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Research Article

The Use of Scientific Programming Method under Visual Communication Design Concept in Urban Landscape Design

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The purpose of this study is to provide more orderly and convenient urban planning ideas for the fast-paced life in the complex urban environment. The current sign design is analyzed according to the needs of urban residents for barrier-free sign design, and the sign design based on urban space color is established. An urban landscape visual communication optimization method is proposed based on hue saturation value (HSV) technology. The multiscale retinex (MSR) algorithm is used as a reference for simulation experiments. The experimental results show that the designed optimization method is significantly better than the traditional method in the expression effect of visual communication. First, the attention time of the sign design can be reduced by more than 3 seconds, which can effectively improve the lives of urban residents and tourists and improve their browsing efficiency. Next, 94% of the citizens believe that optimized urban signs are more prominent than traditional ones. Finally, the sign design optimization method proposed provides an image with a higher definition than the traditional sign design method. The proposed sign design and optimization scheme can effectively coordinate the relationship among urban landscape design, guided objects, and cities, help busy urban life, and provide new ideas for the development direction of visual communication design.

1. Introduction

Urban residents live an increasingly complex life with the progress of living standards. They often encounter various problems in transmitting and exchanging spatial information and crowd information in their daily life activities [1]. It requires urban sign design to deal with and coordinate the relationship between guided objects and cities [2], and use sign design to provide people with effective and orderly information and services. Sign design appeared in Europe and America and developed rapidly after World War II. Meanwhile, many recognition systems have been developed [3]. One of the reasons for the development of sign design is that it has mature design standards abroad, which provides reference specifications for the process of system design [4]. In the United States, design agencies even customize a special specification design manual for system design as a standard to ensure global unification [5]. In China, with the international development at the end of the last century, China has studied the problem of solving the standardization of urban sign design [6] and issued relevant specifications, providing a feasible solution to solve the disordered, complex, and unclear design of signs [7]. However, barrier-free communication and visual beauty in sign design have become increasingly important with the increasing demand for humanization.

Image is the key carrier of information dissemination in visual communication [8]. The higher the image quality is, the higher the effect and efficiency of information transmission are. In addition, sign design will tend to be more humanized [9]. However, the image quality will be affected by irresistible environmental factors in the process of generation and information transmission. In the process of image generation, the introduction of an image processing terminal will maintain and enhance information to ensure the effectiveness of visual communication and the efficiency

of sign design [10]. The visual communication in traditional sign design lacks effective image processing technology. Therefore, with visual features as the starting point, the image performance effect of visual communication is optimized to provide a new idea for the technical support of sign design. Therefore, based on the concept of visual communication design, hue saturation technology (HSV) and a multiscale retinex (MSR) algorithm are used for the urban barrier-free sign design through scientific programming methods. The proposed method can meet the practicability of signs and improve the clarity of images to increase the beauty of urban signs.

2. Methods

2.1. Urban Sign Design System

2.1.1. Sign Design. The development of the sign design at the early time was to solve the problem of finding the way for people unfamiliar with the region. After the Second World War, it developed into a road sign. The progress of science and technology and the rapid development of urban life construction lead to the change of the sign design [11]. Now, it has developed into a complete visual communication system. From the perspective of visual language, the performance of sign design involves graphics, text, and color; from the aspect of material application, various material applications such as metal, wood, and stone are involved; from the perspective of target groups, it includes from young children to the elderly and from healthy people to disabled people; from the concept and significance of design, it includes ergonomics, general design, and complex design [12].

Among the constituent elements of the sign design, graphics are regarded as the characteristics of things or reference objects. The function of graphics is concrete, the dissemination speed of graphic information is fast, and the perception is more intuitive [13]. Meanwhile, in the space of a two-dimensional plane, for the same amount of information, the space area required by graphics is less than text [14]. The shaping of image content can increase the activity of the whole sign design, increase more effective information and aesthetic effect in a limited area, and reduce the recognition time of people. Color, as another element of the sign design, includes the function of arranging and integrating modeling and color [15]. It can affect people's emotions, so it can attract people's attention and occupy a crucial position in the recognition process. Different groups have different psychological performances for different colors. The color application in the sign design must be a common standard that can be accepted by the public, a social and universal practical tool, and be used in a wider range as much as possible.

2.1.2. Problem Analysis of Traditional Sign Design. The design requirements of sign design have become increasingly complex due to the continuous development of urban living standards. The sign design should not only meet the travel needs of ordinary people but also analyze the characteristics of special people in society when they receive feedback information so as to improve the sign design humanized according to the information [16]. Meanwhile, the diversity of people and different cultural backgrounds, regional characteristics, and other factors result in different needs for the sign design system. From the perspective of educational level, urban groups currently include illiterate and literate groups. For the illiterate group, pure text guidance will cause information defect, so the sign design should also meet the needs of the group in terms of sound, image, and multimedia interaction; from the perspective of regional characteristics, the sign design with too strong regional language will lead to information defect, which is not conducive to the identification and use of the sign design by tourists and foreigners; from a sound point of view, the sign design not only considers the sound people but also focuses more on the needs of the disabled. Most of the traditional sign designs are difficult to meet the needs of providing high-quality and efficient services for the disabled [17]. Unlike the sign design in other developed countries, the development and research of domestic sign design are still in the early stage, and the planning of sign design is still in the scope of graphic design [18]. Although the sign design belongs to the category of graphic design, there are defects in design and thinking when considering public signs only from the perspective of graphic design. It usually makes the design of the sign design insufficient to coordinate and solve the relationship between people and the urban environment, resulting in the value of many existing signs only floating on the surface and the difficulty in achieving real information transmission, which is not the product of the interaction between people and cities in the real sense.

