

## Article

# Social Media Users' Visual and Emotional Preferences of Internet-Famous Sites in Urban Riverfront Public Spaces: A Case Study in Changsha, China

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**Abstract:** With the increasing online exposure of urban public spaces, the new concept of “internet-famous sites” has emerged in China. Social media users are the main contributors to this new phenomenon. To fully understand social media users’ preferences in such kinds of public spaces, this article took 27 typical riverfront internet-famous sites (RIFSs) in Changsha City (China) as an example. Through social media platform selection, keyword research, text and image data extraction, visual and emotional symbol coding, and manual calculations of coding frequency, this study investigated social media users’ perception of RIFSs, especially on visual and emotional preferences. The online images and review comments were extracted from the popular Chinese social media platform “Xiaohongshu”. We found that (1) the popularity of each RIFS had a significant head effect and there were far more positive emotions than neutral and negative emotions in review comments. (2) RIFSs in Changsha were divided into five categories: commercial RIFSs, art exhibition RIFSs, historical and cultural RIFSs, ecological recreational RIFSs, and uncultivated RIFSs. Social media users had different visual focuses on each kind of RIFS. (3) Social media users provided specific reasons for their emotional preferences towards different types of RIFSs. This study can provide a new perspective on improving waterfront vitality and offer a targeted and attractive method for waterfront regeneration that is different from traditional methods.

**Keywords:** riverfront public space; riverfront internet-famous sites (RIFSs); visual elements; emotional preferences; symbol coding; social media; internet-celebrity city; Changsha; China



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## 1. Introduction

During COVID-19, China’s “home quarantine” policy led to the rise of social media, through which people connected with the outside world. People shared their experiences and insights about the culture of a city, their lifestyle, and the spatial environment online. A few years after the cancellation of home quarantine policies, citizens were free to go outside and choose to visit places mentioned on social media. This phenomenon highlighted the preference of citizens regarding urban public spaces, leading to a surge in the number of offline tourists [1] and thus stimulating urban vitality. Relevant research has been conducted to examine social-spatial issues under the influence of COVID-19 [2,3]. What is more, multiple social media platforms in China have launched annual “Internet-celebrity city rankings” [4], “livable city rankings” [5], “vibrant city rankings” [6], and “internet-famous site rankings” [7] based on photos uploaded online. Therefore, the new concept of “Internet-celebrity cities” has emerged in China, which could have a new impact on people’s daily lives [8]. Notably, “Internet celebrity” originally referred to people who became popular online due to a certain event or who continuously gained popularity by outputting professional knowledge. After that, the connotation of “Internet celebrity” gradually extended from “people” to various fields, such as tourist attractions [9], buildings [10], and cities [11]. The concept of Internet-celebrity cities gradually attracts public attention, which

can provide new observation perspectives on urban life, thus becoming one of the most direct, authentic, and down-to-earth evaluation criteria for measuring urban vitality [12].

Urban riverfront space is one of the most prominent open spaces in a city, as well as a key area of urban vitality, and is a representative area at which many internet-famous sites are located. Previous studies on urban waterfront vitality were mostly based on spatial elements and human activities. Yang et al. [13,14] divided riverfront spatial elements into four basic aspects: base, shoreline, function, and facilities. They also categorized waterfront human activities into four basic types: viewing stays (such as watching others, watching the scenery, taking photos, etc.), sports stays (such as running, biking, fitness, etc.), leisure stays (such as resting, walking the dog, playing on the waves, etc.), and social stays (such as chatting, dating, camping, etc.). The above studies show great reference value for this article to classify explanatory environmental variables.

Based on this, we chose the riverfront internet-famous sites in a typical Chinese “Internet-celebrity city”, Changsha, as an example, to explore the core focus of tourists by analyzing social media data. Therefore, the main research questions are as follows:

- What are the general conditions of riverfront internet-famous sites (RIFS) in Changsha? This research question aims to determine the general conditions of different types of RIFSs, the general popularity values of each RIFS, and the general preferences of visual and emotional elements in RIFSs.
- What are social media users’ visual focus in different types of RIFSs?
- What are social media users’ emotional preferences in different types of RIFSs?
- What are the characteristics of human behaviors in different types of RIFSs?

## 2. Literature Review

### 2.1. Internet-Celebrity City and Internet-Famous Sites

Studies on the relationship between cities and networks are not new. In the book “The Rise of the Network Society”, Manuel Castells provided a prospective study to propose the concepts of “space of flows” and “space of places” to explain the connotation of changes in time and space in information society [15]. Combining Castells’ contribution with the previous theory of “production of space” put forward by Henri Lefebvre [16], later scholars reached a consensus that the advent of the Internet era has brought about significant changes in space production and space consumption [17–20]. However, few studies have been conducted concerning “Internet-celebrity cities”. In China, the topic of “Internet-celebrity cities” has emerged and received wide discussion in the daily lives of citizens. However, its identification has not yet been unified in academic circles. Moreover, the academic community has not yet formed a specialized theoretical system in this field, and related research articles are mostly based on practical aspects. Some scholars have interpreted “Internet-celebrity cities” as cities that have become popular on social media [21]. Ding et al. first proposed the basic characteristics of “Internet-celebrity cities”. Firstly, people who visit “Internet celebrity cities” like to publish travel photos and comments on social media. Secondly, attractive geo-tagged photos or comments may cause a surge in online views and offline field trips. Thirdly, multiple “internet-famous sites” are generated as a result [22].

Certain research on “Internet-celebrity cities” mainly focuses on “internet-famous sites”, such as internet-famous tourist attractions or internet-famous streets. Zhou et al. studied the relationship between destination images and tourist loyalty in Chongqing’s popular scenic spots through questionnaire surveys [23]. Lv explored the landscape characteristics of “internet-famous streets” in Shanghai from the perspective of media communication studies [24]. However, there is a lack of studies on riverfront internet-famous sites. On the macro-scale, relevant research has mainly focused on overall distribution patterns [25,26], industry form classification [27], and the man–land relationship [28]. For example, Chen et al. found that internet-famous sites have brought about significant changes in the urban landscape structure [29]. Liang et al. used the main urban area of Xi’an City as an example to study spatiotemporal dynamic evolution and the influencing

factors of internet-famous sites using Baidu Index platform data [11]. Based on the social media platform Dianping, Cao [30] and Tang et al. [10] investigated the business types and spatial heterogeneity of internet-famous restaurants in Wuhan and Changsha, respectively. On the micro-scale, correlational studies mainly focused on the function and design of internet-famous buildings [31]. The above research on internet-famous sites is mostly based on social media platforms. Furthermore, social media users have played key roles as direct and authentic observers in public spaces.

## 2.2. Urban Spaces Analysis Based on Social Media Data

Social media is one of the main ways for the public to obtain information and express opinions [2,32]. Social media data have advantages such as easy accessibility, a large time span, and large volumes of data [3,33]. User-generated content such as images and text information are the two main types of content that are widely spread online. On the one hand, review comments can directly reflect people's impressions and emotional preferences toward urban space [34]. On the other hand, visual symbols have symbolic, indicative, persuasive, explanatory, and documentary qualities [35]. Moreover, massive visual information [36], which was previously difficult to convey through text and language, has extremely high dissemination efficiency via intuitive images and symbolic information.

In terms of textual analysis, previous research often used high-frequency words and semantic network analysis methods to measure user preferences. For example, Wang et al. utilized "word frequency analysis" and "social network and semantic analysis" tools in the ROSTCM6 software developed by Wuhan University to quantitatively examine texts and conduct a comparative evaluation study on parks in Guangzhou [37]. Liu et al. used star rating evaluation data and review comments to perform an importance-performance analysis (IPA), analyzing the main factors affecting the recreational satisfaction of riverside and putting forward corresponding suggestions [38]. Zheng used JIEBA tools to analyze Weibo text data and concluded that the visual experience played a dominant role in residents' perceptions of urban parks [32]. Fan et al. used Baidu ERNIE NLP deep learning classifiers to examine the sentiments of urban green space residents [39]. Ding et al. integrated the text data of three main social media platforms (Dianping, Mafengwo, and Ctrip) and used IPA analysis methods to study the differences in the preferences of travelers of the Beijing mountain landscape [40]. However, the above-mentioned scholars generally reflected that the elimination of information released by non-individual users such as news texts and advertisements was difficult to identify through machine learning. What is more, when analyzing open questions such as the causes of emotional preferences or identifying trendy slang, the machine learning and pre-coded vocabulary samples were still very limited and could not be comprehensively summarized. In short, manual judgment is still flexible and efficient under certain circumstances.

In terms of image analysis, some scholars have studied the spatial distribution of geo-tagged photos to identify potential tourism destinations and the ecological situation of nature reserves. For example, Richards et al. used social media photographs to study the habitats and potential tourist interests of coastal mangroves [41]. Nicolas et al. tried to use social media photographs to foresee landscape interest in Madrid [36]. Moreover, other scholars tend to use computer vision technology to classify statistics and code visual elements. Notably, semantic segmentation is a technique used to segment images into semantic variables and label each pixel in the original picture to perform assessments. In the field of human-scale urban design, semantic segmentation technology has been mainly applied to street views. Researchers can qualify the street-view landscape information by element, color, quantity, area, element pixel ratio, etc. [42–45]. Since computer vision models based on deep learning need to be fully trained before application, the quality of the training dataset is crucial to the accuracy and efficiency of recognition [46]. Moreover, the existing datasets related to urban studies may only adapt to certain conditions with limited preset visual elements, which also makes it difficult to generalize this to other complicated situations.

### 3. Materials and Methods

#### 3.1. Study Area

Changsha is a provincial capital city in central China, with prosperous commerce, abundant tourism resources, and a long-standing historical culture. As a typical “Internet-celebrity City”, Changsha was rated China’s first “World-class City of Media Arts” by UNESCO [47] and ranked 6th in “China’s Top 100 Internet Celebrity Cities” in 2020 [48]. At the same time, in the white book “Beautiful City Index: The Relationship between the Short Video and Urban Prosperity”, Changsha was also rated an “A-class city” in the offline prosperity index [49]. What is more, during COVID-19, Changsha ranked first on the nationwide livable cities list released by The Economist in 2022 [50]. Therefore, we chose Changsha as our research city.

The banks of the Xiang River are important urban public areas in Changsha, showing a narrow and long spatial form of the North–South expansion of the city. Moreover, the riverfront public space has a high concentration of internet-famous sites. We chose the Changsha ring expressway as the boundary in the north–south direction. We also chose a 500 m buffer zone or adjacent main roads as the boundary in the east–west direction with the best visual and perceptual distance to the river. Next, we used social media data to select riverfront internet-famous sites (RIFSs) within the study area.

#### 3.2. Methodological Framework

This article took riverfront public spaces in Changsha as an example, analyzing the related images and comments on the popular social media platform “Xiaohongshu”. Twenty-seven RIFSs were selected and classified to explore their overall conditions. We also analyzed different types of RIFSs through the symbol-encoding process and manual calculations of symbol frequency. This study investigated social media users’ perceptions, especially regarding visual and emotional preferences, as well as the characteristics of human behavior in different types of RIFSs. The research framework is shown in Figure 1.

