, z_i) = o, j(x + w)_2 \tag{11}$$

Each pixel can represent a specified colour in the smart colour optimization scheme. In order to ensure the stability of colour in colour matching generation, we also need to perform convergence value calculation:

$$C^{i,k} = \min \ D, x, C_{u,v} \tag{12}$$

In the proposed method, the objective function is used to measure the visual harmony of colour matching, so as to explore the user's preference for intelligent colour matching:

$$obj(I)_x = \arg\max \ o \bullet b(I_x) + u(I_x) \tag{13}$$

$$b(I)_x = 1 - Nor_d(w + w_t) \tag{14}$$

Among them, b represents multiple collocation schemes composed of decision variables. The optical properties of colour are also the main content affecting the environmentally intelligent colour-matching effect, and colour plays a powerful psychological impression in people's perception, which can evoke a series of psychological effects. We calculate the colour optical eigenvalues:

$$AD(w, c_1) = \sum_{i=1}^{x} XDC(w_1, c)_x \tag{15}$$

Using the output results referenced by the optical feature values, the above analysis information is input into the CAD intelligent colour-matching optimization model and finally presented in a visual way.

4 RESEARCH ON INTELLIGENT COLOUR MATCHING OPTIMIZATION OF INDOOR ENVIRONMENT BASED ON INTEGRATION OF BIG DATA AND CAD TECHNOLOGY

4.1 Research on Indoor Environment Intelligent Colour Matching Computing Analysis and Comfort Detection Based on Big Data Technology

Based on the relevant literature survey, we analyzed the role of colour matching in an indoor environment. First of all, it can render the atmosphere of the space, and people give residents different emotions through the performance characteristics of colour matching. The use of different colour schemes to form an elegant, simple, quiet, lively and other abstract environment, not only gives the space a distinct personality but also gives the charm. From the perspective of space orientation, in the halls, corridors and other public places, the setting of bright signs not only highlights the design thinking but also improves the clarity of the route, so that the transition and connection of the space are more natural. Secondly, in terms of spatial recognition, various environments use different colours to display areas, allowing residents and users to quickly enter the environmental atmosphere, and different levels of colour design can also allow people to quickly identify the floor where they are currently located. Finally, from the perspective of spatial segmentation, colour matching can divide a large space into small Spaces with different tones, forming a relatively independent open area, so as to enrich the content of the environment. It can be seen that the colour-matching analysis of the indoor environment is the main means to improve environmental comfort and design height. In our research, we use big data analysis to calculate and extract the colour-matching features of the indoor environment and use the 12-colour ring as the basic primary colour of intelligent colour matching. The colours analyzed by big data and the adjacent colours corresponding to the colour matching of the space environment are displayed in a visual way, as shown in Figure 5.

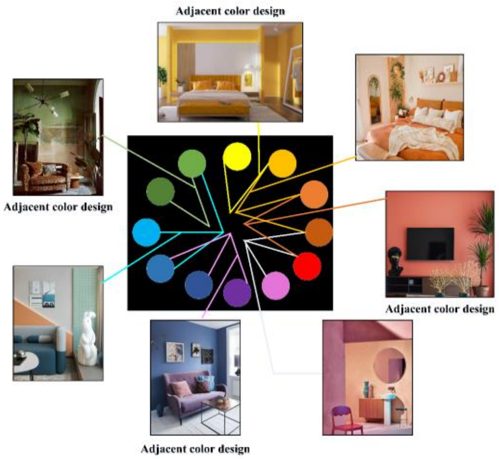

Figure 5: Visual display of adjacent colours in spatial environment colour matching.

As can be seen from FIG. 5, the 12 tones blend with each other to form an environmental atmosphere with different colour tendencies, and the visualization method can represent the role of colour-matching features in detail. At the same time, the colours in the interior space can bring warmth, tranquillity, and cold feelings to the occupants. In order to explore the comfort of residents, we also use big data analysis to calculate the impact in the indoor environment colour matching on the comfort of the masses. In the process of collecting data information, the data pulse is used to represent the changes in people's comfort. The gap between the measured actual comfort level and the pulse data from big data analysis is shown in Figure 6. As can be seen from Figure 6, there is a small gap between the pulse data information analyzed by big data technology and the actual information. It can be seen that big data analysis technology has good accuracy in the extraction process of indoor environment colour-matching information.

4.2 Optimization of an Intelligent Colour-Matching System for Interior Environment Design Based on CAD Technology Fusion

When following the law of colour matching, it is also necessary to choose the appropriate colour system according to the internal function of the space, so that the colour matching can better integrate into the environmental atmosphere and express the colour emotion. Therefore, the indoor environment design intelligent colour matching system needs to understand the needs of the user level, but also from the design point of view to choose the matching scheme that conforms to the indoor environment. We use the integration of big data and CAD technology to generate an intelligent colour-matching optimization system model.

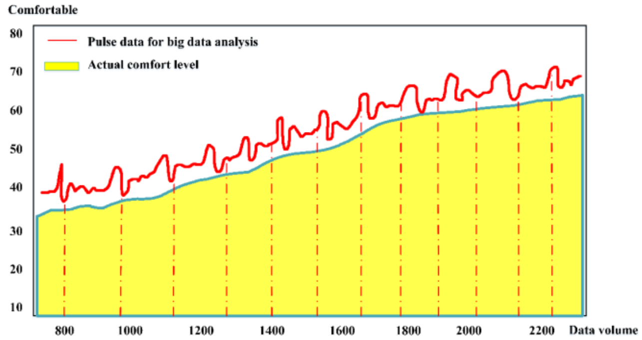

Figure 6: The gap between actual comfort and pulse data analyzed by big data.

