

Retraction

Retracted: AHP-Based Analysis Factors Influencing the Construction of a Smart City with Three-Dimensional Regional Color

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] X. Yang and L. Ma, "AHP-Based Analysis Factors Influencing the Construction of a Smart City with Three-Dimensional Regional Color," *Journal of Sensors*, vol. 2021, Article ID 1778399, 11 pages, 2021.

Research Article

AHP-Based Analysis Factors Influencing the Construction of a Smart City with Three-Dimensional Regional Color

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Urban color is becoming more and more important in the construction of smart cities. This research mainly discusses the influencing factors of AHP-based 3D regional color smart city construction. From the perspective of city managers, the factors selected in the article that affect the choice of urban color planning are economic development, urban culture, designer's ideas, customs, and natural environment. We use GIS to comprehensively collect basic geographic information data of the city. We use CityEngine and GIS data to quickly create virtual cities. When constructing the AHP model, once the weight value of each factor in the color-influencing factors of the entire smart city is obtained, the total ranking of the levels needs to be checked once. After that, the study uses the MATLAB program platform to realize the parametric design of the main color of the city, including the control of the changes in the spatial structure of the main color of the city, followed by the control of the transition and coordination mode between the key elements of the city color. Explorer provides comprehensive and rich 3D digital city roaming browsing, query positioning, analysis, and other functions; supports the loading of multiple data sets from the Internet and local; and can dynamically load massive 3D city simulation models above and below ground. Finally, the design of the urban architectural color or improvement plan is further carried out, and the urban color main color design plan is finally implemented in the implementation of the urban architectural color, which effectively realizes the quantitative control of the urban color. When evaluating smart city color resources, the color weight value of public facilities is 0.147, which accounts for 14.7% of the total weight value. This research helps to enhance the regional and local cultural characteristics.

1. Introduction

Modern urban color planning is more common in some developed countries in Europe and America. Its purpose is to improve the urban environment and control urban color pollution, and at the same time, it is a means to continue the urban context. However, most of these color plans are not for the whole city but for specific plots. The color of the central city focuses on historical continuity, and the new city focuses on modernity.

The establishment of a smart city is not only conducive to the sustainable development of the city's economy, while improving the development of urban information technology, it can also promote the development of emerging industries in the city. Under the background of uneven urban

color quality, how to correctly analyze the urban color environment, guide urban color planning, and use high-quality colors to shape the city spirit and promote regional culture are the main direction of this research and have far-reaching significance.

Li et al. believes that in a smart city, all types of user data will be stored in electronic devices, and data is the backbone of all smart systems. However, current smart phones do not have the ability to manage user confidential data and are facing privacy leaks due to excessive data collection. When smart phone applications are within the scope of permission, excessive data collection means that users have more data than the original functions, which will become one of the most serious potential security risks in smart cities. Their research will investigate the current situation of over-

collection of data and the most frequent cases of over-collection of data, although their research is an active method to prevent excessive data collection. By putting all user data on the cloud, it is not certain whether the security of user data can be greatly improved [1]. Menouar et al. believe that without a reliable and effective transportation system, a smart city is impossible. According to this necessity, ITS becomes the main component of all smart city concepts. Their research focuses on ITS applications that may use UAV but does not emphasize the possibility of UAV corresponding to ITS for the next generation of smart cities [2]. Zhu et al. first reviewed the latest work of multimedia big data and SC. In addition, key issues affecting the success of secure multimedia big data in TASC are identified. They proposed two types of TASC: TASC-S (TASC with a single trust value threshold) and TASC-M (TASC with multiple trust value thresholds). Although the throughput of TASC-M in their research may fluctuate with the same trust value threshold, the research process lacks data [3]. Hashem et al. believe that the expansion of big data and the evolution of Internet of Things (IoT) technology have played an important role in the proactive realization of smart cities. Big data provides the possibility for cities to gain valuable insights from large amounts of data collected from various sources [4]. IoT can use highly networked services to integrate sensors, radio frequency identification, and Bluetooth into the real-world environment. Their research introduced the most advanced communication technologies and smart-based application technologies used in smart cities, but the research process is not novel enough [5].

From the perspective of city managers, the factors selected in the article that affect the choice of urban color planning are economic development, urban culture, designer's ideas, customs, and natural environment. We use GIS to comprehensively collect basic geographic information data of the city. We use CityEngine and GIS data to quickly create virtual cities. When constructing the AHP model, once the weight value of each factor in the color influencing factors of the entire smart city is obtained, the total ranking of the levels needs to be checked once. After that, the study uses the MATLAB program platform to realize the parametric design of the main color of the city, including the control of the changes in the spatial structure of the main color of the city, followed by the control of the transition and coordination mode between the key elements of the city color. Explorer provides comprehensive and rich 3D digital city roaming browsing, query positioning, analysis, and other functions; supports the loading of multiple data sets from the Internet and local; and can dynamically load massive 3D city simulation models above and below ground.

