Research on Intelligent Signage of Urban Parks - Taking Shenyang Nanhu Park as an Example

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Abstract. In the context of urban renewal, China's economy is developing rapidly. With the premise of meeting the needs of life, people's requirements for quality of life are increasing. Urban parks are important leisure and entertainment places for citizens. For the construction of city park public, the signage is an important part of the park construction. The signage has an important significance in it. Based on the fieldwork of Shenyang South Lake Park's signage design and the measurement results of the standardization of sample scores, the deficiencies in Shenyang South Lake Park's signage design were found. By analyzing the development status of the signage design and the application of intelligent technology in urban park signage, this paper searched for the intersection of intelligent technology and urban park signage. This paper proposes the use of intelligent technology means to innovate the design of urban park signage and ultimately make the user get a good user experience.

Keywords: Urban park; Shenyang Nanhu Park; intelligent signage

1 Introduction

Under the premise of rapid national economic development, people began to pursue deep-seated spiritual needs. City parks are places for people to rest, visit, exercise, interact and hold various collective cultural activities. It is also an important part of urban construction, urban ecosystem and urban landscape.

The signage of Shenyang Nanhu Park is still in a lagging stage of development, the behavior habits and needs of users are constantly changing with the development of the Internet. Data analysis, customized services and intelligent content pushing have been commonly applied in urban space intention, but less in urban parks in comparison.

As an artificial structure in urban parks, the signage needs to provide more services not only about space, location, layout and signage, but also to harmonize data resources with the natural environment on the basis of keeping up with the times, compared to

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urban signage design [1]. As one of the most important elements of visual communication design, the concept of signage design has been investigated and studied by many scholars. The concept of "Internet+" proposed by Yu Yang in 2012 has directly promoted the development of intelligent signage. With the change of modern information dissemination methods, the popularity of smart phones has also become an important guarantee for the promotion of intelligent signage. Urban Park has many advantages as the city' s green lung, natural oxygen bar, center of leisure and entertainment, cultural life, ecological protection and so on [2]. Urban Park has many advantages as the city's green lung, natural oxygen bar, center of leisure and entertainment, cultural life, ecological protection and so on [3]. Urban parks have a large number of activity areas, and the signage divides these areas one by one. The signage plays a role in guiding, interpreting, and transmitting culture in parks [4]. In addition, the design of the signage should match the landscape of the park, different scenes should be configured with different signages, so as to achieve harmony and unity with the park. While ensuring the aesthetic sense, it increases the experience [5]. During the development of urban construction, in order to improve the quality of life of citizens, leisure and entertainment places of different sizes have been planned in each district accordingly. With the different styles of city parks, various kinds of signage have been created. Although the park construction is good, the field research found that there are common and serious deficiencies in urban park signage design and the popularity of intelligent signage in the urban parks is not high. The visual symbolic expression of the traditional urban wayfinding is standardized, single and boring [6]. Digital media technology applied to urban signage system design brings a different sensory experience through various forms of expression. For example, the information is expressed and conveyed through kinetic graphic design elements to achieve further enhancement of user experience. Digital media, artificial intelligence and other technologies applied to signage design can not only make up for the shortcomings of traditional signage, but also give people an immersive and interactive experience.

2 Study site selection

The Nanhu Park is located in the southern part of Heping District, Shenyang City. It was built in 1938, originally named Changzhao Park. It was renamed Nanhu Park after liberation. Nanhu Park covers an area of 52 hectares, including 12 hectares of water surface. Shenyang Nanhu Park is an early construction, horticultural park elements such as the South Canal and small bridges as the main theme. The South Canal runs through the whole park. The whole park is divided into 5 areas, which are Friendship Bell Square, Deer Square, Wigwam Square, Yingyue Lake area and Playground, as shown in Figure 1.

Fig. 1. Map of Shenyang Nanhu Par

3 Research methods

3.1 Data Acquisition and Data Pre-Processing

This study used a Canon D6000 camera to record the research sample. The signage design of Shenyang Nanhu Park was used as the research object. A total of 69 signage design samples was collected. In order to ensure the color accuracy of the acquired images, all samples need to be pre-processed for numerical correction of hue and saturation value (HSV). The images were processed using the Automatic White Balance (AWB) algorithm to make the sample images comparable with each other.