2.2. Information Cognitive Architecture of Sign Design

2.2.1. Architecture Design. Information cognition is a process for the public to understand, acquire, and judge information based on the sign design, and it is also a cognitive process of visual information [19]. The process of recognizing visual information is similar to the working principle of computers. The information viewer realizes the visual information processing and information cognition through the use of the sign design. The input, output, and decision making of information are very complex cognitive structures in the sign design. The communication between the browser and the system can ensure that the information is received effectively and is conducive to the detailed and rapid judgment and decision making of the information. The process architecture of information cognition in the sign design is studied. Figure 1 displays the specific process.

The content of Figure 1 shows that the color of the sign design can affect the perception and emotion of the group so as to realize the expression and transmission of complex and small information. In the construction of the corresponding relationship between color and information of the sign design, it is essential to fully study and consider the characteristics and psychology of the audience. For example, when the sign design of Wollongong hospital in Australia is conducted, red color with strong visual impact is used in the emergency room and the same area on the first floor of the

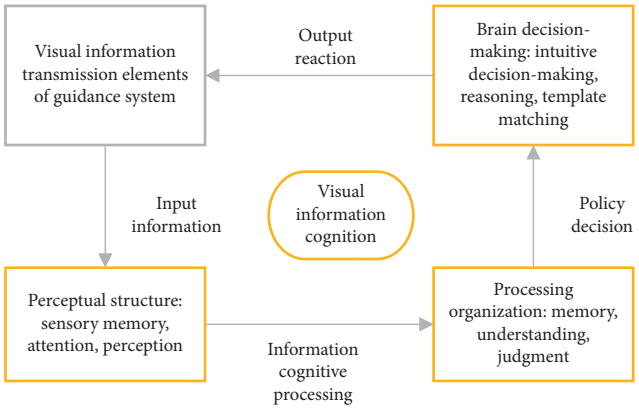

Figure 1: Information cognitive architecture of sign design.

hospital, blue with a quiet atmosphere is used in the operating room and intensive care unit on the second floor of the hospital, and warm yellow is used in the inpatient area of the hospital [20]. This shows that the color symbols in the sign design can ensure the accuracy and readability of the information dissemination process. Thereby, the color selection in the sign design should fully consider the symbolic representation and significance of color. Figure 2 presents the information transmission process of color.

In the sign design, color elements should not only be well distinguished but also have a strong correlation with information. In each level module of the sign design, the correspondence between color and information can make the transmission of information integrated and continuous.

2.3. Optimization Method of Color Visual Communication in HSV Space

2.3.1. Image Enhancement Theory. Generally, the first channel for people to obtain an impression from public space is color, and different colors provide different feelings and impressions. Certain visual habits will be formed after matching and corresponding use of different colors for a long time. Table 1 displays the impact of different colors on the group's emotion.

Human vision can realize the sensitive perception of different colors. The application of color with a strong performance effect has become the main way of communication in the design of space color sign design. For the contrast of sensitivity, hue, purity, and other elements of different colors, the overall planning and standardized construction of color order should be realized in the design so as to convey the information more accurately and vividly. The optimization method researched and designed refers to the coordination factors between the main color of the system and the urban landscape environment, and also ensures that the sign design can be distinguished in the environment so as to clearly display the information and facilitate the use.

In order to avoid the coefficient insensitivity of the discrete wavelet transform (DWT) algorithm in the process of image processing [21], a dual-tree complex wavelet

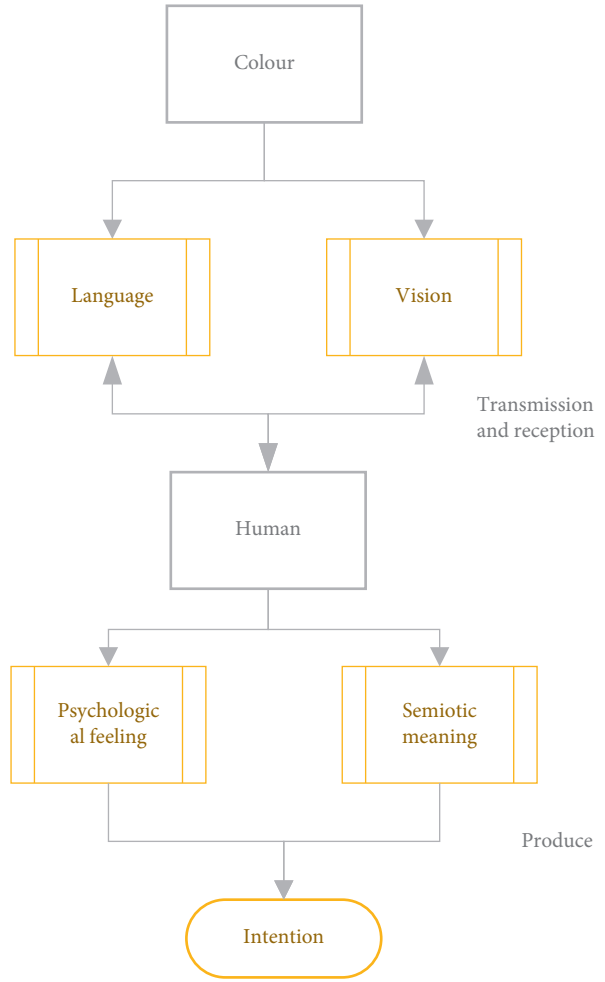

Figure 2: Color information transmission process.

transform (DT-CWT) algorithm is introduced. Figure 3 shows the process of algorithm transformation.