2. Smart City Construction

2.1. Urban Color. A series of issues such as the nature of color, how to recognize color, and how color affects human behavior and psychology are fundamental issues in color research. The essential attribute of color is not an objective existence; it is a feeling that light waves cause

to people when they are received by human eyes. When there is no light, colors cannot be perceived by human eyes [6–7]. Proper use of the proportion can make the shape have a well-proportioned and harmonious beauty. Proportion is very important in street color planning. To make the color ratio stable, it must first conform to the law of vision. If the ratio is too small or too large, it will cause visual discomfort [8].

The popularity and regionality of city flowers and city trees play the role of a city's natural geographical domain, and it is also a reflection of the city's regionality. It can be said that plants are the main elements of gardens, and they can directly reflect regional characteristics. The role of urban vegetation characteristics in the street color plays a vital role in both the overall and local aspects. When planning street color, much consideration should be given to the meaning of vegetation color [9–10].

2.1.1. Role Positioning. The architectural space layout of the street is the skeleton of the street and the main factor for the beautification of the street. The color treatment of the building complex should be echoed and rhythmic, with ups and downs. Therefore, the color design of each building should be based on the whole, should be unified, and should show continuity and order in the space. The processing of street architectural colors is an integral part of urban architectural art and architectural style. As regards the color planning of buildings along the street, not only is it necessary to consider the application of functions, reflecting the prosperous socialist city style, and also consider the visual comfort, at the same time, it is necessary to meet people's aesthetic needs and give people a beautiful enjoyment [11].

2.1.2. Planning Principles. The first is the thematic design method; that is, the theme echoes with the uniform color form of the building facade. Not only are these colors formal elements, but more importantly, colors give deeper cultural spiritual connotations. The second is architectural detail design techniques. The detailed color design of the building facade is very important to the building. The quality of the street facade color is often determined by the splendor of the detail design. The detailed color design can also make the texture and scale of the building facade closer to people's use and aesthetic needs, creating a more comfortable and pleasant spatial scale. The third is the continuity design technique, that is, to create the order and integrity of the building facade color. The color of the building facade can also be designed continuously through the rules of formal beauty such as rhythm, balance, contrast, and variation [12]. St. Basil's Cathedral in Moscow and Besancon Castle in France are shown in Figure 1.

In the process of building the house, the specific area S of the house needs to be measured [13].

$$S = (A + 4)(B + 4) \sum_{i=1}^n \pi R^n. \quad (1)$$

When building the overall structure of the house, the location of the house needs to be measured in time. In the



FIGURE 1: St. Basil's Cathedral in Moscow and Besancon Castle, France (from <http://alturl.com/q6r6t> and <http://alturl.com/qk7tn>).

process of building the house, the foundation V of the house needs to be preliminarily measured [14].

$$V = (A + 2C + K \times H) \sum_{i=1}^n KL. \quad (2)$$

In the design of the house, the relationship R between two adjacent cylinders is sometimes calculated.

$$F = R^2 \left(\pi - \frac{\pi}{180} \alpha + \sin \alpha \right) = R^2 p. \quad (3)$$

2.2. Analytic Hierarchy Process. The Analytic Hierarchy Process (AHP) combines qualitative and quantitative analyses, and its main uses are mainly reflected in two aspects:

- (1) Classify the target object and evaluate its quality level and resource advantage
- (2) Make decision-making and evaluation plans and finally get the best choice based on the comparison of the respective weights of the main influencing factors. The basic principles of Analytic Hierarchy Process (AHP) are increasingly understood, recognized, and accepted by people and are applied to energy demand forecasting, economic development planning, economic management, urban planning, education planning, talent demand, evaluation of scientific research results, and resource evaluation, etc. On the one hand, the concept of systems engineering has been widely used [15]. We calculate the product of the elements in each row of the n -th order judgment matrix C and take the n -th root of the product to obtain the judgment matrix A ; we perform normalization and standardization processing:

$$A = \frac{A}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^n \cdot A}}. \quad (4)$$

We calculate the maximum eigenvalue λ_{\max} :

$$\lambda_{\max} = \sum_{i=1}^n \frac{CA}{\sqrt{n} \cdot A}. \quad (5)$$

We calculate the judgment matrix-consistency index CI and conduct the consistency test [16].

$$CI = \frac{\lambda - n}{n - e^{-p}}. \quad (6)$$

The average random consistency index RI is introduced, and the ratio of the judgment matrix consistency index CI to the average random consistency index RI of the same order is called the random consistency ratio CR [17].