3.2 Data processing

In this study, researchers in signage design and related design disciplines, a total of 45 experts, using a slide show with a rough preview of all the sample photos, allowing the evaluator to establish evaluation criteria. Each slide was played for 20 seconds [7]. The evaluator learned the sample information of all samples and scored them independently on a Likert scale: 1 (low quality) - 7 (high quality) [8]. A total of 42 questionnaires was received, the return rate was 100%. After screening, 4 invalid questionnaires were excluded, and 38 valid questionnaires were finally obtained. Followed by inputting evaluation data into EXCEL and the standardization of which was carried out, which ran as follows:

$$\mathrm{Z_{ij}} = \frac{(R_{ij} - \overline{\mathrm{R_j}})}{S_j} \tag{1}$$

$$SBE_i = {}^{\Sigma z_{ij}}\Big/_{N_i} \tag{2}$$

In Equation (1):Z_{ij} was the standardized value given by evaluator j for the observed sample photo i. R_{ij} was the rating value given by evaluator j for the observed sample photo i. $\overline{R_j}$was the average of the rating values of all sample photos by evaluator j. S_j was the standard deviation of the rating values of all sample photos by evaluator j. In Equation (2):$SBE_i$was the standardized score of quality for sample photo i. $N_i$was the total number of evaluators.

4 Study results

4.1 Comparative analysis of the quality of signage design in Shenyang Nanhu Park

The results of the quality evaluation of the signage design in 69 samples are shown in Table 1. The first 15 samples are high quality samples, and the last 15 samples are low quality samples. The quality of the signage design was analyzed by comparing the high-quality samples with the low-quality samples, as shown in Table 1.

Table 1. Samples quality ranking order for samples

Sample NO.	Standardized value	Sample NO.	Standardized value	Sample NO.	Standardized value
NO.61	1.57	NO.62	0.27	NO.45	-0.40
NO.69	1.56	NO.6	0.20	NO.8	-0.42
NO.42	1.47	NO.17	0.20	NO.60	-0.50
NO.14	1.46	NO.11	0.19	NO.41	-0.50
NO.32	1.45	NO.7	0.19	NO.67	-0.65
NO.66	1.44	NO.20	0.18	NO.21	-0.74
NO.56	1.34	NO.63	0.17	NO.48	-0.75
NO.15	1.33	NO.55	0.16	NO.59	-0.75
NO.49	1.33	NO.43	0.08	NO.26	-0.76
NO.44	1.33	NO.65	0.06	NO.13	-0.85
NO.46	1.24	NO.24	0.05	NO.16	-0.86
NO.36	1.22	NO.22	-0.06	NO.30	-0.87
NO.25	0.99	NO.12	-0.07	NO.10	-0.88
NO.68	0.89	NO.5	-0.17	NO.19	-0.98
NO.2	0.86	NO.27	-0.18	NO.47	-1.09
NO.3	0.74	NO.50	-0.18	NO.23	-1.10
NO.4	0.63	NO.38	-0.19	NO.58	-1.22
NO.28	0.53	NO.31	-0.28	NO.34	-1.34
NO.64	0.42	NO.54	-0.28	NO.35	-1.45
NO.33	0.42	NO.57	-0.28	NO.39	-1.45
NO.29	0.41	NO.37	-0.31	NO.51	-1.45
NO.40	0.28	NO.53	-0.40	NO.9	-1.57
NO.52	0.27	NO.1	-0.40	NO.18	-1.57

In the high-quality samples, the signage design is generally characterized by a jump in color (NO.2, NO.14, NO.15, NO.25). Clear and recognizable information conveyed to, concise content of the signage signs, in clear contrast to the surrounding environment. The text size and location are set reasonably, so you don't have to walk to the location of the signage to see it (NO.66). The design content combines with the park's own theme to design the corresponding style and enhance its cultural connotation. Language diversity (NO.32, NO.42, NO.49, NO.56, NO.61, NO.69). High-quality samples as shown in Figure 2.

Fig. 2. High-quality samples

In the low-quality samples, the signage system generally presents the feature that the signage is obscured by trees (NO.26, NO.34, NO.35). Lack of maintenance and dilapidated signage; signage too small and unreasonably positioned (NO.13, NO.16, NO.23, NO.39, NO.9). The design of the signage lacks cultural connotation; the color of the signage is bland and does not jump in the scenery, making it difficult to identify (NO.47, NO.34, NO.35, NO.51); or it is directly painted and sprayed (NO.58). Low-quality as shown in Figure 3.

Fig. 3. Low-quality samples

5 Shenyang Nanhu Park Signage Existing Problems

Shenyang Nanhu Park's existing signage design is confusing in terms of information arrangement and unclear hierarchy; in spring and summer when plants are in full bloom, many signage signs are placed among the plants and obscured, making it impossible for users to read the information. The existing signage design of Shenyang Nanhu Park does not take into account the needs of users of different ages, different literacy levels, different regions and different countries, and does not meet the accessibility requirements of information reading for all age levels. The typography, symbol design and color selection of the signage design also do not take into account the unique urban culture of Shenyang, resulting in the existing signage design of Shenyang South Lake Park being uniform and without memory points. All sample images are shown in Figure 4.