The system model can display the modelling scene after optimized colour matching in a three-dimensional virtual way in the room. In order to reflect the reality of strengthening the intelligent colour matching of the indoor environment, we will display the colour-matching features extracted from big data and the generated intelligent colour-matching optimization scheme application diagram.

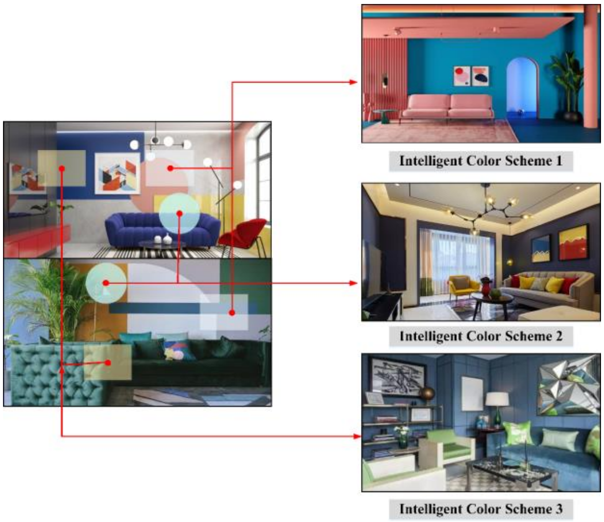

Figure 7: The generated intelligent colour-matching optimization scheme.

As can be seen from Figure 7, data analysis is used to extract different colour elements in the indoor environment, and intelligent colour schemes satisfying designers and users are generated according to functional requirements. It can also be seen from the figure that elements of different colours can be reused and have their own characteristics in multiple scenes. At the same time, in the dominant colour and auxiliary colour of the indoor regional environment, the colour matching optimization system can also complete the division of spatial functions according to the overall style, and adjust the layout and facade effect through colour matching. CAD systems also need to pay attention to the feedback efficiency of the system when generating intelligent colour schemes. We compared the output efficiency of an intelligent colour-matching system for CAD indoor environment design before and after combining big data technology, as shown in Figure 8.

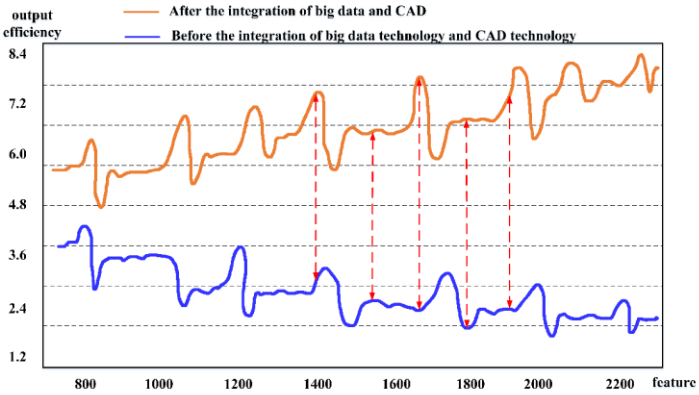

Figure 8: Output efficiency of the intelligent colour matching system for CAD indoor environment design before and after combining big data technology.

As can be seen from Figure 8, before using big data technology to integrate computer-aided systems, it is necessary to focus on analyzing the colour characteristics of the indoor environment to complete the intelligent colour-matching optimization. Therefore, the output efficiency before fusion is low. When we complete the integration of big data technology and CAD system, the overall performance of the intelligent colour-matching optimization system has been improved. The efficiency of the output design scheme has also been further improved, and there is a clear trend of improvement. In an indoor environment, intelligent colour-matching optimization systems and good interactivity are also the soul of the virtual system. We design the interaction structure from the user experience perspective so that users and designers can accurately and intuitively understand their position in the colour-matching optimization system.

5 CONCLUSIONS

Interior environment design is an interdisciplinary subject, it involves colour science, aesthetics, psychology, physics and many other fields. Colour matching is a knowledge of its own system, which requires designers and the majority of enthusiasts to spend time studying. Most of the interior environment design generation scheme stage pays attention to the adjustment of internal space form, often ignoring the colour and colour-matching design. To some extent, the interior structural design is disconnected from the colour matching, which affects the comfort and living experience of the occupants. This paper uses the integration and function of big data and CAD technology to study the optimization strategy of intelligent colour matching in an indoor environment. First of all, before the topic research, the overall characteristics of indoor environment colour matching are analyzed, and the preferences and tendencies of different regions, different nationalities and different age groups in environmental colour matching are counted. Big data analysis technology was used to analyze the colour-matching function and colour composition of the indoor environment, and a 12-tone matching method was adopted to detect the living experience of different colours. The indoor environment effect generated by three intercoolers and combined colours are analyzed, and the environmental data signal is extracted with big data technology. Finally, with the help of CAD technology, an intelligent colour-matching system for indoor environments is generated, and the CAD model is integrated with big data technology to deal with the generation of intelligent colour schemes. With the help of big data technology and CAD models, intelligent schemes of different spatial functions are generated according to colour-matching feature information. With real-world applications in mind, we also build virtual systems to help users communicate and interact with designers. The results show that the indoor environment colour-matching optimization system based on the integration of big data and CAD technology can be implemented. The colour-matching function can be used to divide the interior space and environmental layout, and the generated intelligent design scheme is also in line with the comfortable living experience of the masses.

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