According to the transformation structure in Figure 1, $H_i(n)$ is defined as the real part transformation of DT-CWT and $G_i(n)$ is the imaginary part transformation. 0 and 1 are conjugate and orthogonal to each other, and z is the frequency. Equations (1) and (2) are obtained as follows:

$$H_0(z) + H_0\left(\frac{1}{z}\right) + H_0(-z) + H_0\left(-\frac{1}{z}\right) = 2, \tag{1}$$

$$H_1(z) = z^{-1}H_0\left(-\frac{1}{z}\right)\infty. \tag{2}$$

The scaling function is defined as $\varphi(t)$, its Fourier transform is $\Phi(w)$, the translation amount is t, the scaling amount is n, and the basic equation is $\Psi_h(t)$. H_0, h_1, g_0, and g_1 are the low-pass filter and the high-pass filter, respectively, and the real number equations of the filter bank are obtained; equations (3) and (4) are as follows:

$$\varphi_h(t) = \sqrt{2}\sum_n h_0(n)\varphi_h(2t-n), \tag{3}$$

$$\Psi_h(t) = \sqrt{2}\sum_n h_1(n)\Psi_h(2t-n). \tag{4}$$

Table 1: The influence of color on emotion.

Color	Emotion	Significance
Red	Excited, nervous, festive	Prohibition, negation, fire prevention
Yellow	Bright, mysterious, brilliant	Warning, attention
Blue	Calm, deep, cold	Instructions
Green	Pure, healthy, hope	Safety, route
Brown	Neutral, land	Attractions, facilities
Orange	Dynamic, fashionable	Construction
Black	Deep, solemn, formal	Graphic or text background
White	Pure, simple	Graphic, text background, or border

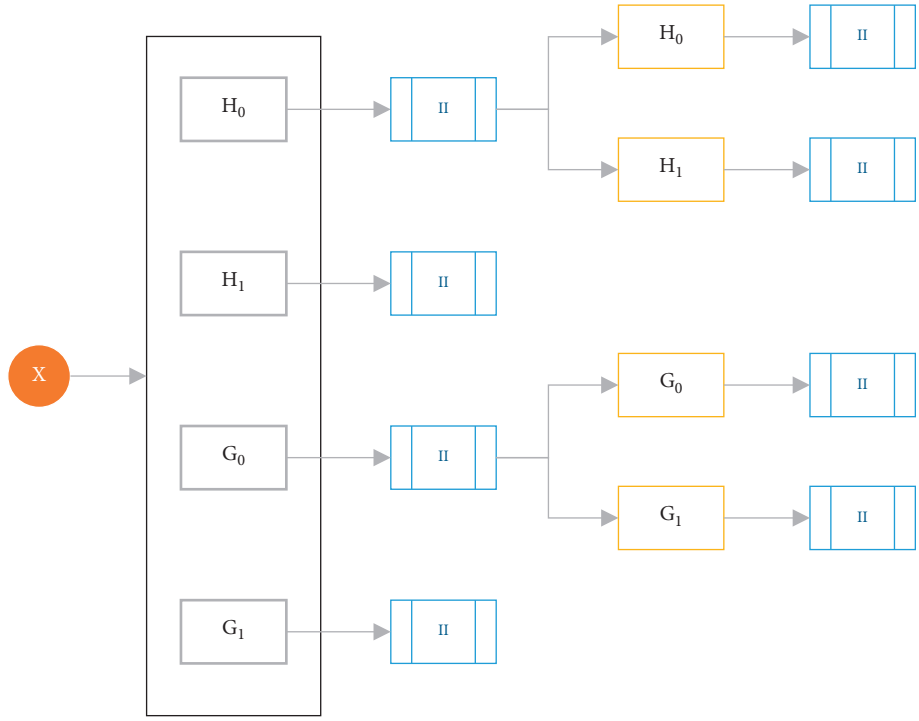

Figure 3: DT-CWT conversion process.

Meanwhile, (5) and (6) are the expressions of the remaining conjugate filter parts.

$$\varphi_g(t) = \sqrt{2}\sum_n g_0(n)\varphi_g(2t-n), \tag{5}$$

$$\psi_g(t) = \sqrt{2}\sum_n g_1(n)\psi_g(2t-n). \tag{6}$$

According to the above equations, j is defined to determine the scaling degree, w is the basis function matrix, e is the scale frequency, and the scale function can be obtained as follows:

$$H_{0b}\left(e^{jw}\right) = H_{0a}\left(e^{jw}\right)e^{jw/2}. \tag{7}$$

The sequence is defined as ϕ. x and y are the scale function coefficients and the wavelet function coefficients, respectively. After multiple accumulation calculations, the sequence is obtained as follows:

$$\begin{aligned}\phi_1(x,y) &= [\phi_a(x)\phi_a(y) - \phi_b(x)\phi_b(y)] + j[\phi_a(x)\phi_b(y) - \phi_b(x)\phi_a(y)],\\ \phi_2(x,y) &= [\phi_a(x)\phi_a(y) + \phi_b(x)\phi_b(y)] + j[-\phi_a(x)\phi_b(y) + \phi_b(x)\phi_a(y)].\end{aligned} \tag{8}$$

2.3.2. HSV Optimization Method. Color space usually refers to a model that can provide a color description of images in the process of image processing [22]. The common color space is red-green-blue (RGB) color mode. Here, another HSV color space is introduced [23]. It is defined that R represents red, G represents green, B represents blue, H represents hue, S represents saturation, and V represents lightness. The transformation equation of HSV color space can be obtained through nonlinear transformation based on RGB:

$$V = \max(R, G, B), \tag{9}$$

$$S = \begin{cases} \dfrac{V - \min(R, G, B)}{V}, & V \neq 0, \\ 0, & \text{else.} \end{cases} \tag{10}$$

The description model of HSV color space is obtained through equations (9)–(11), and the optimization process is studied and designed. Based on the improvement of the MSR algorithm, a smoother guide filter with greater detail retention is employed to replace the Gaussian filter [24]. Figure 4 shows the new algorithm architecture.