#### 3.3. Sample Acquisition and Selection

##### 3.3.1. Selection of Social Media Platform

We compared the most commonly used social media platforms in China, that is, Sina Weibo, Tiktok, Kwai, Dianping, and Xiaohongshu. Among them, Sina Weibo provides real-time push notifications for online articles but is unable to provide stable hot news rankings. TikTok and Kwai are also popular social media sites, but these two platforms mainly focus on short videos. Compared with photographs, visual elements in short videos are relatively difficult to extract, and data quantification analysis using the above two social media platforms is difficult. Dianping is a consumer-oriented website, with users sharing content such as merchant information, consumer comments, and discounts. It is often used for research on commercial issues, which is not suitable for this study. Notably, Xiaohongshu is a social media platform that showcases different lifestyles and public activities. The text, images, and videos on Xiaohongshu contain a large amount of information that is highly relevant to our study. Therefore, we chose Xiaohongshu as the source of data acquisition.

##### 3.3.2. Selection of Riverfront Internet-Famous Sites (RIFSs)

The first step was to determine the search keywords. We manually searched the website of the Xiaohongshu platform using the keywords “Changsha, Riverfront”, “Changsha, Waterfront, Internet-famous sites”, or “Changsha, Riverfront, Internet-famous sites” to obtain relevant posts (Figure 2). Secondly, we selected relevant posts with high popularity values. This study referred to previous relevant selection methods [51–53]. We added up the total number of “likes”, “collects”, and “comments” to obtain the popularity value, retaining relevant posts with a popularity value exceeding 1000 (Figure 3), and the time period we examined was before 1 September 2023. In this way, we collected 120 popular posts representing 27 RIFSs in total (Figure 4). The attributes associated with the posts include

the username, the location of the RIFS, the number of “likes”, “collects”, and “comments”, the review content, and photographs, which were kept as the basic database for this study, subtracting irrelevant information. Through our calculations, a total of 1186 valid image data and 20,257 text data were obtained in this study.

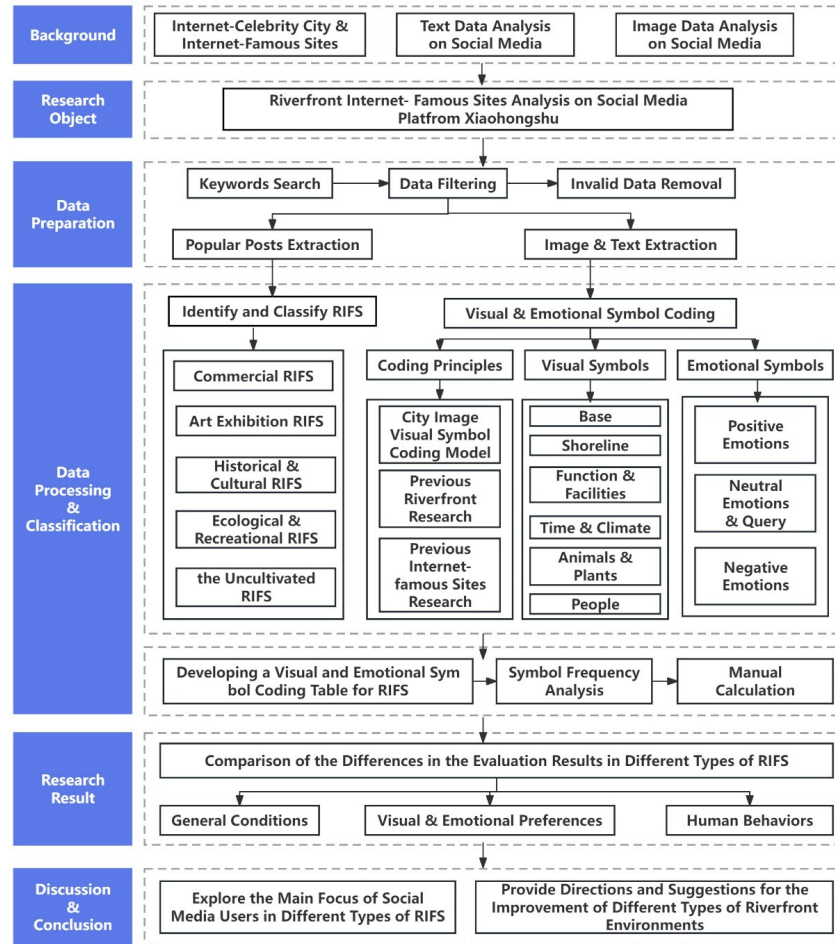


Figure 1. Research framework.

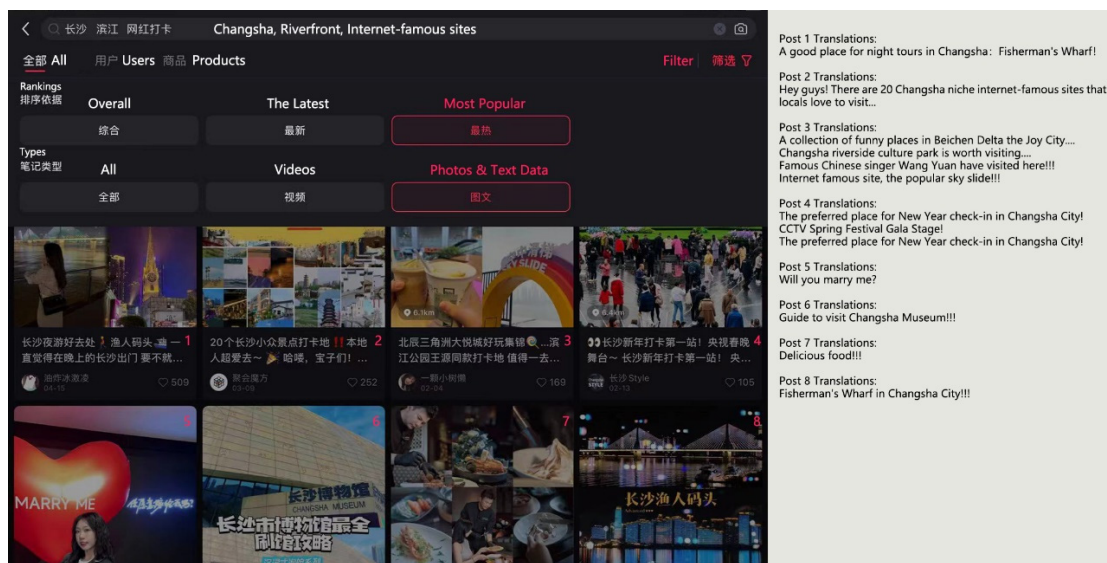


Figure 2. Search interface of Xiaohongshu (with English translation).

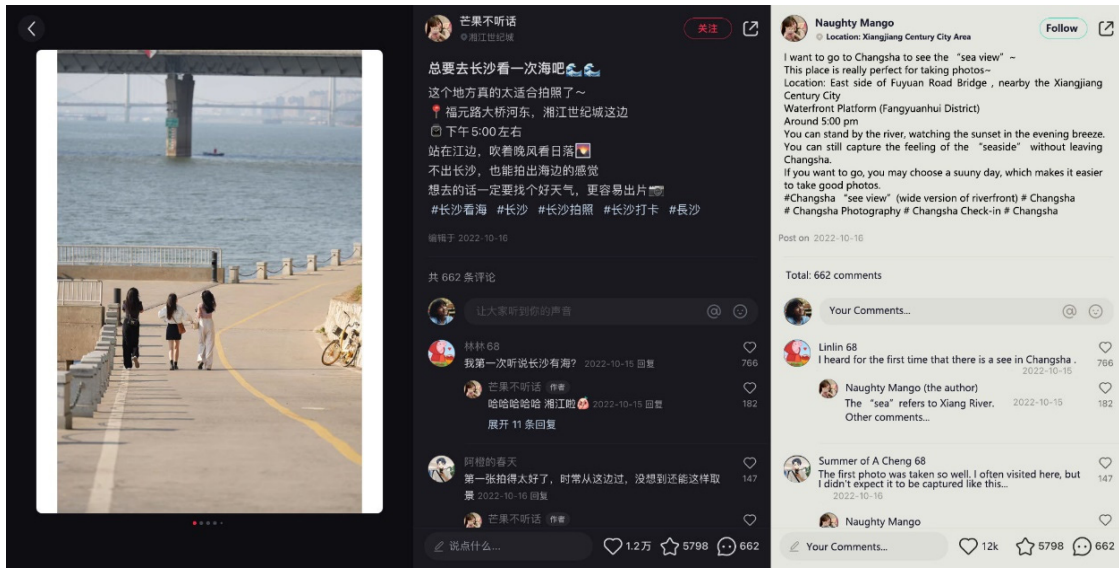


Figure 3. Relevant posts on Xiaohongshu (with English translation).

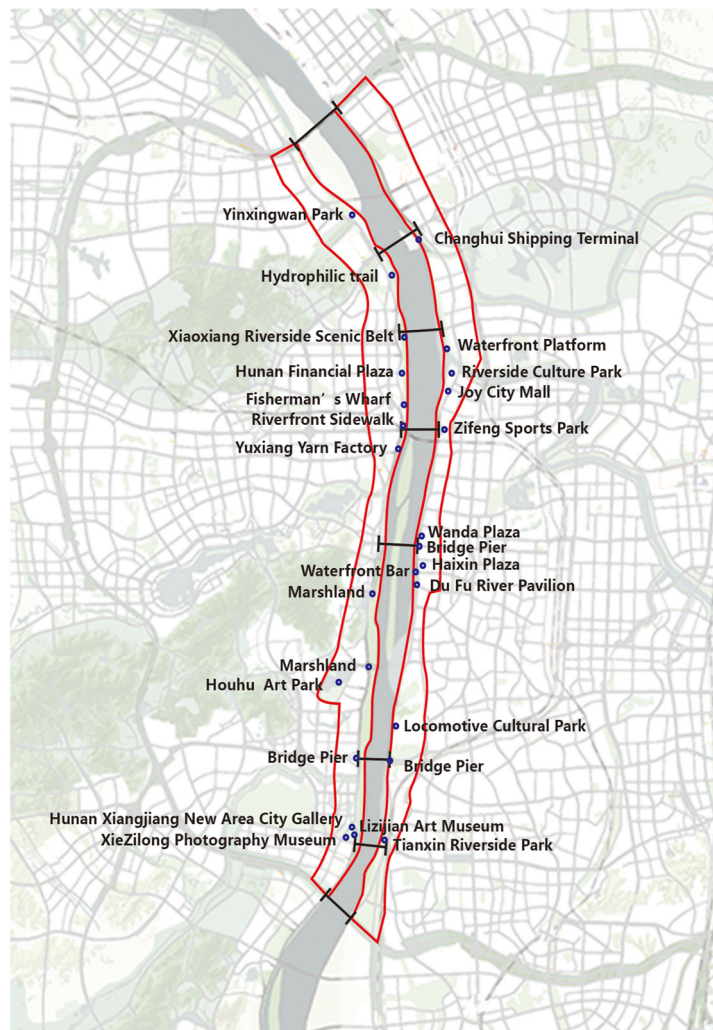


Figure 4. Locations of 27 riverfront internet-famous sites in Changsha, China.

### 3.4. Data Analysis and Index Design

#### 3.4.1. Classification and Quantity Statistics of RIFS

The first step was to classify different types of RIFSs: Commercial RIFSs (such as stores or commercial complexes), Ecological Recreational RIFSs (rich ecological vegetation landscapes such as forests, wetlands, and water bodies), Art Exhibition RIFSs (art centers, art galleries, cultural centers, museums, etc.), Historical and Cultural RIFSs (historical and cultural buildings with surrounding environments), and Uncultivated RIFSs (areas without standardized development and operation, most of which are niche, mysterious, and primitive). We manually classified and summarized the 27 RIFSs into 5 different types. We then analyzed and compared the popularity of different types of RIFSs and the popularity of each individual RIFS.