$$CR = \frac{CI}{RI}. \quad (7)$$

This article adopts the evaluation principle of combining qualitative and quantitative. While performing abstract and general analyses and description of city street colors, mathematical methods are used for quantitative calculation and statistics, which can effectively reduce the interference of subjective factors in qualitative analysis and make the analysis results more objective. In the street color planning, the following principles must also be followed: people-oriented. The ultimate users of street colors are citizens, so we should proceed from the basic needs of citizens, consider their comfort and safety characteristics in appreciating and using them, fully embody the people-oriented concept and adapt to the development of the times. With the improvement of social civilization and the increase of people's economic income, citizens have higher and higher requirements for the color of urban streets. While fully considering economic development, they cannot completely negate the historical context. The spatial pattern of mountains, water, and city in the city has been gradually improved in the course of historical development and evolution. The intensive urban spatial pattern and decentralized ecological pattern have also formed the basic characteristics of the contemporary urban style [18]. For comparison of two factors, a ranking method

can be adopted. The basic principle of the ranking method is to rank the importance of a group of variables or indicators and then obtain the weights through standard quantification. The most commonly used is the sorting and summing method [19–20].

$$W = \frac{N - R + 1}{\sqrt{\sum_{i=1}^n (N - R)}}. \quad (8)$$

Among them, W is the standardized weight of the i -th variable and n is the total number of variables [21].

2.3. Smart City. “Smart city” is based on a new generation of information technology, through the use of information and communication technology to sense, analyze, integrate, and use urban data; to achieve a comprehensive, timely, and effective regulation of urban resources; and to achieve the realization of the city in terms of fast operation, harmony, and win-win between people and the city [22]. “Smart community” is centered on the needs of residents and guided by community services. It makes full use of the Internet, the Internet of Things, telecommunication networks, cloud computing, and other new-generation information technologies to integrate huge amounts of data and information for in-depth analysis and complex calculation formation of a new community management and service model characterized by highly integrated smart technologies, high-end development of smart industries, and efficient and convenient services for the people which is one of the important components of contemporary new smart cities [23–24].

$$y = \frac{1}{1 + e^{-p}}. \quad (9)$$

The output value M_{ij} of the smart city model is denormalized as follows [25]:

$$M = M_{\max} - \frac{0.8 - M_{ij}}{0.6} (M_{\max} - M_{\min}). \quad (10)$$

Standardized collection of raw index data p -dimensional random vector [26]:

$$p = (x_1, x_2, \dots, x_p). \quad (11)$$

Standardized transformation of the data [27]:

$$Z_{ij} = \frac{x_{ij} - \bar{x}_j}{s_j}, \quad i = 1, 2, \dots, p, \quad (12)$$

$$\bar{x}_j = \frac{\sum_{i=1}^n x_{ij}}{n}.$$

We find the correlation coefficient matrix Z_{ij} [28].

$$R_{ij} = \frac{\sum_{i=1}^n (x_i - \bar{x})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \cdot \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}}. \quad (13)$$

We solve the p characteristic roots of the correlation coefficient matrix and obtain the orthogonal characteristic vector M_b [29] corresponding to the characteristic roots.

$$M_b = \sum_{j=1}^m \lambda_j + \sum_{j=1}^p \lambda_j. \quad (14)$$

3. Three-Dimensional Regional Color Smart City Construction Experiment

3.1. Three-Dimensional City Information Collection

3.1.1. Selection of Urban Color Planning Factors. From the perspective of city managers, among the factors selected in the article that affect the choice of urban color planning, the importance of the five factors is ranked as follows: economic development, urban culture, designer’s ideas, customs, and natural environment.

3.1.2. Three-Dimensional Fine Modeling Model Data. The urban 3D model data is mainly composed of 3D construction (construction) model data, digital orthophoto map data, and digital elevation model data [30]. The 3D city model database is managed in the form of a MySQL database. It mainly stores the three-dimensional geometric model data of the spatial object and the corresponding texture data and, at the same time, records the relationship between the geometric model and the texture.

3.1.3. Three-Dimensional Terrain Model Data. The 3D terrain model is a multilevel terrain tile data set constructed based on the pyramid quadtree. According to the method of DEM and DOM, the terrain elevation and terrain surface details are resampled at the pyramid level to form a terrain tile model at all levels. Then, the terrain engine is dynamically loaded, and the terrain is rendered seamlessly in real time.

3.1.4. Urban Basic Geographic Information Data. The urban basic geographic information data fully reflects the topography of the city, participates in various spatial overlays and analyses, and is used frequently. This part of the data includes two-dimensional basic geographic information data such as buildings, roads, vegetation, water systems, city walls, fences, and fences.