$$H = \begin{cases} \dfrac{60(G - B)}{V - \min(R, G, B)}, & V = R, \\ 120 + \dfrac{60(G - B)}{V - \min(R, G, B)}, & V = G, \\ 240 + \dfrac{60(G - B)}{V - \min(R, G, B)}, & V = G. \end{cases} \tag{11}$$

2.4. Barrier-Free Sign Design in the Urban Area

2.4.1. Color Selection Principles of Sign Design

(1) Adaptability. In the sign design, the adaptability between color and space should be focused on when the space color is planned. This not only requires meeting the needs of different users in different spatial fields but also requires the color planning of the system to accurately realize information transmission and efficient information interaction. When the color adaptability is high enough, the information transmitted by the sign design will be preciser and easy to obtain and interpret so as to achieve faster guidance efficiency.

(2) Correspondence. The establishment of correspondence between color and information is the basic guarantee for the public to obtain their target information in the urban environment. By encoding the color, transforming the information into code, and editing and arranging the spatial color, more accurate information with high correspondence basis can be established. The information expressed on this basis forms an identifiable condition, which can help the public to screen and extract information quickly.

(3) Systematicness. Color is a complete element structure in the sign design. When it is isolated from the sign design, it will not only cause the phenomenon of low quality and low accuracy of the information but also affect the continuity of the information transmission process. The sign design can no longer perform its functions when the transmission of information is interrupted. Besides, space environment and space color are also systematic. With the assistance of color, the public selects different coherent information from the space so as to obtain more comprehensive content.

2.4.2. Barrier-Free Sign Design in the Urban Area.

The concept of barrier-free design is put forward by United Nations (UN) in the 1970s. In modern society with the rapid development of economy and science and technology, the plan and design of the environment and facilities in public space should take into account the needs of different kinds of people. For groups such as the visually impaired and the hearing impaired, urban design should reflect care and respect and provide convenience for the lives of these people [25]. In the early stage, barrier-free design is mainly reflected in travel and signs, such as blind tracks, tactile road signs, dedicated lanes, and toilets. Besides, barrier-free design should also take into account entertainment and life, and human design should focus more on rationality and humanistic care.

Generally, the sign design is often implemented and promoted by healthy people. In the current barrier-free sign design, the focus is mainly on the hearing-impaired and wheelchair users, and the care for the visually impaired will be slightly insufficient. For example, the blind path is not employed to a large extent, because blind people are even difficult to get out of the house. There are still massive similar problems, and the distance requirements for real humanistic care are still far from enough. Moreover, higher requirements have also been put forward for the logo design in the sign design, which should not only be standard and accurate but also have the ethics of design, reflect respect and care, and include cultural connotation.

2.4.3. Visual Barrier-Free Sign Design.

Based on the sign design of the urban subway, the sign design for visually impaired people in the subway station is planned. Figure 5 shows the classification architecture of sign design planning.

Visually impaired people include blind people and color-blinded people, and the number of red-green color-blinded people is the largest among color-blinded people [26]. Thereby, red-green color-blinded people are taken as the research object to study the spatial color of the urban subway. Web Content Accessibility Guideline (WCAG) is used as a reference to meet the requirements of concise and clear colors and easy identification in urban subway stations, and the sign size regulations under different sight distances that can adapt to visual habits and clearly express information are designed, as shown in Figure 6.

Table 2 shows the design of materials and processes.

2.4.4. Experimental Design.

Thousand visually impaired people are selected as the samples and randomly divided into 10 groups. The international general graphic design is selected to test the attention time of the sample to the sign design. Regarding color selection, high-tech color elements based on the cold color system are selected and designed, and the image is divided into several blocks so that the elements can correspond to the samples to quickly find the target area of interest. In the text design, the text information shall be simplified as much as possible, and the different levels of information of the sign design shall be displayed

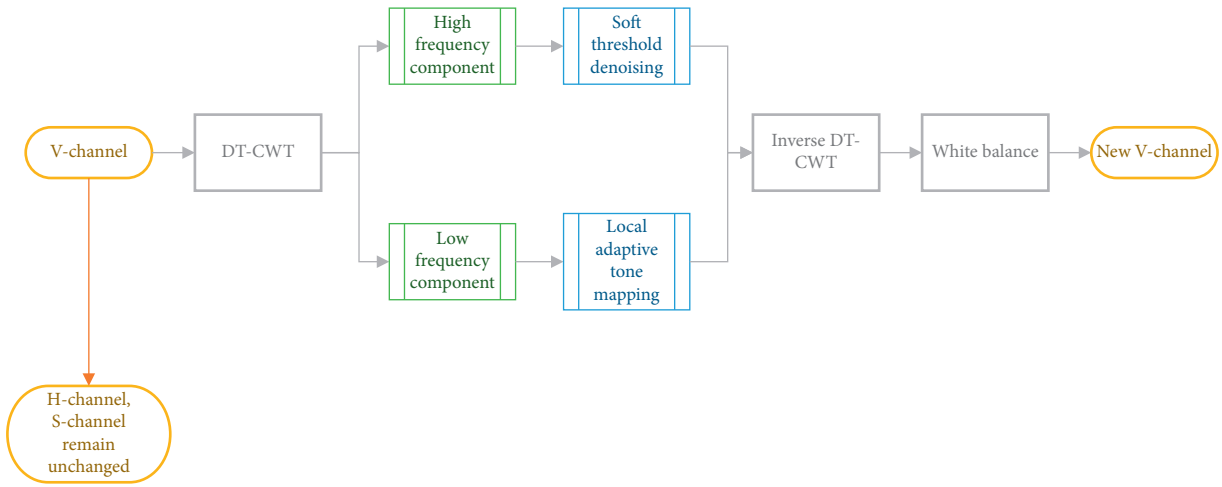

Figure 4: Optimization method framework.