#### 3.4.2. Developing a Visual and Emotional Symbol Coding Table for RIFSs

We manually classified and summarized the images and review comments from 120 popular posts based on different types of RIFSs. Notably, previous research on the specific environmental symbols that attract social media users was conducted by encoding the geo-tagged photos based on environmental characteristics and calculating and comparing the frequency of each symbol [33,40,54]. In this study, we referred to the social media city image visual symbol coding table created by Jin et al. [55], riverfront spatial elements classifications and human activity classifications created by Yang et al. [13], and emotional preferences of “internet-famous streets” through social media users’ comments created by Lv [24] to develop a preliminary visual and emotional symbol coding table for RIFSs (Table A1).

#### 3.4.3. Frequency Analysis of Visual and Emotional Symbols

In the image recognition and statistics process, we first selected 50 photos randomly. Then, we utilized semantic segmentation technology to perform visual symbol recognition. However, in our study, we had to perform image recognition regarding urban riverfront public space, which covers a large range of spaces (ranging from the entire riverside skyline to a small facility). The spatial scope and type differences may cause a series of confusing results in recognition and simulation based on machine learning. Therefore, our research team decided to perform manual recognitions: each image was determined and discussed by three researchers to identify 4–5 of the most prominent visual symbols. If the prominent symbols were not included in the original coding table, they were added. Elements that were not included were removed from the original coding table as well. We calculated the frequency of visual symbols and compiled the results into a general visual symbol coding table and separate tables for the 5 major categories and highlighted the top 10 highest-frequency visual symbols. In the text analysis process, each review comment on the 120 popular posts was judged manually by three researchers to identify positive, neutral and query, or negative emotions. Then, unrelated review comments were deleted, leaving a total of 3340 emotional evaluations. Our research team also recorded and summarized the main causes of various emotions. We also calculated the frequency of emotional symbols and compiled the results into a general emotional symbol coding table and separate tables for the 5 major categories. Our research team conducted frequency analysis for the duration of a whole month (from 1 September 2023 to 2 October 2023).

## 4. Results and Analysis

### 4.1. General Conditions of RIFSs

#### 4.1.1. General Conditions of Different Types of RIFSs

The 27 RIFSs were divided into five main categories: Commercial RIFSs, mainly composed of riverfront shopping malls (Joy City Mall, Haixin Plaza, and Wanda Plaza), riverfront restaurants and entertainment blocks (Fisherman’s Wharf and Houhu Art Park), and riverfront commercial stores (waterfront bars in the Hisense area). Generally, specialty stores or clusters of specialty stores with a unique riverside location became one of the main

attractions for visitors. This kind of internet-famous site had an extensive flow of people, a lively atmosphere, and strong visual appeal. At the same time, the unique merchandise and services were favored by visitors. Art Exhibition RIFSs included art museums or galleries (such as the Xie Zilong Photography Museum, the Li Zijian Art Museum, and the Hunan Xiangjiang New Area City Gallery) or centralized cultural exhibition areas (such as Changsha riverside Cultural Park, which is composed of Changsha Museum, Changsha planning exhibition hall, Changsha library, Changsha concert hall, and the surrounding Riverside Landscape Park). “Checking in” at exhibition activities has also developed into a trend among young people today, reflecting citizens’ pursuit of art and aesthetics. Historical and Cultural RIFSs (such as Du Fu River Pavilion, Yuxiang Yarn Factory, and Locomotive Cultural Park) mainly rely on riverfront historical and cultural resources, which give people a sense of historical vicissitudes or a humanistic atmosphere. Buildings and structures were often historical legacies with distinct characteristics of the times, regions, and styles, which were often the main attraction points of the sites. Ecological Recreational RIFSs were mainly riverfront parks (such as Hunan Financial Plaza, Xiangjiang Marshland Park, Zifeng Sports Park, Yinxingwan Park, and Tianxin Riverside Park) or riverfront docks (Changhui Shipping Terminal). Visitors were not primarily focused on consumption but rather on the pursuit of ecological leisure experiences. According to visitors’ familiarity, Ecological Recreational RIFSs can be divided into two categories: the first type is traditional landmark attractions with certain popularity, which foreign tourists tend to visit; the second type is any other new place with a special meaning and a relatively different niche in which residents were also interested. The emergence and rise of Uncultivated RIFSs were closely related to the impact of COVID-19. People’s outdoor activities tended to stay away from places with a high population density. Therefore, explorers, mainly young people, began to find domestic niche tourist destinations. With the support of internet-celebrity bloggers, several of the Uncultivated RIFSs around cities have been explored. The Uncultivated RIFSs obtained in this article are mainly composed of hydrophilic footpaths, hydrophilic platforms, piers and bridge openings, etc.

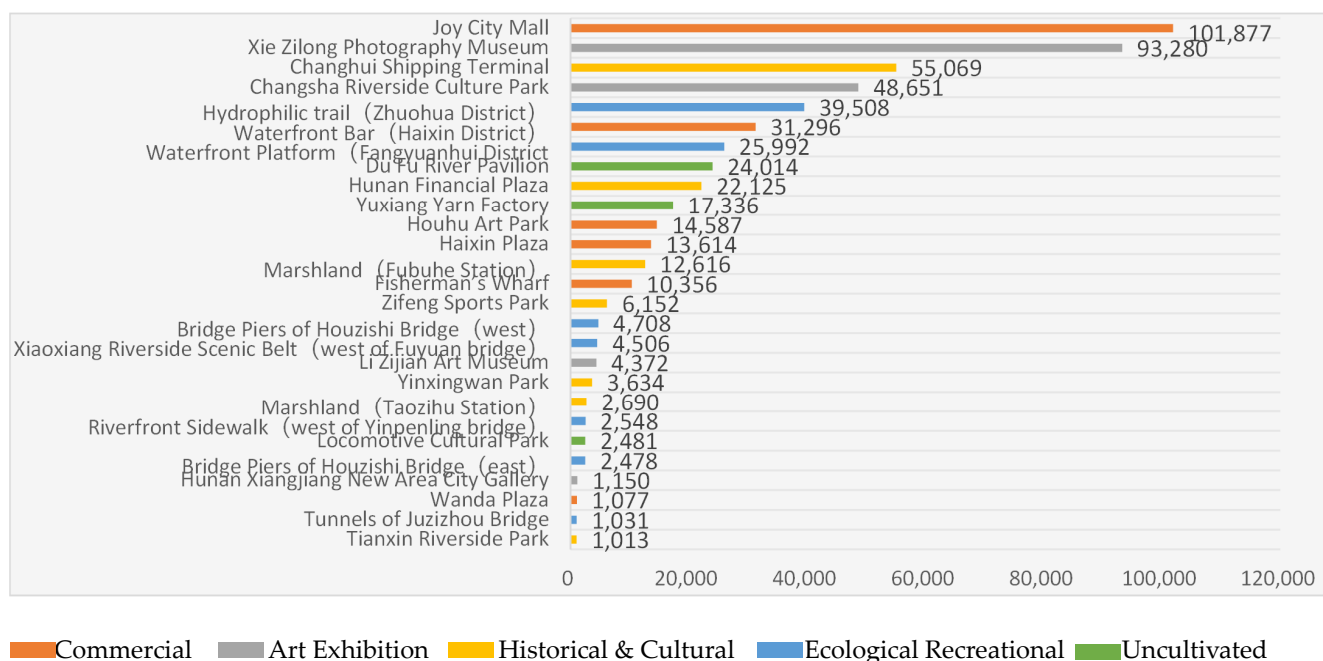
According to (Table 1), Ecological Recreational RIFSs (7) and Uncultivated RIFSs (7) were the most photographed, followed by Commercial RIFSs (6). There were four Art Exhibition RIFSs. The number of Historical and Cultural RIFSs (3) was the lowest. In terms of popularity values, although the number of Commercial RIFSs ranked third, their maximum popularity values and total popularity values were the highest, indicating that commercial RIFSs had the strongest online dissemination ability and could attract the largest audiences. Although Ecological Recreational RIFSs and Uncultivated RIFSs had the highest quantity, they gained the lowest popularity values, indicating that their online dissemination ability was relatively weak. Moreover, the number of Art Exhibition RIFSs and Historical and Cultural RIFSs was small, whereas their overall popularity was relatively high.

#### 4.1.2. Popularity Values of Each RIFS

The popularity values of each of the 27 eligible RIFSs are shown in Figure 5. Among them, Joy City Mall ranked first and the Xie Zilong Photography Museum ranked second. As the popularity ranking decreased, the popularity value decayed dramatically. The popularity values of these two RIFSs were essentially twice as high as the Changhui Shipyard Shipping Terminal (ranked 3rd), 10 times higher than Fisherman’s Wharf (ranked 14th), and, incredibly, 100 times higher than Tianxin Riverside Park (ranked 27th). The above result indicated that the head effect of the popularity values of RIFSs is obvious. What is more, audience fragmentation, in which social networks push recommended content to target groups through built-in algorithms, continuously increases the online popularity of the top RIFSs. At the same time, it was also the agglomeration effect that urban space can develop in the virtual environment.

**Table 1.** Popularity of different types of RIFSs.

Types	Popularity Ranking	RIFS (Popularity Values; Ranking)
Commercial RIFS	1	Joy City Mall (101,877; 1), Waterfront Bar (Haixin District) (31,296; 6), Houhu Art Park (14,587; 11), Haixin Plaza (13,614; 12), Fisherman’s Wharf (10,356; 14), Wanda Plaza (1077; 25),
Art Exhibition RIFS	2	Xie Zilong Photography Museum (93,280; 2), Changsha Riverside Culture Park (48,651; 4), Li Zijian Art Museum (4372; 18), Hunan Xiangjiang New Area City Gallery (1150; 24),
Historical & Cultural RIFS	3	Du Fu River Pavilion (24,014; 8), Yuxiang Yarn Factory (17,336; 10), Locomotive Cultural Park (2481; 22),
Ecological Recreational RIFS	4	Changhui Shipping Terminal (55,069; 3), Hunan Financial Plaza (22,125; 9), Marshland (Fubuhe Station) (12,616; 13), Zifeng Sports Park (6152; 15), Yinxingwan Park (3634; 19), Marshland (Taozihu Station) (2690; 20), Tianxin Riverside Park (1013; 27),
Uncultivated RIFS	5	Hydrophilic trail (Zhuohua District) (39,508; 5), Waterfront Platform (Fangyuanhui District) (25,992; 7), Bridge Piers of Houzishi Bridge (west) (4708; 16), Xiaoxiang Riverside Scenic Belt (west of Fuyuan bridge) (4506; 17), Riverfront Sidewalk (west of Yinpenling bridge) (2548; 21), Bridge Piers of Houzishi Bridge (east) (2478; 23), Tunnels of Juzizhou Bridge (1031; 26),



**Figure 5.** Popularity values of each RIFS in Changsha City.

4.1.3. General Preferences of Visual Elements in RIFSs

Among the major categories of visual symbols (Table 2), “people” (1814) and “function & facilities” (1761) were far more frequent than “animal & plant” (516), “base” (379), and “shoreline” (597). In most photographs, human activities often took place in front of beautiful waterfront sceneries in a typical “time and climate” (705).