The biggest advantage that CityEngine can use is to directly use GIS data to quickly create virtual cities. In addition, it also provides powerful three-dimensional design capabilities, which has played a positive role in urban planning and design. Explorer provides comprehensive and rich 3D digital city roaming browsing, query positioning, analysis, and other functions; supports the loading of multiple data sets from the Internet and local; and can dynamically load massive 3D city simulation models above and below ground. The system also supports a secondary development interface, and users can use Runtime ((Runtime system) to add new functional modules through industry plug-in extensions.

In the process of parametric design of urban color design, we will take the urban spatial structure relationship, including urban regional division, node, and boundary determination, and the coordinated transition mode of urban color as invariable parameters, to form a parametric design of urban color. The frequency color value of the city color node, color boundary, radiation radius value, and attenuation value are used as variable parameters. The change and control of these parameters can directly affect the design results. In this way, we have transformed the design of the main color of the city into a design of two structural parts: the design of a logical framework system with invariable parameters. In this part, we should fully integrate the current situation of the city and the development goals of the city and grasp the macroscopic system of the city, so as to make the logical framework of the city color design closer to the actual situation of the city and more in line with the goals and requirements of the city development. At the same time, the coordination methods of urban colors mainly include the same coordination and approximate coordination, which will also be used as constant parameters to directly constrain the variable parameters. The second is based on the logical framework of the urban color nodes and the specific color design of the color border.

3.2. AHP Model Construction

3.2.1. Constructing a Judgment Matrix A. For this project, after determining the model of the factors affecting the color of the smart city, the factors at different levels are compared in pairs. These different factors need to be evaluated by the expert scoring method. The so-called expert scoring method refers to the anonymous method. We consult the opinions of experts, conduct statistics and analysis on the suggestions given by the experts, truly and objectively integrate the experience of most experts and their subjective judgments, and then make reasonable estimates of these influencing factors based on their judgments. The results of these estimates are fed back to experts. Finally, we determine the scale of each different influencing factor and finally determine its judgment matrix through these scales.

3.2.2. Level List Sorting and One-Time Inspection. After constructing the judgment matrix, the next step is to rank and sort the influencing factors of smart cities. The maximum eigenvalue λ_{\max} is calculated by calculation, and then, CI and RI are calculated. Finally, the CR value is obtained, and then, the value of CR is compared with 0.1. When $CR < 0.1$, the judgment matrix is considered to have satisfactory consistency. Otherwise, it is necessary to adjust the judgment matrix and make it have satisfactory consistency.

3.2.3. Level Total Ranking. The hierarchical sorting in a step is a single sorting in a small range of levels. This step is to use the weight value of the upper factor, combined with the weight value of the bottom factor, and finally, we get the risk weight value of the bottom risk factor in the entire hierarchy and then sort.

TABLE 1: Consistency index RI.

N	1	2	3	4	5	6	7	8
RI	0	0	0.52	0.88	1.11	1.25	1.35	1.42

TABLE 2: Total ranking of AHP hierarchy.

Level C-D	Level A-B				W
	B1	B2	B3	B4	
	0.047	0.260	0.133	0.4688	0.0314
C1	0.231	0	0	0	0.0308
C2	0.104	0	0	0	0.0159
C3	0.666	0	0	0	0.1406
C4	0	0.116	0	0	0.0746
C5	0	0.223	0	0	0.0884

TCI = 0.0292; TRI = 0.5478; TCR = 0.053 < 0.1.

3.2.4. One-Time Inspection of the Total Ranking of Levels. When the weight value of each factor in the color influencing factors of the entire smart city is obtained, the total ranking of the levels needs to be tested once, and the total ranking of the levels is checked through. When we calculate $CR < 0.1$, it is believed that the results of the overall level total sorting have satisfactory consistency; otherwise, the values of the elements of the matrix must be rejudged. The consistency index RI is shown in Table 1.

3.3. Getting the Design Plan with the Help of Digital Technology Design Platform. Through the digital design processing of urban color base points, boundaries, and regional structure models, as well as the processing of urban color adjacent relations on this basis, to solve the digital expression of urban color transition and coordination methods, we can use MATLAB. The programming software under the program platform realizes the design scheme of the main color of the city.