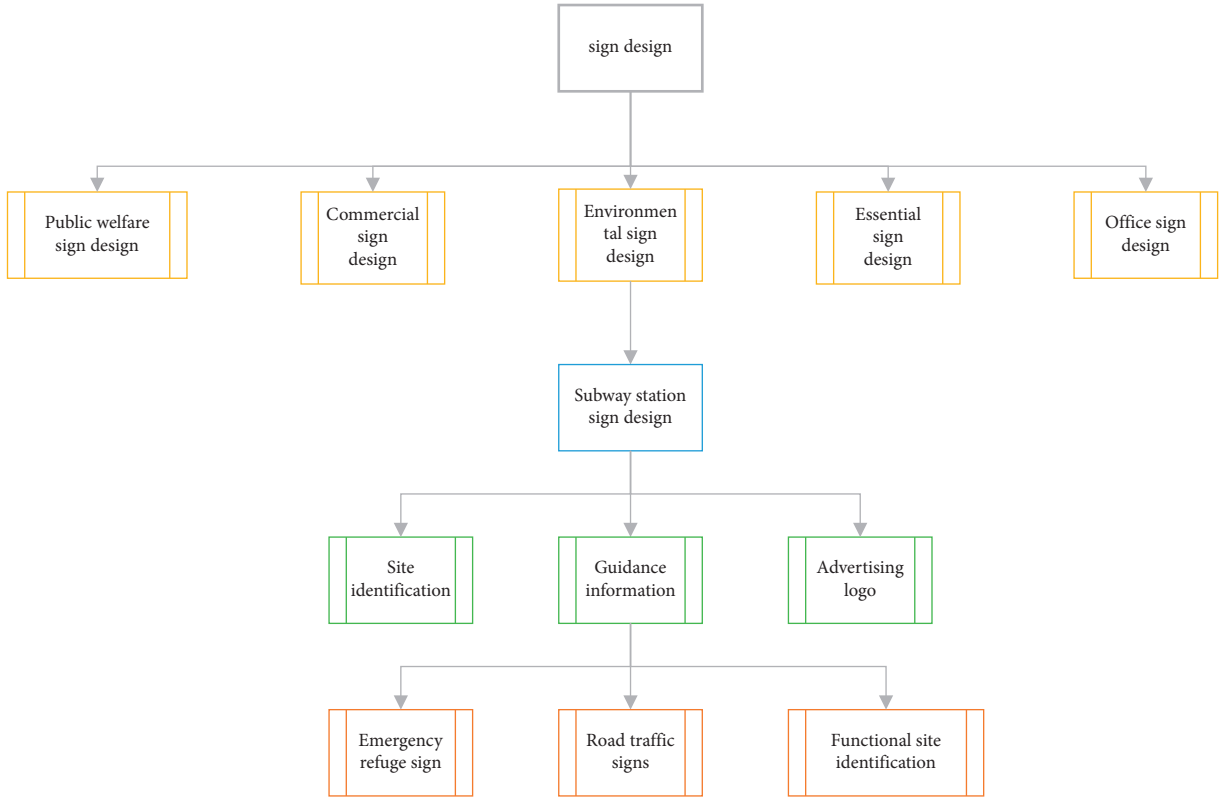

Figure 5: Planning diagram of barrier-free tutor system.

and transmitted by using the neat and tidy typesetting and text structure with the prominent color effect so as to make an experimental study on the information memory degree of the sample [27].

The parameters in Table 3 are selected to conduct the optimization scheme experiment of image processing.

3. Results and Discussion

3.1. Analysis of Experimental Results of Regional Sign Design. The 10 groups of 1,000 visually impaired samples mentioned above are taken as the research objects to conduct experiments and data sorting on the attention duration of the samples in the coverage area of the sign design. The attention duration of traditional sign design and current interactive sign design is compared. Figure 7 displays the results obtained.

Figure 7 shows that the attention duration of urban barrier-free signs designed by traditional and interactive systems is about 15 seconds and 12 seconds, respectively. It shows that the traditional urban barrier-free signs attract the public's attention for a long time, so the public needs to spend a longer time to obtain the required information in the process of travel, which affects the public's travel safety. The

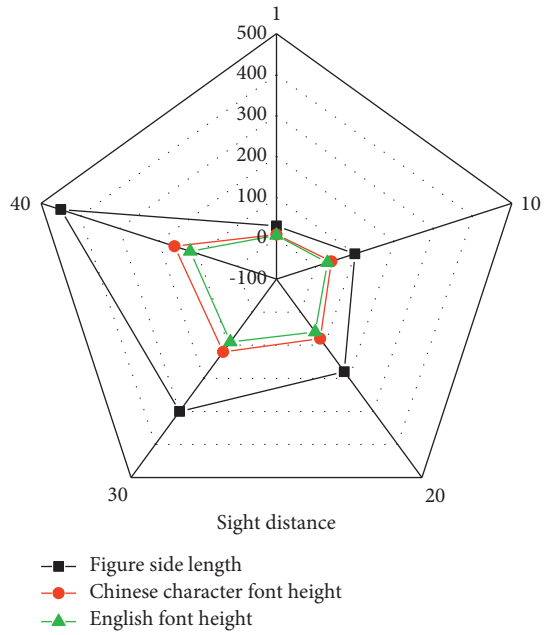

Figure 6: Design of different sight distance dimensions.

Table 2: Material and process design.