Table 3 shows the top 10 highest-frequency visual symbols for the RIFSs. The top three symbols were “youth” (421), “personal posing” (317), and “women” (305), which intuitively reflects that the current user group of this social network platform is mainly young women. What is more, behaviors such as “personal posing”, which showcased oneself, occupied the main position on social media. Notably, the specific character type “police officer” (159) ranked high, because they are famous for “helping residents and tourists to take photos and teach styling”. This indicated that social media users may be interested in “topical issues and individuals”.

**Table 2.** Frequency of visual symbol coding table for RIFs.

Major Category	Sub-Category	Basic Types
Base (total: 379)	riverfront topography (total: 316)	grass slopes (70), tree ponds (68), forests (66), flat lawns (38), shoals (27), flower beds (25), terraced lawns (17), sandy areas (4), hard areas (1)...
	altitude difference (total: 63)	flood control base (2), transition base (0), hydrophilic base (9), steep slopes (2), outdoor steps (35), slopes (15), terraces (0)...
Shore-Line (total: 597)	Shoreline (total: 546)	Waves (132), tidal ebb zone (71), stones (61), ecological embankments (53), railings (52), hard embankments (46), docks (20), bike lanes (16), winding paths (15), tides (11), embankments (10), light shows (7), flood walls (7), fireworks (5), flat shorelines (4), convex banks (2), and mooring piers (including opposite shore, distant mountains) (22) and islands (12)...
	Overhang (total: 51)	face shaped overhang (24), vertical overhang (18), enclosed overhang, terrace (9)...
Function & Facilities (total: 1761)	Building (total: 571)	buildings on the opposite bank (236), art museums (58), landmark buildings (50), architectural details (47), restaurants (39), attics (34), shops (17), markets (17), commercial buildings (16), villas (lakeside villas) (14), old industrial buildings (13), amusement parks (9), cultural and creative shops (6), squares (5), cafes (4), main stores (3), tea houses (1), milk tea shops (1), vending machines (1)...
	Structure (total: 482)	river-spanning bridge (187), billboards (38), piers (36), stone bridges (35), roads (31), parking lots (26), street lights (26), signboards (22), sculptures of great figures (14), cartoon sculptures (14), large screens (14), building stairs (11), lighthouses (11), boardwalks (11), parks (10), water towers (6), railway tracks (6), underground passages (5), slides (5), trash cans (5), sports venues (3), utility poles (1), public toilets (1)...
	Transportation (total: 121)	cruise ships (44), bicycles (24), fishing boats (19), trains (steam trains) (11), motorcycles (11), cars (10), rowing (2)...
	Items (total: 380)	neon lights (137), food (92), tables and chairs (45), children's dolls (43), umbrellas (sunshades) (18), barbecues (15), tents (6), daily necessities (5), beds (5), luggage (5), kites (4), tea sets (2), speakers (1), chess and cards (1), balloons (1)...
	Resting facilities (total: 196)	tree pool (68), stool (64), steps (35), flower pond (25), seats (4)...
	Others (total: 11)	graffiti (9), Scene location for variety shows (2)...
	Season (total: 74)	Spring (3), summer (53), autumn (7), winter (13)
Time & Climate (total: 705)	Time (total: 114)	early morning (0), morning (1), noon (3), afternoon (15), nightfall (8), day (12), night (76), festival (4)...
	Weather (total: 404)	sunrise (7), sunset (130), blue sky (93), clouds (68), sunset glow (69), rainbow (0), starry sky (0), wind (37)...
	Climate (total: 113)	sunny (67), cloudy (8), rainy (2), snowy (0), smog (36)...
Animals & Plants (total: 516)	Plants (total: 450)	Trees (134), grasses (125), flowers (54), aquatic plants (48), arbor (35), deciduous plants (13), potted plants (12), shrubs (19), vines (7), dead woods (3)...
	Animals (total: 66)	dogs (23), cows (21), swans (15), horses (5), birds (1), cats (1)...
People (total: 1814)	types of people (total: 1118)	Youth (421), women (305), police officers (159), men (79), vendors (35), tourists (29), children (29), residents (18), elderly (17), couples (13), wanderers (5), teenagers (3), middle-aged (3), delivery drivers (1), singers (2), bands (1)...
	Behaviors (total: 696)	1. viewing stay (total: 355): personal posing (317), taking wedding photos (22), capturing scenery (16).. 2. sports stay (total: 101): walking (62), cycling (24), paddle boarding (4), swimming (4), running (3), skateboarding (3), square dancing (1).. 3. leisure stay (total: 172): camping (32), fishing (40), walking dogs (23), stepping on water (waves) (22), barbecue (15), taking baby out for a walk (9), listening to music (10), singing at karaoke bar (10), having picnics (15), flying kites (4), reading books (3).. 4. social stay (total: 168): drinking tea (25), chatting (13), dating (10), stamping (9), eating melon seeds (8), strip the skewers (2), playing chess (1)...

**Table 3.** Top ten most frequent visual elements of RIFSs.

Ranking	Visual Element	Frequency	Attribute (Sub-Category)	Attribute (Major Category)
1	youth	421	types of people	people
2	personal posing	317	behaviors	people
3	women	305	types of people	people
4	buildings on the opposite bank	236	buildings	function & facilities
5	river-spanning bridge	187	structures	function & facilities
6	police officer	159	types of people	people
7	neon lights	137	items	function & facilities
8	trees	134	plants	animals & plants
9	waves	132	shoreline	shoreline
10	sunset	130	climate	time & climate

In the major category of “function & facilities” symbols, “buildings on the opposite bank” (236) and “river-spanning bridge” (187) ranked fourth and fifth, respectively, with a higher frequency than other spatial elements. This indicates that social media users may prefer distant views and cross-river landscapes. “Neon lights” (137) often appeared simultaneously with “night” (76), “river-spanning bridges” (187), “commercial buildings” (16), and “billboards” (38), reflecting social media users’ pursuit of modernization and commercialization while highlighting visual effects.

Meanwhile, “trees” (134) were essentially an indispensable natural symbol as they appeared at almost every popular riverfront site. This may be due to the color changes in leaves in different seasons becoming a natural symbol for people to perceive the seasonal changes in cities. Meanwhile, plants can also enrich the sense of the landscape level of the urban riverfront. What is more, “waves” (132) and “sunsets” (130) often appeared simultaneously in photographs. The sunset implied a special metaphor for time, which was highly favored by the public due to its unique aesthetic characteristics of celestial phenomena. In most photographs, the afterglow of the sunset reflected on the shimmering river, creating a sense of calm and a gentle atmosphere.

#### 4.1.4. Emotional Preferences of Review Comments in RIFSs

The review comments on RIFSs can reflect social media users’ emotional perceptions. High-frequency words indicated a strong cognitive consensus among users. Through manual filtering to remove irrelevant text content, a total of 3340 emotional comments were obtained (Table 4). Among them, there were 3055 positive emotions, accounting for 91.47%, far higher than the number of neutral emotion symbols (frequency of 257, accounting for 7.69%) and negative emotions (frequency of 28, accounting for 0.84%). Firstly, the content with positive emotions was roughly classified into four categories: “Beautiful Scenery”, “Fun”, “Want to visit”, and “Other Compliments”. The high frequency of “Beautiful Scenery” (1478) and “Want to visit” (1216) proved that popular posts on social media could have a strong ability to attract audiences. In the category of “Beautiful Scenery”, social media users attached great importance to the “wide vision” (97) of the riverfront, “children’s dolls” (65) in festival activities, and “sharing photo shooting experience and skills” (32). Meanwhile, the frequency of “film and television shooting locations” (27) and “one stop experience of Changsha wonderful night & intangible cultural heritage” (21) were also high, indicating that the attraction of film and television promotion and local characteristic experiences to netizens was also obvious. In the field of “Other Compliments” (306), the anecdote of “a police officer at a certain scenic spot who had a professional level of photography skills” (252) became an internet celebrity. In addition, the “inclusion and respect for vulnerable groups” (51) in riverfront spaces also received a great deal of

attention. Secondly, in terms of neutral emotions and queries, comments were mainly from four perspectives: “comfort” (101), “fun” (83), “convenience” (48), and “safety” (25). Thirdly, negative emotions were extremely rare and were mainly due to “the discrepancy between the actual situation and the photos” (16) and dissatisfaction with hygiene and the environment.

**Table 4.** Frequency of emotional elements of RIFs.

Emotional Preference	Main Points	Representative Comments (Frequency)
Positive (total: 3055)	Beautiful Scenery (total: 1478)	wide vision (97), lovely dolls (65), share photo shooting experience (32), spectacular islands (18), romantic marshland (15), cinematic atmosphere (15), graceful spatial geometrical modelling of architecture (14), nostalgia atmosphere (8), sense of technology (7), a holiday exclusive edition (6), sense of oil painting (3), the distinctive features of the old city (3), sense of mysterious (1)
	Fun (total: 55)	one stop experience of Changsha wonderful night & intangible cultural heritage (27), Internet-famous children’s slide (7), alcohol and music (4), delicious food (4), fashionable style of middle ages (3), home-stay (3), a trendy way of entertainment (3), coffee & dessert (2)
	Want to visit (total: 1216)	film and television shooting location (21), the celebrity effect attracts popularity (8)
	Other Compliments (total: 306)	the police have a professional level of photography skills (252), inclusion and respect for vulnerable groups (51), comfortable (2), unique (1)
Neutral & Query (total: 257)	Safety (total: 25)	questioning safety of amusement facilities (20), questioning the level of traffic and public security (5)
	Comfort (total: 101)	whether there are too many people and crowds (46), whether the temperature is comfortable (23), is there any odor from the excrement of cattle and sheep (13), whether mosquito bites or not (7), is there any snakes in the grassland (4), are there any tourists trampling on the grass (3)
	Convenience (total: 48)	whether convenient to parking lots (40), whether there is any restrooms (4), whether the activity free of charge (4)
	Experience (total: 83)	how to stamp and commemorate (44), the specific time of the fireworks display (18), the flower season (12), whether the food is delicious (9)
Negative (total: 28)	Disappointed (total: 28)	there is a discrepancy between the actual situation and the online photos (16), water turbidity (5), tourists trample on flowers and plants at will (4), fragmentation of visual information (2), lack of humanistic atmosphere (1)

Overall, the vast majority of comments were positive emotions, indicating that the majority of users had a positive attitude toward the RIFs. Notably, neutral and query content can reflect the concerns of netizens. The small number of negative evaluations cannot be ignored as they can expose the problems existing in riverfront public spaces and can also play a key role in improving the quality of the physical environment.

#### 4.2. Visual Preferences of Difference Types of RIFs

##### 4.2.1. High-Frequency Visual Symbols in Commercial RIFs

According to the visual symbol coding table for Commercial RIFs (Table A2) and the statistics of the 10 highest-frequency visual symbols (Table 5), the frequency of “youth” (45) was relatively high, which reflected the consumption habits of youth in commercial RIFs. Gourmet “food” (59) appeared most frequently, which usually appeared with “billboards” (38), “store” (34), and “restaurants” (34). This phenomenon reflected that social networks have spawned a new type of “food socializing” [56]. Food and catering have become important content and an indispensable element of visual cognition of the riverside commercial space and can provide an irreplaceable experience. On the other hand, some internet-famous riverfront commercial spaces such as restaurants, bars, and cafes can attract citizens to stay, which often show beautiful scenery with “neon lights” (59), “buildings on the opposite bank” (44), “nightfall” (32), and the “sunset” (29). This phenomenon showed a meaningful integration of urban riverfront spaces and visual-consumption-oriented spaces. What is more, Commercial RIFs were often related to special festivals. On Children’s Day, the “cartoon sculptures” (24) placed on the square of the Joy City Mall attracted many

visitors who engaged in taking photos. Special decorations on holidays have formed a positive emotional interaction with consumers.