The process of using software to realize the design scheme is actually a simple software application process. In this process, one aspect is the control of the changes in the spatial structure of the main color of the city, in response to the location change or the increase or decrease in the number of urban color structural factors such as urban color base points and color boundaries encountered in the process of urban renewal and development. For the control of the situation, such a method can have a strong adaptability and practicality in the parametric design of the main color design of the city. The second is to control the transitional coordination mode between the key elements of urban color and find the best main color effect from it. The parametric design process of urban color main tone design is also a transformation of the process of urban color design from an expert professional design process to a popular application mode. That is to say, in the design process using parametric software, the designer can realize the design of the main color scheme of the city through his own design concept of the main color of the city for the general public

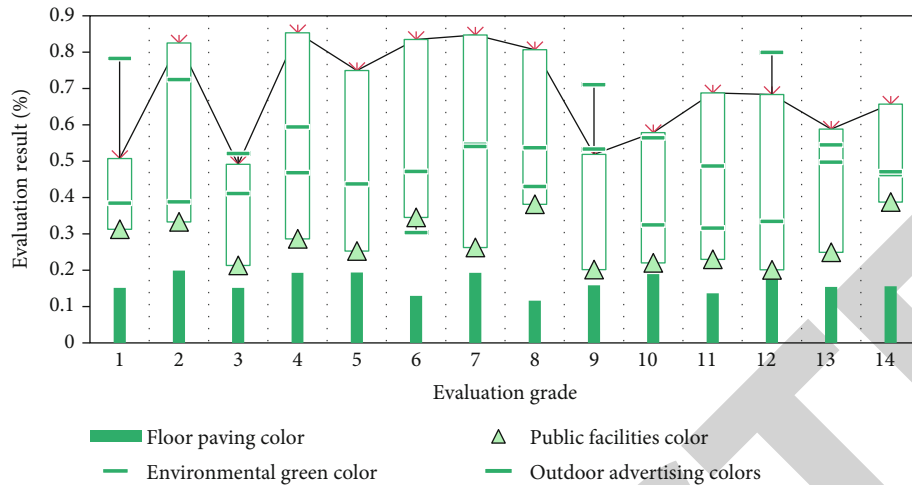


FIGURE 2: The weight of each design element in the color plan of urban pedestrian streets.

and provide more reference schemes for the final main color scheme of the city.

Urban color planning and design is not only to determine a hue for the color of a city but also to highlight the natural beauty of the city and its harmony with the natural environment. To a certain extent, it can reflect the historical context of the city and adopt colors to identify the functions of cities and urban areas. The beauty of human colors comes from nature's influence on humans in the historical process of "natural being born into humans." For humans, natural primary colors are easy to accept, even the most beautiful. With regard to the principle of harmony with the natural environment, harmony is the core principle of the use of colors, as well as the core principle of urban colors. Harmony requires the unity or coordination of urban colors in changes and differences. The coordination of urban colors includes two aspects. One refers to the coordination of artificial colors and natural colors or the colors of the urban natural environment; the other refers to the coordination of artificial colors and natural colors or the colors of the urban architectural environment. The color of the city must first be coordinated with the color of the natural environment. Continuing the principle of urban historical context, urban color and historical accumulation have become the carrier of urban culture and continue to tell the historical culture of the city. Therefore, historical and cultural cities or ancient cities should maintain their traditional colors to show the authenticity of their history and culture in order to continue their historical context. If the original style of the city has been destroyed, at least the colors of the buildings surrounding the historical buildings and cultural monuments must match those of the ancient buildings.

3.4. Evaluation and Selection of Design Schemes. Although the parametric design method of the main color of the city is convenient, efficient, objective, and open to the general public, the judgment and selection of the design scheme need to be more strict. Special meetings should be organized by the urban planning department and the urban management department to invite urban color planners, color

experts, and relevant urban management departments to participate in the selection. At the same time, the opinions of urban residents should be emphasized to ensure that the main color scheme of the city reflects the characteristics of the city. It also conceals the aesthetic needs of most urban residents. After determining the main color scheme of the city, it is necessary to compile guidelines based on the distribution of the main color of the city to control the implementation process of the main color of the city in the form of regulations.

3.5. Principles for Determining the Color Transition Mode.

After determining the color base point and the partition boundary, the basic pattern of the city's color distribution has been roughly determined. In the urban color pattern framework, what we need to consider most is the issues between color base point and base point, between base point and boundary, and interface color transition.

3.5.1. The Transition Mode between Color Base Points Considers the Effect of Rhythm Change. The problem of color transition between color base points is to solve the problem of uniform and coordinated color transition in the derivation process of the main color of the city. According to the main color coordination mode of the city color, there can be a lightness gradient transition method, a purity gradient transition method, a hue gradient transition method, and so on.

3.5.2. The Transition Method between the Base Point and the Boundary Should Be Selected in Accordance with the Boundary Conditions. The boundary is an important interface between color areas or between the main color of the city and the natural color. The color effect to be achieved by the border directly affects the color transition mode. For example, in the boundary between regions, the color transition method can be considered to reduce the chroma. Under the influence of the natural boundary, the transition method will vary depending on the natural conditions of the boundary.