Material	Safety, environmental protection, high durability, and economic value
Station process	Antirust and anticorrosion treatment shall be carried out for metal parts; the signs of internal lighting shall meet the protection requirements of IP65; the appearance of the sign should be painted, sprayed, and baked.
Off station process	Antirust and anticorrosion treatment shall be carried out for metal parts; the signs of internal lighting shall meet the requirements of heat dissipation and dust prevention.

Table 3: Parameter design.

Item	Numerical value
Operating system	Windows 7
CPU (central processing unit)	4-core 2.5 GHz
RAM (random access memory)	8
Programming environment	MATLAB 2015

visual communication design method proposed can effectively reduce the public's identification time of signs. The research results show that the attention duration of the method proposed is generally about 8.5–9.5 seconds, which greatly reduces the public's attention time for urban barrier-free signs. It reduces the time for the public to obtain the required information through urban barrier-free signs and increases the safety factor for public travel. In contrast, the sign designed by the visual communication design method proposed is more suitable for the construction of contemporary cities. The attention duration of single-layer sign design is studied to verify the efficiency results of each part of the system. Figure 8 presents the results.

Figure 8 suggests that in the sign design on the first floor, when the sample obtains the desired information, the attention time of the traditional system and the interactive design system is about 10 seconds and 9 seconds, respectively. However, the attention time required for the sign design proposed here is significantly lower than that of the first two systems, which is generally maintained at about 7 seconds. The shorter the attention time to sign design is, the faster the browser obtains information through sign design, and the higher the efficiency is. Therefore, the above research results prove that the sign design here has more application significance to improve efficiency than the traditional and interactive design systems. For the beautification degree of the system, the questionnaire is adopted to investigate the sample's views on the appearance of the system designed here. Figure 9 displays the results.

Figure 9 reveals that 94.9% of the sample objects believe that the aesthetic effect of the sign design proposed is better than the traditional and interactive design systems in terms of image, color, and features. It shows that the beautification content of the design meets the aesthetic needs and aesthetic concepts of the public. Moreover, due to the diversity of samples, a few research objects believe that the beautification effect of the design is not as good as traditional and interactive design systems.

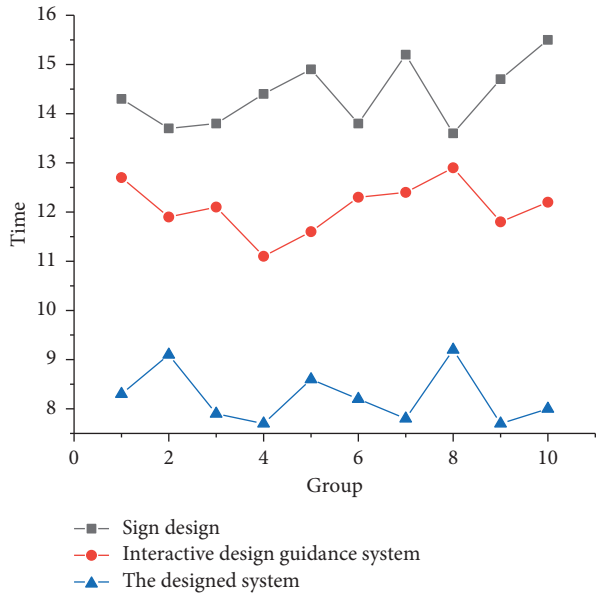

Figure 7: Attention duration of sign design.

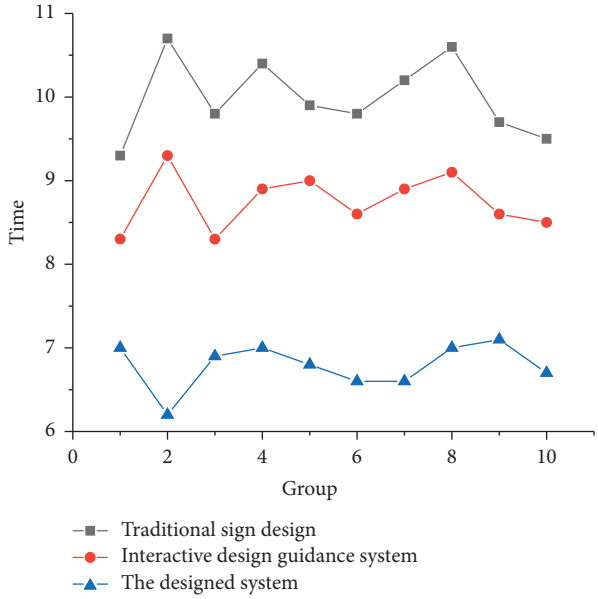

Figure 8: Attention duration of sign design in one floor.

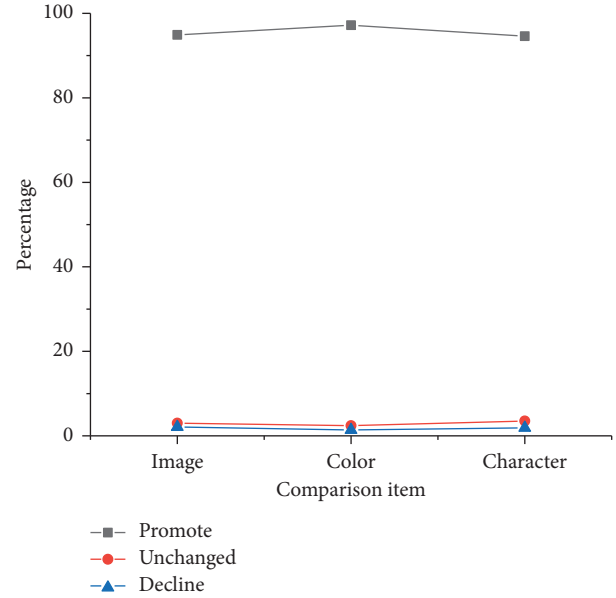

Figure 9: Attitude survey results.