**Table 5.** Top ten visual elements of Commercial RIFSs.

Ranking	Visual Element (Basic Types)	Frequency	Attribute (Sub-Category)	Attribute (Major Category)
1	food	59	items	function & facilities
2	neon lights	59	items	function & facilities
3	youth	45	types of people	people
4	buildings on the opposite bank	44	buildings	function & facilities
5	billboards	38	structures	function & facilities
6	store	34	buildings	function & facilities
7	restaurant	34	buildings	function & facilities
8	nightfall	32	time	time & climate
9	sunset	29	climate	time & climate
10	cartoon sculptures	24	structures	function & facilities

#### 4.2.2. High-Frequency Visual Symbols in Art Exhibition RIFSs

According to the visual symbol coding table for Art Exhibition RIFSs (Table A4) and statistics of the 10 highest-frequency visual symbols (Table 6), the frequency of types and behaviors of people such as “youth” (191), “women” (177), “police officer” (157), and “personal posing” (181) ranked in the top four. Among them, the “police officer” acted as a typical “internet-famous photographer” to help tourists take photos at the “Art Museum” (56). These kinds of personal posing behaviors have emphasized the integration of visitors’ physical gestures with scenic spots. Furthermore, certain existing personal posing photos generally became templates for visitors to imitate, and followers tended to use similar outfits, the same postures (such as sitting on the “stones” (27) or “eating snacks” (25)), and the same weather of “blue sky” (33) or “cloud” (25), immersing themselves in the same “summer” (26) season.

**Table 6.** Top ten visual elements of Art Exhibition RIFSs.

Ranking	Visual Element (Basic Types)	Frequency	Attribute (Sub-Category)	Attribute (Major Category)
1	youth	191	types of people	people
2	personal posing	181	behaviors	people
3	women	177	types of people	people
4	police officer	157	types of people	people
5	art museums	56	buildings	function & facilities
6	blue sky	33	weather	time & climate
7	architectural details	31	buildings	function & facilities
8	stones	27	shoreline	shoreline
9	summer	26	season	time & climate
10	eating snacks	25	behaviors	people
10	cloud	25	weather	time & climate

Meanwhile, the appearance of internet-famous art buildings attracted audiences with unique shapes, novel technical materials, and bright colors. Visitors often upload their photos while only highlighting the good parts of “architectural details” (31) and hiding the undesirable parts to present a perfect view.

#### 4.2.3. High-Frequency Visual Symbols in Historical & Cultural RIFS

According to the visual symbol coding table for Historical & Cultural RIFS (Table A6) and top 10 high-frequency visual symbols statistics (Table 7): the frequency of character types and behaviors such as women (61), youth (58), and personal posing (54) ranked in the top three, which was similar to Art Exhibition RIFS. Besides, the neon lights (43) on the landmark buildings (34) at night (22) were high-frequency urban visual elements that visitors tended to take photos of. Due to the regional characteristics of historical and cultural RIFS, it often attracted a large number of visitors. Meanwhile, netizens also tended to constantly repeat and imitated “standardized performance templates” provided by internet celebrities, which made the uploading photos similar to each other’s. During the children’s day, the children’s Dolls (43) were placed in the historical attic (34), which created a novel mixture of styles and also attracted lots of audience. The tidal ebb zone (27) and metasequoia forest or trees (27) on the front terrace of the historical building complex are the popular places for netizens to experience the “historical vicissitudes” in the riverfront.

**Table 7.** Top Ten Visual Elements of Historical & Cultural RIFS.

Ranking	Visual Element (Basic Types)	Frequency	Attribute (Sub-Category)	Attribute (Major Category)
1	women	61	types of people	people
2	youth	58	types of people	people
3	personal posing	54	behaviors	people
4	neon lights	43	items	function & facilities
5	children’s dolls	43	items	function & facilities
6	landmark buildings	34	buildings	function & facilities
7	attic	34	buildings	function & facilities
8	trees	27	riverfront topography	base
8	tidal ebb zone	27	shoreline	shoreline
10	night	22	time	time & climate

#### 4.2.4. High-Frequency Visual Symbols in Ecological Recreational RIFS

According to the visual symbol coding table for Ecological Recreational RIFS (Table A8) and top 10 high-frequency visual symbols statistics (Table 8): the “buildings on the opposite bank” (91) and the “river-spanning bridge” (82) had the highest frequency of appearance. The buildings on the opposite bank form a distant skyline, and the cross river bridge highlights the depth and distance of the river. The two elements indicated that netizens who come to Ecological Recreational RIFS pay more attention to the “openness” and “grandeur” of vision. What’s more, the combination of waves (73) and sunset (48) in the most photographs created a beautiful and hazy atmosphere. It is worth noting that Orange Island in the middle of the Xiangjiang River, as the main landmark of the city, has erected a portrait of the great Chairman Mao, which was also a popular spot for netizens to take photos and check in.

**Table 8.** Top Ten Visual elements of Ecological Recreational RIFS.

Ranking	Visual Element (Basic Types)	Frequency	Attribute (Sub-Category)	Attribute (Major Category)
1	buildings on the opposite bank	91	buildings	function & facilities
2	river-spanning bridge	82	structures	function & facilities
3	waves	73	shoreline	shoreline
4	youth	63	types of people	people
5	sunset	48	weather	time & climate
6	grass slope	40	riverfront topography	base
7	stool	40	leisure	function & facilities
8	tree pool	37	riverfront topography	base
9	man	34	types of people	people
10	personal posing	31	behaviors	people

In addition, the Ecological Recreational RIFS were often described as “relaxed”, “free”, “green”, “comfortable”, and “resting”. Elements such as grass slope (40), stool (40), and tree pool (37), which can act as resting facilities, have become the main visual attractions. This type of RIFS often have rich natural landscapes. However, the identifiability and uniqueness of the sites were relatively weak.

#### 4.2.5. High-Frequency Visual Symbols in the Uncultivated RIFS

According to the visual symbol coding table for the Uncultivated RIFS (Table A10) and top 10 high-frequency visual symbols statistics (Table 9): the visual focus of Uncultivated RIFS were similar to ecological recreational RIFS. “Buildings on the opposite bank” (73), “river-spanning bridge” (71), “youth” (56), “personal posing” (45), “waves” (29) and “sunset” (28) all entered the top 10 high-frequency elements in both types.

**Table 9.** Top Ten Visual Elements of the Uncultivated RIFS.

Ranking	Visual Element (Basic Types)	Frequency	Attribute (Sub-Category)	Attribute (Major Category)
1	buildings on the opposite bank	73	buildings	function & facilities
2	river-spanning bridge	71	structures	function & facilities
3	youth	56	types of people	people
4	personal posing	45	behaviors	people
5	woman	36	types of people	people
6	sunny	34	climate	time & climate
6	stone bridge	31	structures	function & facilities
8	railings	29	shoreline	shoreline
9	waves	29	shoreline	shoreline
10	sunset	28	weather	time & climate

Moreover, netizens have diversified tourism demands on the Uncultivated RIFS. On the one hand, tourists tended to revisit places where celebrities or internet-celebrities have been to. They wanted to obtain the same “check-in experience” as celebrities. For example, in the internet famous site, Hydrophilic trail in Zhuohua District, the elements of stone bridge (31) and railings (29) were once scenic elements used by Chinese film star Bai Jingting in his portrait images. On the other hand, tourists tended to imitate the movie

scenes. For example, by filming the rows of piers on the Houzishi Bridge combined with the hazy water mist along the riverside, netizens aimed to recreate the dreamlike scene of the movie “Inception”. Another example is the large-scale grassland landscape in the Xiaoxiang Riverside Scenic Belt, which has become the “Wizard of Oz” landscape imagined by photography enthusiasts.

#### 4.3. Emotional Preferences of Difference Types of RIFSs

Table 10 summarizes the frequency and proportions of the different emotional comments regarding different types of RIFSs, and Table A3, Table A5, Table A7, Table A9, and Table A11 give detailed explanations of various emotional preferences for each kind of RIFS, respectively.

**Table 10.** Statistical analysis of the different emotional comments in different kinds of RIFSs.

RIFS	Positive		Neutral & Query		Negative		Total
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency
Commercial RIFS	944	93.47%	65	6.44%	1	0.10%	1010
Art Exhibition RIFS	744	96.50%	8	1.04%	19	2.46%	771
Historical & Cultural RIFS	276	79.31%	70	20.11%	2	0.57%	348
Ecological Recreational RIFS	695	90.49%	67	8.72%	6	0.78%	768
Uncultivated RIFS	396	89.39%	47	10.61%	0	0.00%	443

The total number of comments on Commercial RIFSs was the highest, with positive comments accounting for 93.47%. Representative comments included “beautiful and romantic Changsha version of the Bund” (14), “the distinctive features of the old city” (12), “a holiday exclusive edition” (6), “full of nostalgia” (6), “film and television shooting location” (21), etc. The frequency of neutral evaluations was 65 (accounting for 6.44%) and mainly concerned questioning the safety of amusement facilities (20) and the comfort level regarding overcrowding and comfortable temperatures (33). Notably, the frequency of questioning “whether the food is delicious” was only 9, which went against the high frequency of food elements in visual symbols.

The proportion of positive comments regarding Art Exhibition RIFSs (96.50%) was the highest among the five types of RIFSs. The comments mainly focused on sharing shooting experience and skills (32), expressing feelings about the “geometric sense” (14), “scientific sense” (4), and “oil painting sense” (3) of art architectural modeling, and praising photographers’ photography level: “the police officer is really professional!” (252). At the same time, the “one stop experience of Changsha wonderful night & intangible cultural heritage” (27) was also the focus of netizens. Notably, the Art Exhibition RIFS was the only type that had more negative comments (19) than neutral comments (8). The negative factors that disappointed netizens included “there is a discrepancy between the actual situation and the online photos” (13) and “turbid water” (5). It can be seen that the beautifying effect of online photos caused a certain degree of distortion, which may cause negative feelings during the offline experience.

The total number of comments in the Historical and Cultural RIFS was the lowest. Interestingly, the proportion of positive comments (79.31%) was the lowest among the five types of RIFSs, while the neutral comments (20.11%) were the highest. In particular, positive comments mainly focused on “beautiful buildings with a sense of nostalgia” (25), “beautiful fireworks show” (14), and “interesting stamping of historical buildings” (17). The neutral query and inquiry comments mainly reflected the convenience of facilities and the method of visiting: “whether the site is convenient for parking” (3), “whether there is a public toilet” (1), “how to stamp for souvenir” (41), and “ask about the time of the fireworks show” (18). This result was closely related to the spatial attribute and human activities. However, the riverside historical and cultural space in Changsha was less preserved. With

less activation and utilization, residents' participation and experiential activities in such types of RIFSs were relatively singular.