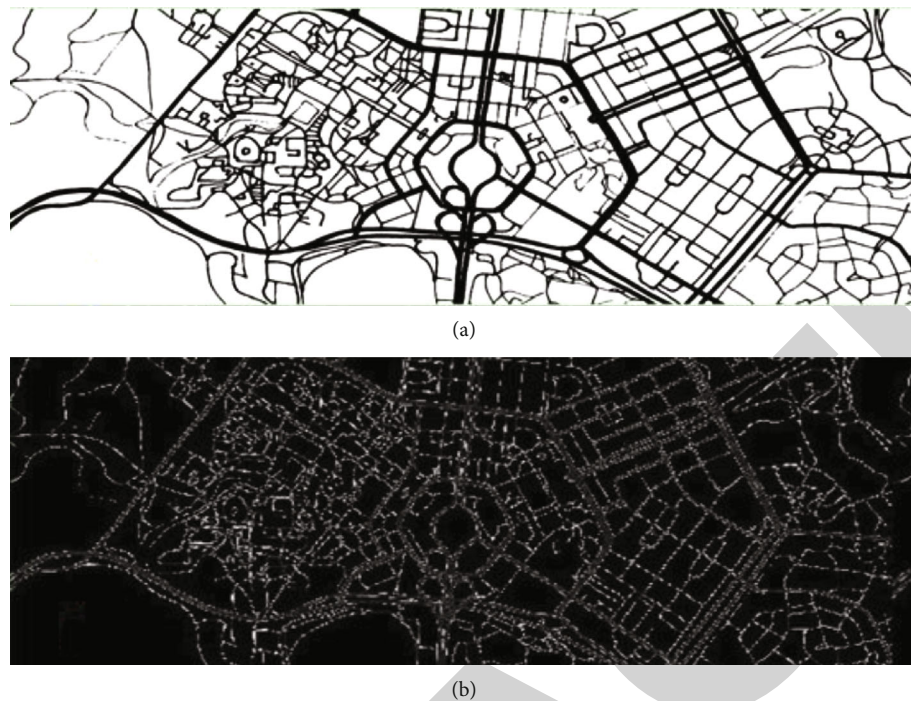


FIGURE 3: Grayscale processing of the image using MATLAB software.

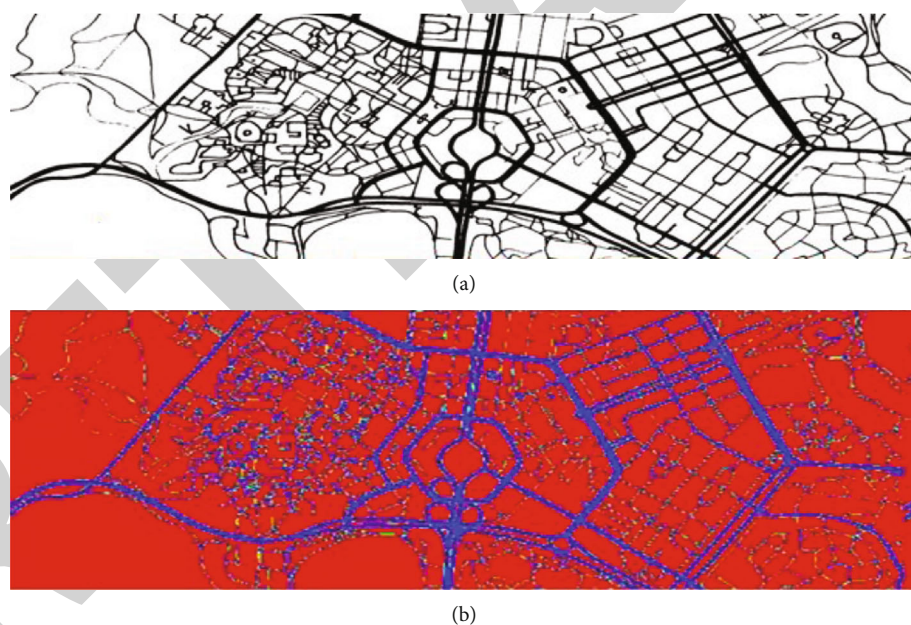


FIGURE 4: Uniform city color effect.

3.5.3. *The Color Change of the Interface Is Naturally Generated by the Transition between the Base Point and the Boundary.* The color effect of the urban interface directly affects the color visual experience of urban residents or tourists. We need to control and grasp the important interface colors of the city in the design. In general, the color effect of the urban interface is naturally produced by the transition between the base point and the boundary. For urban interfaces that require special treatment, you can add color base

points that control rhythmic changes to the interface in the form of “acupuncture” to achieve the effect.