3.2. Simulation Results and Analysis. The simulation experiment of the optimization algorithm is carried out on four images, and the data of the original image and the result data of the MSR algorithm are compared and analyzed. Figure 10 shows the obtained discrete entropy.

Figure 10 shows that the discrete entropy obtained by the designed optimization method is higher than that of the traditional scheme and MSR algorithm. When the discrete entropy of the original image is good, it shows that the MSR algorithm can obtain the optimization result index similar to the design algorithm. When the discrete entropy of the original image is poor, it shows that the result index of the MSR algorithm will be different from the algorithm designed here. The results show that the discrete entropy obtained by the design method proposed is generally maintained at about 7.5 seconds, while the discrete entropy obtained by the traditional design system and the interactive design system is generally maintained at about 6 seconds and 7 seconds, respectively. Therefore, the result index of the design method proposed is more suitable. In addition, the definition after image processing is compared. Figure 11 shows the results.

Figure 11 reveals that the effective values of image analysis of the designed algorithm and the MSR algorithm are generally about 8–10 and 9–14, respectively, while that of the traditional design system is about 4. The algorithm and MSR designed here can significantly improve the definition of the image, and both algorithms can realize light compensation and enhancement for the original image with

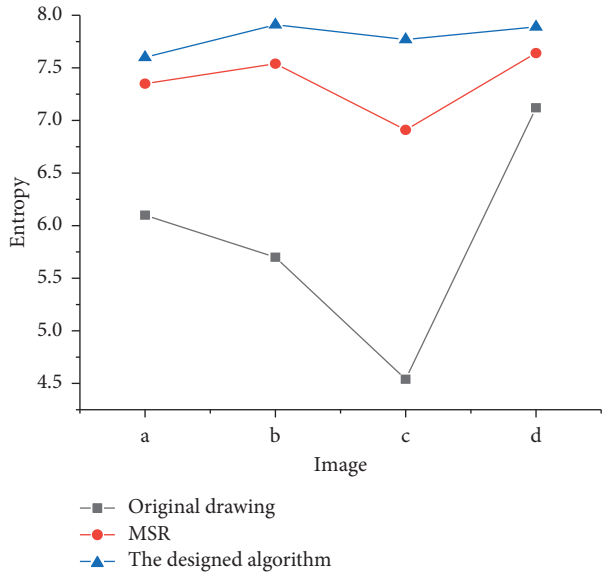

Figure 10: Discrete entropy comparison.

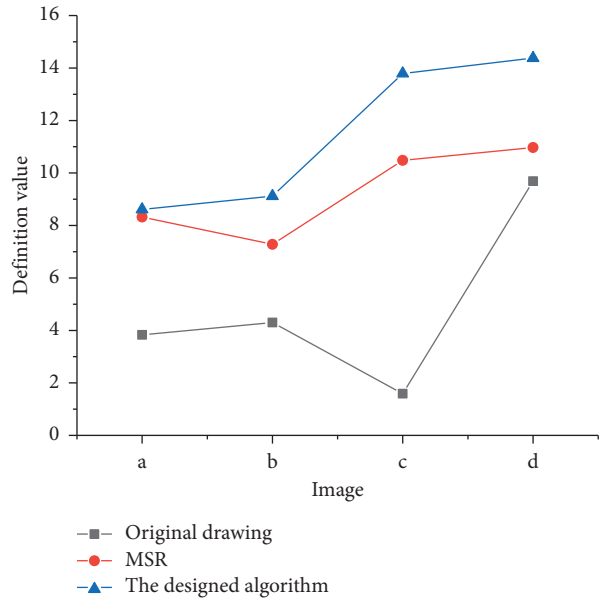

Figure 11: Definition value comparison.

insufficient illumination. However, in the process of the actual experiment, the color effect of the image optimized by the MSR algorithm is white, resulting in a certain visual error effect. Hence, the visual effect of the image optimized by the MSR algorithm is slightly worse than the algorithm designed here.

4. Conclusions

Based on the concept of visual communication design, a scientific programming method is used to study the urban color space design and optimize the image processing system in sign design. Based on the optimization scheme, the barrier-free urban sign design with the visually impaired as the main object of attention is designed. The attention time of the sample to the sign design is tested, analyzed, and then compared with the traditional sign design and interactive sign design. The results show that the attention time required by the design system proposed can be maintained at about 8.5–9.5 seconds. It is verified that the proposed visual sign design can reduce the time needed for the visually impaired to obtain information to improve the efficiency of information acquisition. In addition, the designed image processing algorithm also plays a good role in improving the image with poor illumination conditions, and the definition value of the image is increased to about 9–14. Compared with traditional image processing methods, it can better restore the authenticity of the image and can make up for the defects such as insufficient light of the image. Although this thesis provides a good design method, there are still some research deficiencies in practical application. The scope of the sign design service group will be expanded in the future. Besides, the sign design will be more comprehensively optimized in combination with electronic information technology and artificial intelligence technology to give better play to the role of humanistic care.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest to report regarding the present study.

References

[1] W. B. Jing, "Control method of urban intelligent parking sign design based on Internet of Things," *Computer Communications*, vol. 153, pp. 279–285, 2020.

[2] T. Peng and H. Deng, "Evaluating urban resource and environment carrying capacity by using an innovative indicator system based on eco-civilization—a case study of Guiyang," *Environmental Science and Pollution Research*, vol. 28, no. 3, pp. 1–15, 2021.

[3] A. H. F. Chow, R. Sha, and Y. Li, "Adaptive control strategies for urban network traffic via a decentralized approach with user-optimal routing," *IEEE Transactions on Intelligent Transportation Systems*, vol. 21, no. 4, pp. 1697–1704, 2020.