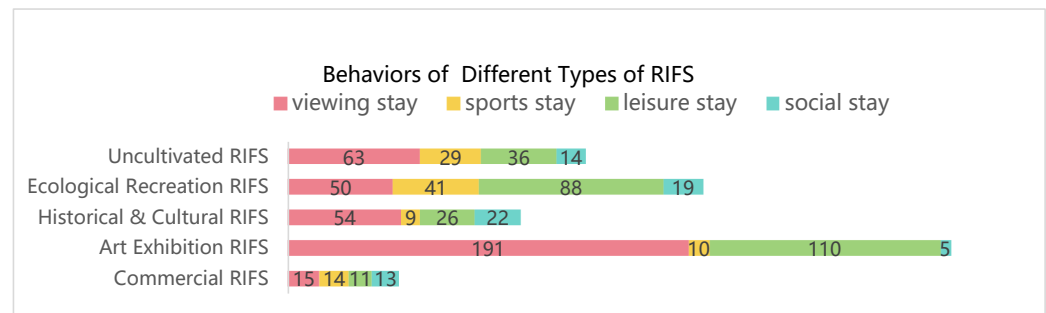
The frequency and proportion of emotional symbols at Ecological Recreational RIFSs were as follows: positive emotions (695, 90.49%), neutral emotions (67, 8.72%), and negative emotions (6, 0.78%). Among them, positive comments mainly included "Wide vision" (28), "Jiangzhongzhou Island is very spectacular" (18), "Cinematic atmosphere" (9), and "Fantasy feeling" (4). Furthermore, neutral and query comments mainly focused on comfort, convenience, and experience, such as "whether there are too many people and crowds?" (26), "whether the temperature is comfortable?" (3), "Is there any parking lot or public restroom?" (22), "When will flowers bloom" (12), etc. Regarding negative comments, the main focus was criticizing "tourists trampling on flowers and plants at will" (4). The negative comments indicated that appropriate planning and management of this kind of RIFS also attracted the attention of netizens.

The Uncultivated RIFS was the only type of RIFS with no negative evaluation. Its positive comments on visual elements were similar to those of Ecological and Recreation types. Notably, Uncultivated RIFSs provided "temporary shelters and rest space" (51) for vulnerable groups in the city, which received praise from many netizens. What is more, neutral and query comments mainly focus on safety, comfort, and convenience, such as "traffic safety" (3), "public security in the places where homeless people gathered" (3), "Is there any parking lot or public restroom?" (15), "whether the temperature is comfortable?" (7), "how do plants and animals develop?" (20), etc.

#### 4.4. Human Behaviors at Difference Types of RIFSs

Human behaviors are diverse in the riverfront spatial environment, which is an important dynamic element of the riverside public space landscape. Together with static environmental elements, human behaviors have shaped rich visual pictures. The symbol coding table of RIFSs displays the types and frequencies of human activities (Table 2). Overall, the total frequency was 696, of which the viewing stay obtained the majority of 395 (51.01%). The proportion of leisure stays and sports stays were 24.71% and 14.51%, respectively. The number of social stays was the lowest, accounting for only 68 (9.77%). In terms of specific activities, "personal posing" and "eating and drinking" were the two main activities at RIFSs, which were also popular activities transmitted on social media. Secondary high-frequency words included more than 30 kinds of activities, such as walking (62), fishing (40), drinking tea (25), cycling (24), walking the dog (23), treading on the waves (22), etc., reflecting the strong diversity of waterfront behaviors.

Figure 6 shows the numbers of the different human behaviors at different types of RIFSs. At Commercial RIFSs, the frequency of viewing stays, sports stays, leisure stays, and social stays were relatively close. In addition to "personal posing", "dating", "chatting", "drinking tea", "singing at outdoor karaoke bar", and other consumer activities account for the majority, which is closely related to the commercial nature of such spaces combined with online social networking to attract popularity. At Art Exhibition RIFSs, the frequency of viewing stays and leisure stays was far more than that of sports stays and social stays, and traditional experience activities such as snack tasting, printmaking, seal cutting, brass rubbing, ceramic art, sugar painting, etc., have aroused wide public interest. At Historical and Cultural RIFSs, the main human activities included stamping, camping, stepping on the waves, listening to music, picnics, walking, etc. However, the proportion of activities related to traditional history and culture is relatively low, indicating that rich historical and cultural resources have not been well explored. At Ecological Recreation RIFSs, the proportion of leisure stays and sports stays was the highest among the other four RIFSs, and the specific activities were also the most diverse, such as walking, cycling, paddle boarding, swimming, skateboarding, square dancing, camping, fishing, walking the dog, barbecuing, stepping on the water, taking the baby out for a walk, kite flying, etc. At Uncultivated RIFSs, viewing stays obtained the majority, while the characteristics of leisure stays and sports stays were similar to those of Ecological Recreation RIFSs.



**Figure 6.** Human behaviors at different types of RIFSs.

## 5. Discussion

In our study, the number of Historical and Cultural RIFSs was the lowest. This phenomenon indicates that Changsha’s modern industrial heritage on the riverfront has not been well preserved. In history, modern industrial projects emerged along the east bank of the Xiang River more than 100 years ago, all of which relied on river transportation. Meanwhile, manufacturing and processing industries also required a large amount of water, which made the Xiang River coastline an important area for modern industries. Compared to the cities in the Yangtze River Delta and the Pearl River Delta, which are the birthplaces of modern Chinese industry, the banks of the Huangpu River and Suzhou River in Shanghai have preserved many different types of industrial historical and cultural heritage. For example, the unique transformation and revitalization of the “Industrial Rust Belt” along the Yangpu River in Shanghai has received worldwide attention [57]. The protection and planning design of historical and cultural heritage along both sides of the Pearl River in Guangzhou have been widely promoted in the field of Chinese urban design [58]. Both Shanghai and Guangzhou have formed a series of coherent historical and cultural RIFSs. What is more, according to the review comments, the experiential activities that residents participated in had weak correlations with local history and culture. This may be related to citizens’ lack of awareness of the protection of historical and cultural heritage. Moreover, the urban planning management department may consider calling on citizens to learn more about local histories and carrying out diversified forms of protection activities through social media.

Uncultivated RIFSs need to be further analyzed. Notably, the other four types of RIFSs, which are controlled by commercial capital, special investment, or government agencies, usually have certain standardization and safety in daily operations. However, there has been no standardized development and operation of Uncultivated RIFSs, most of which are in the state of no management or weak management, or the geographical location was relatively remote, with niche, mystery, and aboriginal locations. Social media users also upload photos to attract more attention from netizens toward people of vulnerable groups. For instance, the observation, understanding, and even exposure of the lives of temporary migrant workers and homeless people living in the bridge cave space of Jvzizhou Bridge can, to some extent, promote the improvement of environmental facilities for this type of waterfront “informal living space” in society.

Regarding visual preference analysis, previous research on riverfront spatial elements has generally been limited to the adjacent shoreline [59–61]. In addition, there have been few studies on the visual preference of tourists for the river-crossing landscape and landscape elements on the opposite bank. This study found that social media users not only paid attention to the close view of the river but also had high requirements for the quality of the distant view. Therefore, in the process of riverfront design, designers should pay attention to developing the urban riverfront overlooking site, which is an important display window of the city’s image [62]. What is more, photos uploaded on social media strengthened the relationship between “seeing” and “being seen” of people at the riverfront. Various human activities have made humans inseparable parts of riverside landscape elements. Different types of characters in riverfront spaces have provided visitors with the ability to explore

and imagine diverse lifestyles. Moreover, weather and climate were also important visual elements, combined with landscape spatial environments, to create a variety of beautiful sceneries. However, weather and climate elements have usually been considered less in traditional waterfront space design.

Regarding the emotional preference analysis, negative evaluations can expose the problems existing in riverfront public spaces and can also play a key role in improving the quality of the physical environment. Among them, the evaluation that “there is a discrepancy between the actual situation and the online photos” reflects the “exaggerated beautification effect” [63] of social media. To pursue a perfect visual effect, photo-uploaders tended to use the “beauty filter” functions on their mobile cameras. Certain inconspicuous places in real life were shot from a “specific angle” and have undergone “color beautifying”, transforming them into special internet-famous sites and catering to the audience’s aesthetic needs. Therefore, this may create negative feelings when tourists visit the real place.

## 6. Conclusions

This article chose riverfront internet-famous sites in the representative Chinese “Internet-Celebrity City” Changsha as an example, using online image and review comment data on the popular social media platform “Xiaohongshu” to analyze the main concerns of the visual and emotional preferences of online netizens for riverfront internet-famous sites. The main conclusions are as follows:

In general, the 27 RIFSs selected in this article were divided into five categories: Commercial RIFSs, Art Exhibition RIFSs, Historical and Cultural RIFSs, Ecological Recreation RIFSs, and Uncultivated RIFSs. Their popularity rankings decreased in turn. From the perspective of a single RIFS, the head effect of the popularity value of the RIFS was obvious. As the popularity ranking decreased, the speed of popularity decayed dramatically. From the overall situation of visual symbol elements, there were far more character symbols and facility and function symbols than animal and plant symbols, base symbols, and shoreline symbols. The frequency of time and season symbols was also high, and they often appeared in combination with various waterfront spatial environments and human activities. What is more, from the overall emotional descriptions, there were far more positive emotions than neutral and negative emotions. Specifically:

- Commercial RIFSs had the characteristics of an extensive flow of people, a lively atmosphere, and an obvious trend of youth. The main attractions of this type of waterfront space were modern architecture with river scenery, cuisine, festivals, and strong visual expression. The frequencies of the four types of stay activities (viewing stays, social stays, sports stays, and leisure stays) were relatively balanced, with most of them being commercial-related activities such as dating, drinking tea, and listening to music at outdoor Karaoke bars. Meanwhile, netizens were more concerned with the safety of facilities, as well as questioning human comfort such as overcrowding, temperatures, etc.
- Art Exhibition RIFSs gained popularity mainly because of the art buildings with their unique designs. The main attractive activities included taking part in exhibition activities to experience the city’s unique culture and highlighting personal artistic aesthetic pursuits. Also, netizens tended to replicate fashion postures, share filming experiences, and other viewing and leisure behaviors. At the same time, they expressed dissatisfaction with the discrepancy between the actual situation and the online photos.
- Historical and Cultural RIFSs were mainly landmark historical buildings. Historical buildings, together with the nearshore waterfront environments and the background skyline on the opposite bank, became high-frequency visual symbols. In addition to personal posing and leisure activities, there were relatively few experiential activities related to history and culture. What is more, residents’ participation in experiential activities was relatively simple. Internet users were more concerned about the quality of public service facilities.

- Ecological Recreational RIFs and Uncultivated RIFs had certain similarities. Users were mainly focused on the ecological environment of the site, as well as emphasizing the creation of a wide vision and a beautiful spatial-temporal atmosphere. The construction of buildings on the opposite bank, river-spanning bridges, waves, and the sunset were the key visual elements. There were various forms of tourist stay activities, mainly focused on sightseeing, sports, and leisure. The inquiries about these venues mainly concerned comfort, convenience, and experience. In addition, there was a more diverse focus on Uncultivated RIFs, which were able to provide temporary accommodation for certain vulnerable groups in the city.

In conclusion, this article expanded the observation perspective and connotation of the vitality of riverfront public spaces based on the perspectives of social media users. Moreover, it can provide more concrete and operable directions and suggestions for the improvement of different types of riverfront environments in the future.