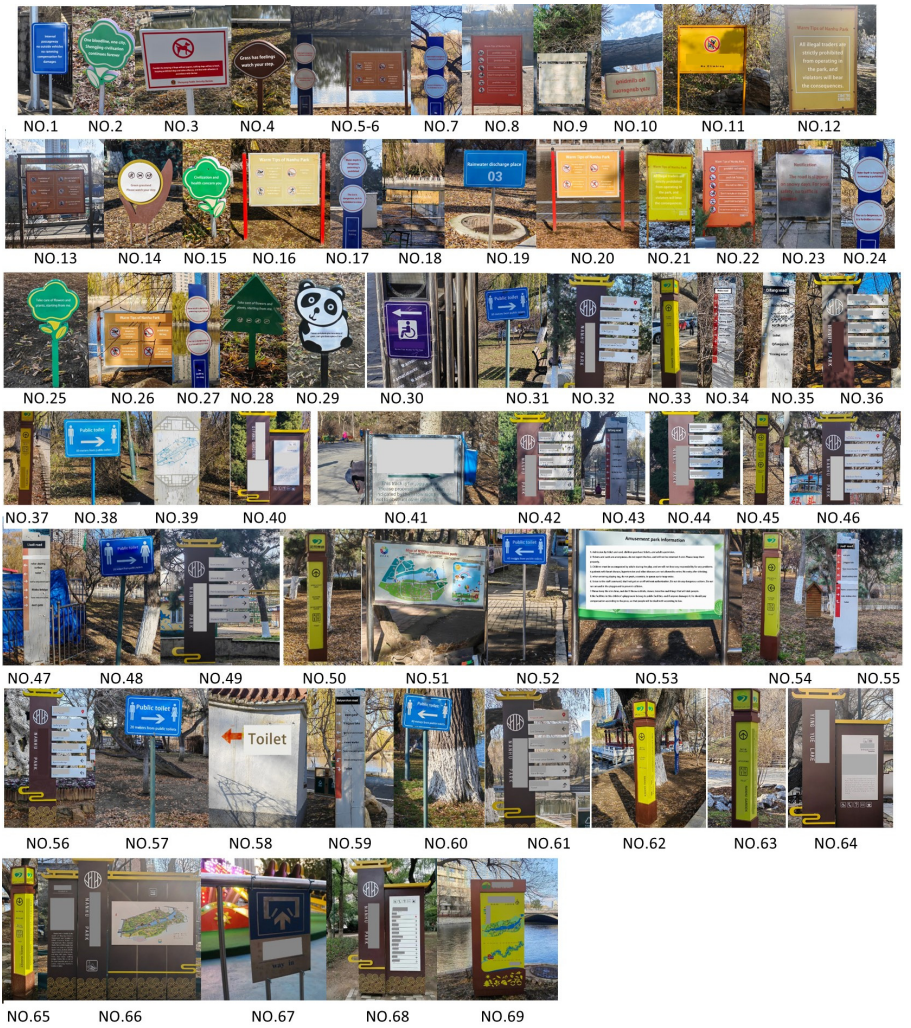

Fig. 4. Sample photo

6 The intelligent upgrade of the signage design

The rapid development and widespread us e of digital technology have brought a great impact on the field of art and design, but it has also opened up many possibilities for the integration of various types of art [9]. The application of digital media technology in the design of the signage can be said to be the cross-border cooperation between the field of science and design, making further breakthroughs and changes in the design of the signage.

The digital signage system was created on the basis of the Internet, with intelligent, technology and virtual characteristics [10], the focus of the intelligent upgrade of the signage design is to establish the connection between user and user, user and signage, environment and signage. Making the data serve the public based on the effective use of existing artificial intelligence.

6.1 User-user connection

The innovation point of the intelligent signage c ompared with the traditional signage is to establish a new connection, making the signage an important communication hub in the tour process.

Firstly, the original visitors can only contact the park staff through offline means during the tour. After the intelligent upgrade of the signage, users can get in touch with the staff online. This upgrade will greatly reduce the occurrence of lost behavior. Secondly, this upgrade is also an emotional upgrade. The communication between visitors can be enhanced during the tour to meet the social needs. The intelligent Signage simulation is shown in Figure 5.