3.6. *Design Schemes in Urban Planning.* We subdivide the ideal color map of the main color of the city and apply it to all levels of the city color planning, further refining the design of the city partition color, and we get the recommended color spectrum of the city color partition, design the color of the city street to get the color of the city street

TABLE 3: Specific color benchmarks.

Applicable area	Hue	Lightness	Purity
Facade base color palette (approximately 70%-80% of the total facade area)	5YR-5Y series	4.0-9.0	1-6
Auxiliary color of the facade (approximately 15%-25% of the total facade area)	0.1R-5Y series, 5Y-10Y series	3.0 or more	2-6
Accent color of the facade (approximately less than 5% of the total area of the facade)	Full hue	Free	Free
House top color (slope house top)	5R-5Y series	3.0 or less	4.0 or less



(a)



(b)

FIGURE 5: Smart city area coloring scheme.

quantitative control plan, further design or improve the design of urban architectural colors, and finally implement the urban color main color design plan to the implementation of urban architectural colors, effectively realizing the quantitative control of urban colors.

4. Results and Discussion

The total ranking of AHP levels is shown in Table 2. After calculation, it can be seen that both the CR in the single sorting and the TCR in the total sorting are less than 0.1. Therefore, each ranking in the judgment matrix has satisfactory consistency, passing the consistency test of the single ranking and the overall consistency test of the total ranking.

The weight of each design element in the color plan of urban pedestrian streets is shown in Figure 2. Environmental greening is based on plants and flowers as the medium. It is not a green plant alone. There are two problems in the greening of many pedestrian streets. One is the excessive pursuit of green, resulting in a single color; the other is that

the quantity of environmental greening is scarce and the quality is not good, resulting in a lack of diversity in colors. The green color of the environment affects the overall color planning of the pedestrian street to a large extent. Then, we consider the color of public facilities. As an integral part of the pedestrian street space, public facilities can be seen everywhere in the urban pedestrian street environment. Although its individual size is small, it exists in a large number in the pedestrian street environment. Therefore, the impact of the landscape color produced by their orderly arrangement cannot be ignored. Through the design and treatment of the color planning of pedestrian streets, public facilities can play a role in shaping the characteristics of urban pedestrian streets, improving the quality of the city, and decorating the urban landscape.

After clarifying the nodes and borders of urban color, we can construct a parametric model of smart city color design. In this model, our main concern is the division of urban color structure areas, the distribution of important color base points, and the spatial relationship between the base

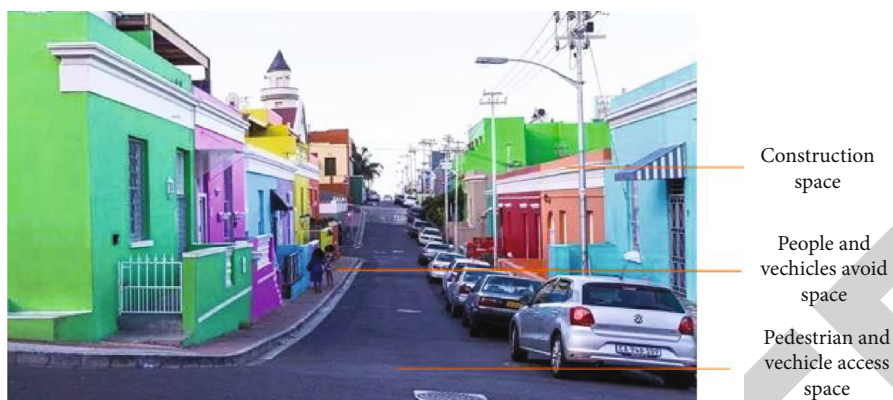


FIGURE 6: Overall design of color style.