## 7. Limitations

The inadequacy of this article lies in the fact that, first, the sample size was small. This article only focused on data from the “Xiaohongshu” platform and, therefore, data from other social media platforms was not considered. Second, this article only conducted frequency statistics on the visual and emotional preferences regarding RIFs, and further research is needed to investigate the correlation between different symbols. Third, the research was conducted only from the perspective of online netizens, lacking a comparative perception of the real space use of offline visitors. Fourth, there was a lack of research on whether “internet-famous” sites directly correspond to offline high-vitality sites. The above deficiencies can serve as directions or ideas for future researchers.

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## Appendix A

**Table A1.** Preliminary visual and emotional symbol coding table for RIFs.

	Major Category	Sub-Category	Basic Types
Visual Symbol	Base	riverfront topography	grass slopes, tree ponds, forests, flat lawns, shoals, flower beds, terraced lawns, sandy areas, hard areas. . .
		altitude difference	flood control base, transition base, hydrophilic base, steep slopes, outdoor steps, slopes, terraces. . .
	Shore-line	shoreline	waves, tidal ebb zone, stones, ecological embankments, railings, hard embankments, docks, bike lanes, winding paths, tides, embankments, light shows, flood walls, fireworks, flat shorelines, convex banks, and mooring piers (including opposite shore, distant mountains and islands). . .
		overhang	face shaped overhang, vertical overhang, enclosed overhang, terrace. . .

**Table A1.** *Cont.*

	Major Category	Sub-Category	Basic Types
Visual Symbol	Function & Facilities	building	buildings on the opposite bank, art museums, landmark buildings, architectural details, restaurants, attics, shops, markets, commercial buildings, villas (lakeside villas), old industrial buildings, amusement parks, cultural and creative shops, squares, cafes, main stores, tea houses, milk tea shops, vending machines. . .
		structure	river-spanning bridge, billboards, piers, stone bridges, roads, parking lots, street lights, signboards, sculptures of great figures, cartoon sculptures, large screens, building stairs, lighthouses, boardwalks, parks, water towers, railway tracks, underground passages, slides, trash cans, sports venues, utility poles, public toilets. . .
		transportation	cruise ships, bicycles, fishing boats, trains (steam trains), motorcycles, cars, rowing. . .
		items	neon lights, food, tables and chairs, children’s dolls, umbrellas (sunshades), barbecues, tents, daily necessities, beds, luggage, kites, tea sets, speakers, chess and cards, balloons. . .
		resting facilities	tree pool, stool, steps, flower pond, seats. . .
	Time & Climate	others	graffiti, Scene location for variety shows. . .
		season	spring, summer, autumn, winter
		time	early morning, morning, noon, afternoon, nightfall, day, night, festival. . .
		weather	sunrise, sunset, blue sky, clouds, moon, rainbow, starry sky, wind. . .
	Animals & Plants	climate	Sunny, cloudy, rainy, snowy, smog. . .
		plants	trees, grasses, flowers, aquatic plants, arbor, deciduous plants, potted plants, shrubs, vines, dead woods. . .
	People	animals	dogs, cows, swans, horses, birds, cats. . .
		types of people	youth, women, police officers, men, vendors, tourists, children, residents, elderly, couples, wanderers, teenagers, middle-aged, delivery drivers, singers, bands. . .
behaviors		1. viewing stay: personal posing, taking wedding photos, capturing scenery. . . 2. sports stay: walking, cycling, paddle boarding, swimming, running, skateboarding, square dancing. . . 3. leisure stay: camping, fishing, walking dogs, stepping on water (waves), barbecue, taking baby out for a walk, listening to music, singing at karaoke bar, strolling around, having picnics, flying kites, reading books, playing, singing, lying down, eating snacks. . . 4. social stay: drinking tea, chatting, dating, stamping, punching, eating melon seeds, strip the skewers, playing chess. . .	
Emotional Symbol	Positive, Neutral & Query, Negative	(detailed reasons are based on review comments)	

**Table A2.** Frequency of visual symbol coding table for Commercial RIFs.

	Major Category	Sub-Category	Basic Types
Visual Symbol (total: 925)	Base (total: 38)	riverfront topography (total: 26)	grass slopes (4), forests (11), flower beds (6), terraced lawns (5)
		altitude difference (total: 12)	outdoor steps (12)
	Shore-Line (total: 26)	Shoreline (total: 17)	stones (6), bike lanes (7), light shows (1), distant mountains (6)
		Overhang (total: 9)	face shaped overhang (1), terrace (8)

Table A2. Cont.

Major Category	Sub-Category	Basic Types
Function & Facilities (total: 516)	Building (total: 184)	buildings on the opposite bank (44), art museums (2), landmark buildings (9), architectural details (16), restaurants (34), shops (34), markets (11), commercial buildings (10), amusement parks (9), squares (3), cafes (6), main stores (4), milk tea shops (1), vending machines (1)
	Structure (total: 129)	river-spanning bridge (5), billboards (38), parking lots (5), street lights (15), signboards (11), cartoon sculptures (24), large screens (13), lighthouses (5), boardwalks (2), parks (5), slides (3), sports venues (1)
	Transportation (total: 9)	cruise ships (1), bicycles (4), fishing boats (1), motorcycles (1), cars (2)
	Items (total: 153)	neon lights (59), food (59), tables and chairs (21), children's dolls (2), umbrellas (sunshades) (7), tents (1), tea sets (2), speakers (1), balloons (1)
	Resting facilities (total: 37)	tree pool (18), stool (10), flower pond (6), seats (3)
	Others (total: 4)	graffiti (2), Scene location for variety shows (2)
Visual Symbol (total: 925)	Season (total: 13)	summer (9), autumn (3), winter (1)
	Time & Climate (total: 127)	Time (total: 37)
	Weather (total: 70)	noon (2), afternoon (1), nightfall (1), day (1), night (32)
	Climate (total: 7)	sunrise (4), sunset (29), blue sky (7), clouds (6), sunset glow (19), wind (5)
	Animals & Plants (total: 46)	Plants (total: 46)
	Animals (total: 0)	— —
People (total: 172)	types of people (total: 119)	youth (45), women (17), police officers (1), men (6), vendors (15), tourists (7), children (7), residents (4), elderly (3), couples (2), teenagers (3), middle-aged (9)
	Behaviors (total: 53)	1. viewing stay (total: 15): personal posing (12), taking wedding photos (1), capturing scenery (2) 2. sports stay (total: 14): walking (7), cycling (4), paddle boarding (1), skateboarding (2) 3. leisure stay (total: 11): camping (1), walking dogs (1), taking baby out for a walk (1), listening to music (4), singing at karaoke bar (4) 4. social stay (total: 13): drinking tea (4), dating (9)

**Table A3.** Frequency of emotional elements of Commercial RIFs.

Emotional Preference	Main Points	Representative Comments (Frequency)
Positive (total: 944)	Beautiful Scenery (total: 370)	wide vision (1), romantic marshland (14), nostalgia atmosphere (6), a holiday exclusive edition (6), the distinctive features of the old city (12)
	Fun (total: 28)	Internet-famous children's slide (9), alcohol and music (4), delicious food (4), fashionable style of middle ages (3), home-stay (3), a trendy way of entertainment (3), coffee & dessert (2)
	Want to visit (total: 545)	film and television shooting location (21), the celebrity effect attracts popularity (8)
	Other Compliments (total: 1)	unique (1)
Neutral & Query (total: 65)	Safety (total: 20)	questioning safety of amusement facilities (20)
	Comfort (total: 33)	whether there are too many people and crowds (20), whether the temperature is comfortable (13)
	Convenience (total: 3)	whether convenient to parking lots (3)
	Experience (total: 9)	whether the food is delicious (9)
Negative (total: 1)	Disappointed (total: 1)	there is a discrepancy between the actual situation and the online photos (1)

**Table A4.** Frequency of visual symbol coding table for Art Exhibition RIFs.

Major Category	Sub-Category	Basic Types	
Base (total: 73)	riverfront topography (total: 55)	grass slopes (5), tree ponds (4), forests (8), flat lawns (11), shoals (5), flower beds (22)	
	altitude difference (total: 18)	flood control base (2), hydrophilic base (2), outdoor steps (11), slopes (3)	
Shore-Line (total: 123)	Shoreline (total: 123)	waves (14), tidal ebb zone (12), stones (27), ecological embankments (17), railings (15), hard embankments (2), docks (6), bike lanes (1), walls (17), embankments (3), flood walls (3), flat shorelines (1), convex banks (2)	
	Overhang (total: 0)	— —	
Visual Symbol (total: 1485)	Building (total: 121)	buildings on the opposite bank (18), art museums (56), architectural details (31), villas (lakeside villas) (14), squares (2)	
	Structure (total: 57)	river-spanning bridge (24), gateway (5), piers (6), sculptures of great figures (9), large screens (1), building stairs (4), lighthouses (3), boardwalks (2), street lights (2)	
	Function & Facilities (total: 231)	Transportation (total: 6)	cruise ships (2), bicycles (4)
		Items (total: 28)	neon lights (13), food (13), umbrellas (sunshades) (1), kites (1)
		Resting facilities (total: 5)	tree pool (4), stool (1)
	Others (total: 14)	geometric modeling (14)	
	Time & Climate (total: 147)	Season (total: 31)	summer (26), winter (5)
Time (total: 15)		nightfall (5), day (1), night (9)	
Weather (total: 87)		sunset (19), blue sky (33), clouds (25), sunset glow (5), wind (5)	
Climate (total: 14)		sunny (4), cloudy (1), smog (9)	

Table A4. Cont.

	Major Category	Sub-Category	Basic Types
Visual Symbol (total: 1485)	Animals & Plants (total: 29)	Plants (total: 21)	flowers (6), aquatic plants (11), arbor (4)
		Animals (total: 15)	swans (15)
	People (total: 882)	types of people (total: 571)	youth (191), women (177), police officers (157), men (16), vendors (13), tourists (4), elderly (5), couples (3), middle-aged (2)
		Behaviors (total: 311)	1. viewing stay (total: 191): personal posing (181), taking wedding photos (10) 2. sports stay (total: 10): walking (5), cycling (4), running (1) 3. leisure stay (total: 110): eating snacks (25), fishing (10), walking dogs (4), stepping on water (waves) (5), taking baby out for a walk (1), flying kites (1), printmaking (13), seal cutting (13), rubbing (13), ceramics (13), sugar painting (12) 4. social stay (total: 5): dating (1), stamping (4)

Table A5. Frequency of emotional elements of Art Exhibition RIFs.

Emotional Preference	Main Points	Representative Comments (Frequency)
Positive (total: 744)	Beautiful Scenery (total: 351)	wide vision (21), share photo shooting experience (32), romantic marshland (1), graceful spatial geometrical modelling of architecture (14), sense of technology (4), sense of oil painting (3), sense of mysterious (3)
	Fun (total: 27)	one stop experience of Changsha wonderful night & intangible cultural heritage (27)
	Want to visit (total: 144)	— —
	Other Compliments (total: 252)	the police have a professional level of photography skills (252)
Neutral & Query (total: 8)	Safety (total: 0)	— —
	Comfort (total: 5)	whether the temperature is comfortable (2), whether mosquito bites or not (3)
	Convenience (total: 0)	— —
	Experience (total: 3)	how to stamp and commemorate (3)
Negative (total: 19)	Disappointed (total: 19)	there is a discrepancy between the actual situation and the online photos (13), water turbidity (5), lack of humanistic atmosphere (1)

Table A6. Frequency of visual symbol coding table for Historical and Cultural RIFs.