[4] Y. Peiliang, L. Xiao, and L. Meipeng, "Reform of China's planning concepts under the background of urban shrinkage," *Journal of Landscape Research*, vol. 12, no. 6, pp. 15–20, 2020.

[5] H. Huang, Y. Cai, and L. Xu, "Stability or instability: the impact of brand concepts on logo design preferences," *Journal of Brand Management*, vol. 28, no. 5, pp. 465–480, 2021.

[6] E. Weingarten, M. W. Meyer, A. Ashkenazi, and O. Amir, "Human experts outperform technology in creative markets," *She Ji: The Journal of Design, Economics, and Innovation*, vol. 6, no. 3, pp. 301–330, 2020.

[7] A. Mahmood, J. Luffarelli, and M. Mukesh, "What's in a logo? the impact of complex visual cues in equity crowdfunding," *Journal of Business Venturing*, vol. 34, no. 1, pp. 41–62, 2019.

[8] Z. Xie, J. Zhao, and T. Wang, "Attract customers with a cold look: when do we prefer cold representative," *Asia Pacific Journal of Marketing & Logistics*, vol. 31, no. 2, pp. 344–358, 2019.

[9] S. Bouyer-Ferullo, C. O'Connor, E. Kinnealey, P. Wrigley, and P. M. Osgood, "Adding a visual communication tool to the electronic health record to prevent pressure injuries," *AORN Journal*, vol. 113, no. 3, pp. 253–262, 2021.

[10] C. Yu, "Retracted article: climate environment of coastline and urban visual communication art design from the perspective of GIS," *Arabian Journal of Geosciences*, vol. 14, no. 4, p. 310, 2021.

[11] Z. Tian, "Dynamic visual communication image framing of graphic design in virtual reality environment," *IEEE Access*, vol. 99, 2020.

[12] L. Vigoroso, F. Caffaro, and E. Cavallo, "Occupational safety and visual communication: user-centred design of safety training material for migrant farmworkers in Italy," *Safety Science*, vol. 121, pp. 562–572, 2020.

[13] B. Dogaroglu, S. P. Caliskanelli, and S. Tanyel, "Comparison of intelligent parking guidance system and conventional system with regard to capacity utilisation," *Sustainable Cities and Society*, vol. 74, Article ID 103152, 2021.

[14] A. H. Jarmo, P. Tiina, H. Yi-Fang, and S. Riitta, "Dynamics of brain activation during learning of syllable-symbol paired associations – sciencedirect," *Neuropsychologia*, vol. 129, pp. 93–103, 2019.

[15] C. R. Vyhnal, E. H. R. Mahoney, and Y. Lin, "Pigment synthesis and analysis of color in art: an example of applied science for high school and college chemistry students," *Journal of Chemical Education*, vol. 97, no. 5, pp. 1272–1282, 2020.

[16] E. K. Owusu, A. P. C. Chan, and T. Wang, "Tackling corruption in urban infrastructure procurement: dynamic evaluation of the critical constructs and the anti-corruption measures," *Cities*, vol. 119, no. 2021, Article ID 103379, 2021.

[17] M. Alipour and D. K. Harris, "A big data analytics strategy for scalable urban infrastructure condition assessment using semi-supervised multi-transform self-training," *Journal of Civil Structural Health Monitoring*, vol. 10, no. 2, pp. 313–332, 2020.

[18] J. Wang, Y. Ren, T. Shu, and L. Shen, "Economic perspective-based analysis on urban infrastructures carrying capacity - a China study," *Environmental Impact Assessment Review*, vol. 83, Article ID 106381, 2020.

[19] Z. Wang, X. Bai, S. Zhang et al., "Information-level AR instruction: a novel assembly guidance information representation assisting user cognition," *International Journal of Advanced Manufacturing Technology*, vol. 106, pp. 1-2, 2020.

[20] S. N. Nasab, A. Azeri, and S. Mirbazel, "Ideal physical features of environmental design in children's hospital: using children's perspectives," *Facilities*, vol. 38, pp. 445-446, 2020.

[21] M. Haribabu and V. Guruvaiah, "Statistical measurements of multi modal MRI – PET medical image fusion using 2D – HT in HSV color space," *Procedia Computer Science*, vol. 165, pp. 209–215, 2019.

[22] J. Z. Hua, G. H. Liu, and S. X. Song, "Content-based image retrieval using color volume histograms," *International Journal of Pattern Recognition and Artificial Intelligence*, vol. 33, no. 11, pp. 19400101–194001014, 2019.

[23] C. T. Lu, J. A. Lin, and C. Y. Chang, "Recognition of film type using HSV features on deep-learning neural networks," *Journal of Electronic Science and Technology*, vol. 18, no. 1, pp. 31–41, 2020.

[24] F. Wang, B. Zhang, C. Zhang, W. Yan, Z. Zhao, and M. Wang, "Low-light image joint enhancement optimization algorithm based on frame accumulation and multi-scale Retinex," *Ad Hoc Networks*, vol. 113, no. 4, Article ID 102398, 2020.

[25] S. Liu, R. Cao, J. Wu et al., "Directly writing barrier-free patterned biosensors and bioassays on paper for low-cost diagnostics," *Sensors and Actuators B: Chemical*, vol. 285, pp. 529–535, 2019.

[26] J. Feng and Y. Pan, "A study of blind people based on morphological recognition color - graphic research," *Journal of the Ergonomics Society of Korea*, vol. 38, no. 6, pp. 483–498, 2019.

[27] Z. Lv, D. Chen, and J. Li, "Novel system design and implementation for the smart city vertical market," *IEEE Communications Magazine*, vol. 59, no. 4, pp. 126–131, 2021.