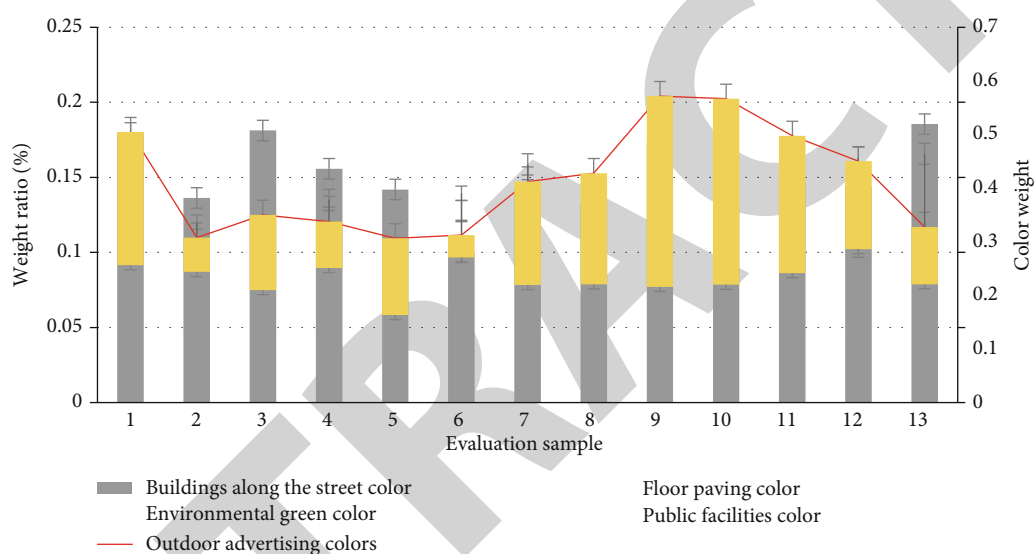


FIGURE 7: Color resource evaluation.

point and the boundary which is shown in Figure 3 for gray-scale processing of the image using MATLAB software.

The unified urban color effect is shown in Figure 4. This kind of urban color planning method is mainly suitable for plain cities, and it is easy to achieve better color effects when the city is not large. Generally speaking, the more important the city buildings are, the more important their colors are. The central area may be a commercial center, an administrative center, or a historical preservation area. The color choice of the city center will directly affect the color atmosphere of the main color of the entire city.

The use of high-purity colors on the facade of the building not only makes it difficult for people to appreciate the changes in the natural landscape but also makes it difficult to form a good long-range view, let alone the continuity of the middle-range landscape. Therefore, the use of high-purity colors on the facade of the building should be restricted. The specific color standards are shown in Table 3.

In the site selection stage, multiple layers of data such as the current status of the city and various planning indicators are superimposed for scientific site selection. In the planning

approval process, scientific decision-making is made on the rationality of the planning scheme, and the size, height, and orientation of the building are adjusted in real time according to the various binding control systems and planning design conditions in the planning and other parameter requirements. It can perform sunlight simulation analysis, height control analysis, and visibility analysis of the environment in which the building is located and can also display and compare multiple planning schemes of the same project on multiple screens. The smart city area coloring scheme is shown in Figure 5.

According to the different surrounding environment of the green color of the street environment, the overall color design style can be the same, changing rules, and mixed. Different streets have different properties and themes, and the overall color style of environmental greening can contrast the overall color environment. The overall design of color style is shown in Figure 6.

The color resource evaluation is shown in Figure 7. The color weight value of the ground paving is 0.45, accounting for 45% of the total weight value. It is the least problematic

factor in the planning of the color resource evaluation. It shows that the ground paving color of the pedestrian street is reasonable for the users, and it is for people at this stage. The shopping behavior has greater security. Due to the single color of the ground paving, the color has poor spatial limitation on the ground paving. The outdoor advertising color weight value is 0.287, accounting for 28.7% of the total weight value. It is the second least problematic factor in the planning of color resource evaluation. The outdoor advertising color reflects the commercial potential of the pedestrian street color and directly affects the development of the pedestrian street color at the same level, as natural media, outdoor advertising colors have greater publicity and guidance for users. The color weight value of public facilities is 0.147, which accounts for 14.7% of the total weight value. The weight value of the color of public facilities is reflected in the color of pedestrian streets. The number of public facilities in pedestrian streets is relatively small, which leads to the symbolic and visual communication of the color of public facilities. The level of sex and richness is weak.

5. Conclusion

Urban color planning must be integrated into the natural environment of a smart city to become an integral part of the entire city. This research uses CityEngine and GIS data to quickly create a virtual city. When constructing the AHP model, once the weight value of each factor in the color influencing factors of the entire smart city is obtained, the total ranking of the levels needs to be checked once. After that, the parametric design of the main color tone of the city is studied through the MATLAB program platform. Explorer provides comprehensive and rich 3D digital city roaming browsing, query positioning, analysis, and other functions; supports the loading of multiple data sets from the Internet and local; and can dynamically load massive 3D city simulation models above and below ground. Finally, the design of the urban architectural color or improvement plan is further carried out, and the urban color main color design plan is finally implemented in the implementation of the urban architectural color, which effectively realizes the quantitative control of the urban color. This research helps to enhance the regional and local cultural characteristics. In future research, the influence of local topography and landforms on the color of urban streets is mainly reflected in the level of color. Making full use of the local landforms can create a harmonious and diverse color landscape for the color landscape of urban streets.

Data Availability

No data were used to support the findings of this study.

Conflicts of Interest

The author declares that there are no conflicts of interest regarding the publication of this article.

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