	Major Category	Sub-Category	Basic Types
Visual Symbol (total: 862)	Base (total: 48)	riverfront topography (total: 42)	forests (27), flat lawns (14), sandy areas (1)
		altitude difference (total: 6)	outdoor steps (6)
	Shore-Line (total: 94)	Shoreline (total: 94)	waves (16), tidal ebb zone (27), stones (23), railings (2), docks (7), winding paths (3), embankments (1), light shows (7), fireworks (5), islands (4), distant mountains (2)
		Overhang (total: 0)	— —

Table A6. Cont.

	Major Category	Sub-Category	Basic Types
Visual Symbol (total: 862)	Function & Facilities (total: 315)	Building (total: 125)	buildings on the opposite bank (13), landmark buildings (34), restaurants (10), attics (34), shops (1), markets (6), commercial buildings (6), old industrial buildings (13), cultural and creative shops (6), cafes (1), tea houses (1)
		Structure (total: 27)	river-spanning bridge (6), roads (5), street lights (2), parks (2), railway tracks (6), gateway (6)
		Transportation (total: 25)	cruise ships (4), bicycles (3), fishing boats (4), trains (steam trains) (11), cars (2), motorcycles (1)
		Items (total: 123)	neon lights (43), food (17), tables and chairs (5), children's dolls (43), postcard (15)
		Resting facilities (total: 15)	tree pool (10), stool (5)
		Others (total: 0)	— —
	Time & Climate (total: 62)	Season (total: 5)	summer (5)
		Time (total: 29)	afternoon (3), night (22), festival (4)
		Weather (total: 26)	sunset (6), blue sky (9), clouds (4), sunset glow (2), wind (5)
		Climate (total: 2)	Sunny (2)
	Animals & Plants (total: 81)	Plants (total: 79)	Trees (27), grasses (14), aquatic plants (19), arbor (14), deciduous plants (1), shrubs (3), dead woods (1)
		Animals (total: 2)	horses (2)
	People (total: 262)	types of people (total: 151)	Youth (58), women (61), vendors (9), tourists (5), children (10), residents (2), middle-aged (2), bands (4)
		Behaviors (total: 111)	1. viewing stay (total: 54): personal posing (54) 2. sports stay (total: 9): walking (6), cycling (3) 3. leisure stay (total: 26): camping (7), resting (1), stepping on water (waves) (6), listening to music (6), singing at karaoke bar (1), having picnics (5) 4. social stay (total: 22): drinking tea (5), chatting (4), stamping (11), eating melon seeds (2)

Table A7. Frequency of emotional elements of Historical and Cultural RIFSs.

Emotional Preference	Main Points	Representative Comments (Frequency)
Positive (total: 276)	Beautiful Scenery (total: 160)	lovely dolls (65), nostalgia atmosphere (2), wide vision (2)
	Fun (total: 0)	— —
	Want to visit (total: 114)	— —
	Other Compliments (total: 2)	comfortable (2)

Table A7. Cont.

Emotional Preference	Main Points	Representative Comments (Frequency)
Neutral & Query (total: 70)	Safety (total: 0)	— —
	Comfort (total: 3)	whether mosquito bites or not (3)
	Convenience (total: 8)	whether convenient to parking lots (3), whether there is any restrooms (1), whether the activity free of charge (4)
	Experience (total: 59)	how to stamp and commemorate (41), the specific time of the fireworks display (18)
Negative (total: 2)	Disappointed (total: 2)	fragmentation of visual information (2)

Table A8. Frequency of visual symbol coding table for Ecological Recreational RIFs.

Major Category	Sub-Category	Basic Types
Base (total: 141)	riverfront topography (total: 132)	grass slopes (40), tree ponds (37), forests (4), flat lawns (5), shoals (19), flower beds (19), terraced lawns (5), sandy areas (3)
	altitude difference (total: 9)	hydrophilic base (2), steep slopes (2), slopes (5)
Shore-Line (total: 251)	Shoreline (total: 243)	waves (73), tidal ebb zone (26), stones (21), ecological embankments (22), railings (13), hard embankments (29), docks (9), winding paths (11), tides (11), embankments (8), flat shorelines (3), distant mountains (9), islands (8)
	Overhang (total: 8)	face shaped overhang (3), enclosed overhang, terrace (5)
Visual Symbol (total: 1456)	Building (total: 93)	buildings on the opposite bank (91), commercial buildings (2)
	Structure (total: 194)	river-spanning bridge (82), piers (8), stone bridges (4), roads (16), parking lots (20), street lights (4), signboards (10), sculptures of great figures (14), lighthouses (8), boardwalks (5), parks (10), water towers (5), trash cans (4), sports venues (2), utility poles (1), public toilets (1)
	Transportation (total: 49)	cruise ships (24), bicycles (8), fishing boats (8), motorcycles (6), cars (1), rowing (2)
	Items (total: 61)	neon lights (17), food (3), tables and chairs (14), umbrellas (sunshades) (8), barbecues (13), tents (5), chess and cards (1)
	Resting facilities (total: 97)	tree pool (37), stool (40), flower pond (19), seats (1)
	Others (total: 3)	Scene location for variety shows (3)
	Season (total: 17)	summer (10), autumn (4), winter (3)
Time & Climate (total: 120)	Time (total: 26)	morning (1), noon (1), afternoon (7), day (10), night (7)
	Weather (total: 70)	Sunrise (1), sunset (48), blue sky (30), clouds (18), sunset glow (27), wind (11)
	Climate (total: 7)	Sunny (22), smog (20)
Animals & Plants (total: 72)	Plants (total: 62)	flowers (18), aquatic plants (8), arbor (7), deciduous plants (11), shrubs (11), vines (7)
	Animals (total: 10)	cows (8), horses (1), birds (1)

Table A8. Cont.

	Major Category	Sub-Category	Basic Types
Visual Symbol (total: 1456)	People (total: 375)	types of people (total: 177)	Youth (63), women (16), police officers (1), men (34), vendors (10), tourists (2), children (6), residents (8), elderly (14), couples (3), middle-aged (19), delivery drivers (1)
		Behaviors (total: 198)	1. viewing stay (total: 50): personal posing (31), taking wedding photos (3), capturing scenery (16) 2. sports stay (total: 41): walking (24), cycling (9), paddle boarding (3), swimming (3), skateboarding (1), square dancing (1) 3. leisure stay (total: 88): camping (24), fishing (15), walking dogs (13), stepping on water (waves) (10), barbecue (13), taking baby out for a walk (3), laying down and having rest (1), having picnics (3), flying kites (3), reading books (3) 4. social stay (total: 19): drinking tea (9), chatting (6), eating melon seeds (2), strip the skewers (2)

Table A9. Frequency of emotional elements of Ecological Recreational RIFs.

Emotional Preference	Main Points	Representative Comments (Frequency)
Positive (total: 695)	Beautiful Scenery (total: 391)	wide vision (28), spectacular islands (18), cinematic atmosphere (9), sense of mysterious (4)
	Fun (total: 0)	— —
	Want to visit (total: 304)	— —
	Other Compliments (total: 0)	— —
Neutral & Query (total: 67)	Safety (total: 2)	questioning the level of traffic and public security (2)
	Comfort (total: 31)	whether there are too many people and crowds (26), whether the temperature is comfortable (3), whether mosquito bites or not (2)
	Convenience (total: 22)	whether convenient to parking lots (21), whether there is any restrooms (4)
	Experience (total: 12)	the flower season (12)
Negative (total: 6)	Disappointed (total: 6)	there is a discrepancy between the actual situation and the online photos (2), tourists trample on flowers and plants at will (4)

Table A10. Frequency of visual symbol coding table for Uncultivated RIFs.

	Major Category	Sub-Category	Basic Types
Visual Symbol (total: 1058)	Base (total: 73)	riverfront topography (total: 59)	grass slopes (21), tree ponds (3), forests (12), flat lawns (8), shoals (7), terraced lawns (7), hard areas (1)
		altitude difference (total: 14)	hydrophilic base (5), outdoor steps (1), slopes (8)
	Shore-Line (total: 171)	Shoreline (total: 127)	Waves (29), tidal ebb zone (6), stones (17), ecological embankments (14), railings (29), hard embankments (15), bike lanes (8), winding paths (2), flood walls (4), distant mountains (5)
		Overhang (total: 43)	face shaped overhang (20), enclosed overhang, terrace (23)

Table A10. Cont.

	Major Category	Sub-Category	Basic Types
Visual Symbol (total: 1058)	Function & Facilities (total: 306)	Building (total: 73)	buildings on the opposite bank (73)
		Structure (total: 152)	river-spanning bridge (71), piers (22), stone bridges (31), roads (10), parking lots (5), street lights (3), signboards (1), boardwalks (2), water towers (1), underground passages (5), trash cans (1)
		Transportation (total: 34)	cruise ships (13), bicycles (7), fishing boats (6), motorcycles (3), cars (5)
		Items (total: 27)	neon lights (5), tables and chairs (5), umbrellas (sunshades) (2), daily necessities (5), beds (5), luggage (5)
		Resting facilities (total: 13)	stool (10), flower pond (3)
		Others (total: 7)	Graffiti (7)
	Time & Climate (total: 178)	Season (total: 17)	Spring (10), summer (4), winter (3)
		Time (total: 27)	morning (1), afternoon (4), nightfall (2), night (20)
		Weather (total: 86)	Sunrise (2), sunset (28), blue sky (14), clouds (15), sunset glow (16), wind (11)
		Climate (total: 48)	Sunny (34), cloudy (7), smog (7)
	Animals & Plants (total: 29)	Plants (total:13)	flowers (2), aquatic plants (6), arbor (2), shrubs (1), dead woods (2)
		Animals (total: 16)	Dogs (1), cows (13), horses (2)
	People (total: 301)	types of people (total: 159)	Youth (56), women (36), men (24), vendors (1), tourists (11), children (3), residents (5), elderly (10), couples (5), wanderers (5), middle-aged (3)
		Behaviors (total: 142)	1. viewing stay (total: 63): personal posing (45), taking wedding photos (9), capturing scenery (9) 2. sports stay (total: 29): walking (19), cycling (7), swimming (1), running (2) 3. leisure stay (total: 36): resting (1), fishing (17), walking dogs (5), stepping on water (waves) (1), barbecue (2), taking baby out for a walk (7), singing at karaoke bar (2), having picnics (1) 4. social stay (total: 14): drinking tea (7), chatting (3), eating melon seeds (4)

Table A11. Frequency of emotional elements of Uncultivated RIFSs.

Emotional Preference	Main Points	Representative Comments (Frequency)
Positive (total: 396)	Beautiful Scenery (total: 206)	wide vision (45), cinematic atmosphere (20), fantasy feeling (1), sense of mysterious (1)
	Fun (total: 0)	---
	Want to visit (total: 139)	---
	Other Compliments (total: 51)	respect for vulnerable groups (51)

Table A11. Cont.

Emotional Preference	Main Points	Representative Comments (Frequency)
Neutral & Query (total: 47)	Safety (total: 3)	questioning the level of traffic and public security (3)
	Comfort (total: 29)	whether the temperature is comfortable (7), is there any odor from the excrement of cattle and sheep (13), whether mosquito bites or not (2), is there any snakes in the grassland (4), are there any tourists trampling on the grass (3)
	Convenience (total: 15)	whether convenient to parking lots (13), whether there is any restrooms (2)
	Experience (total: 0)	— —
Negative (total: 0)	Disappointed (total: 0)	— —

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