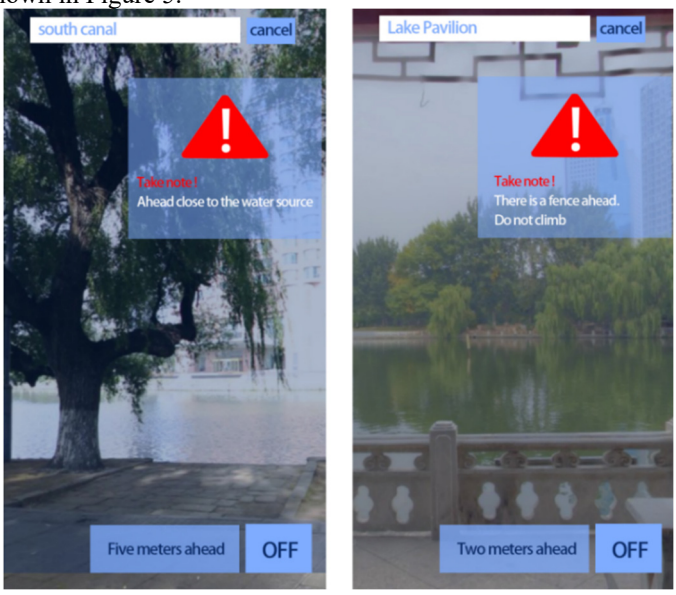

Fig. 5. Intelligent signage simulation diagram

6.2 Connection between users and signage

The traditional signage is limited by factors such as environment and space. The intelligent signage is in a practical sense a migration of information from offline to online.

For visitors to Shenyang Nanhu Park for the first time, they were more dependent on the signage. The upgrade of intelligent signage made the access to service information no longer limited. For example, tour participants can search for the location of their destination directly from the smart signage, how far away it is from themselves, how many meters short of arriving. The intelligent Signage simulation is shown in Figure 6.

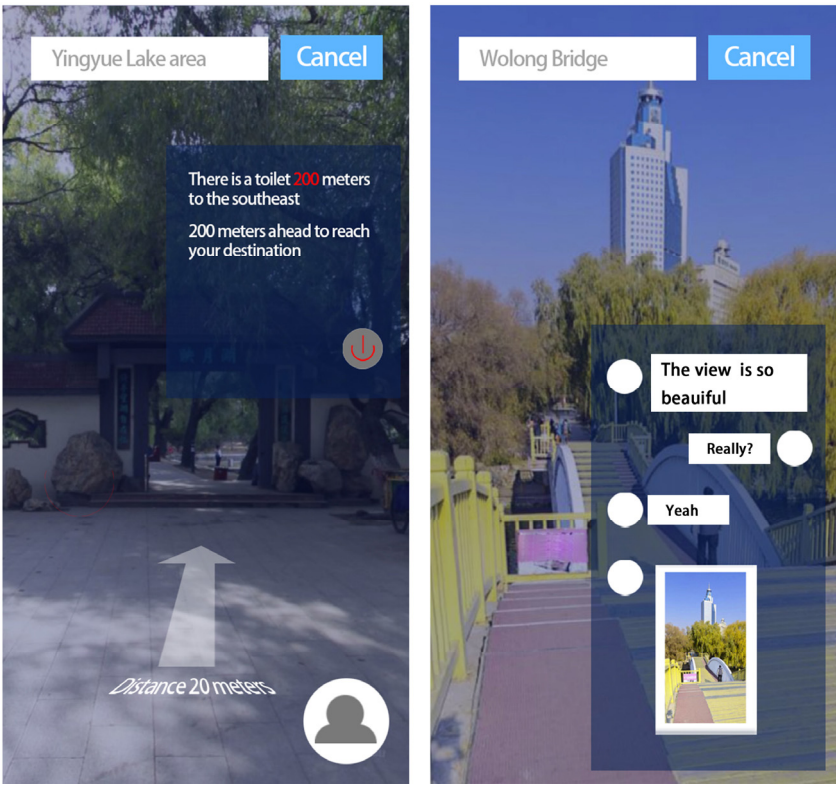

Fig. 6. Intelligent signage simulation diagram

6.3 Linkage between environment and signage

The traditional relationship between the signage and the environment is still in a static and contactless stage. With the development of urban construction, the construction of urban park scenery is constantly updated and iterated. But in the construction process, the design of the signage is the most neglected and financially consuming part.

The negligence of signage design greatly affects the user's experience, the upgrade of smart signage will solve this problem to some extent. The smart signage can update the interface, functions and back-end design according to the season and activities, so that the visitors are not affected in any situation.

7 Conclusion

To sum up, the intelligent upgrade of the signage design is not a complete departure from the traditional signage, but a link between the traditional signage, the user and the field environment. Shenyang Nanhu Park traditional signage did not took into account the connection between users, in the process of touring completely in a passive search to the state. After the intelligent upgrade of the signage, users could actively find the target. The connection between the user and the signage was limited, but in the smart signage, the user can establish a connection with the signage directly using a mobile terminal. The update of the signage could not keep up with the change of environment, while the intelligent signage can update with the change of environment. The signage design is an important part of urban parks. The reasonableness and perfection of urban park signage design is a sign to measure the maturity of park's hardware facilities. Under the general trend of urban development, intelligent guidance interconnects online and offline information, overcoming the bottleneck of development faced by traditional signage.

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