

Research Article

Digital Dissemination of Scene Art in Changbai Mountain Area of Visual Sensor Images

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With the booming development of the tourism industry, how to bring good benefits to the tourist attractions has become a topic worth pondering. In today's Internet age, digital communication has become a mainstream way of disseminating art and culture in tourist attractions. This paper takes Changbai Mountain as the research object and realizes the digital dissemination of scene art in Changbai Mountain based on visual sensor image technology. Digital communication not only changes the way of information dissemination but also profoundly affects people's life, work, and entertainment, changing the way people receive information and the way of thinking, and people have higher requirements for information. Therefore, on the one hand, the communication of Changbai Mountain tourism culture should develop with the development of the times. On the other hand, it should evolve with the evolution of information and constantly change its own form of expression and dissemination to meet the needs of the audience. Finally, the effectiveness of digital dissemination of scene art in Changbai Mountains is reflected through the tourism statistics. The results show that the total tourism revenue of Changbai Mountain in 2019 is the largest, which is 5.61 billion yuan.

1. Introduction

For a long time, as an artistic expression medium, film and television can present vivid, vivid, and timely audio-visual images, expand and extend people's horizons, and promote the dissemination of cultural information. Many tourist cities take the image advertisement of the tourist destination as the main form to display the characteristic culture of the tourist destination. Today, with the development of digital technology and computer technology, the means of film and television production have been greatly enriched. The digital image conveys the highly concentrated history and culture, local customs, and natural landscape of the tourist destination to the audience vividly and vividly through digital technology and artistic techniques. Through high-definition digital images, viewers can intuitively understand the rich cultural relics, folk customs, religious culture, literature, and art of the tourist destination and meet the needs of

increasing knowledge, broadening their horizons and feeling happy.

The innovation of this paper lies in the new point of view, and the application of digital art in the tourism and cultural communication activities of Changbai Mountain will be the general trend. It believes that the reasonable use of digital art expressions and dissemination methods can effectively improve the attractiveness, influence, and dissemination of Changbai Mountain tourism culture and effectively expand the scope, breadth, and depth of Changbai Mountain tourism culture dissemination. In the future, digital art will surely become an important means of Changbai Mountain tourism culture dissemination with its diversified and vivid expression forms and efficient, convenient, and interactive communication methods. In addition, this research introduces visual sensor image technology to realize the digital dissemination of scene art in Changbai Mountain.

2. Related Work

Many scholars at home and abroad have provided a lot of references for research on visual sensor images, Changbai Mountain, scene art, and digital communication.

Tang et al. proposed to adjust the density of key tree species in the forest and cultivate large-diameter wood according to the competition among key tree species. Once the tree's DBH exceeds 20 cm, the growth of the tree is not affected by competition [1].

Sun et al. measured the leaf dark respiration of two dominant tree species (Korean pine and *Tilia*) in the broad-leaved Korean pine mixed forest in Changbai Mountain under light and dark conditions. They discussed the reasons for the differences in leaf dark respiration and light inhibition [2].

Huaiwei and Guo reviewed the experimental research progress on the conductivity of silicate melts. The Na⁺ concentration and H₂O concentration are the key factors to control the conductivity. Two applications include the low-velocity zone of the oceanic asthenosphere and the magma chamber below the Tianchi volcano in Changbai Mountain [3].

Rongqin et al. use the electrical constraint inversion method, which can improve the accuracy of inversion interpretation by using the constraints of electrical logging data in the inversion process, which is beneficial to obtain richer geoelectrical information. Taking the geothermal exploration in the Changbai Mountain area as an example, the measured CSAMT data is used as the resistivity model for inversion, and the electrical characteristics are constrained by the actual drilling data in this section [4].

Huo et al. studied the content and density of soil organic carbon (SOC) and unstable and stable SOC components in peat soils from wetlands, soybean fields, and rice fields around Xingkai Lake in Northeast China [5].

Lv et al. designed a label-free sensing strategy for OTA detection using aptamers, SYBR Gold, and exonuclease. In the presence of the target molecule (OTA), the concept of OTA-specific aptamers was transformed from random coils to antiparallel G-quadruplexes [6].

The data of these studies are not comprehensive, and the results of the studies are still open to question; so, they cannot be recognized by the public and thus cannot be popularized and applied.

3. Visual Sensor Images and Digital Dissemination of Scene Art in Changbai Mountains

3.1. Vision Sensor Image. The visual sensor selected in this experiment is AVT Guppy's CCD camera [7, 8]. AVT Guppy cameras are designed to be extremely compact and have an excellent IEEE 1394 interface. It includes 10 different types of cameras (each with available B/W and color) and a wide variety of sensors and bandwidths, providing the right solution for almost any application imaginable. Guppy is available in casing or panel version (on request) and therefore fits in the smallest of spaces. A selection of

high-quality, sensitive sensors (CCD sensor CMOS) enables Guppy to provide excellent image quality and true-to-life colors. The other two interleaved versions (EIA, CCIR) also enable more conversion image processing from analog to digital. Based on its modularity and significant price/performance ratio, adoption of Guppy is an ideal approach in many applications to achieve digital transformation of image processing [9]. The picture of the CCD camera is shown in Figure 1.

In front of the CCD camera, an interference filter with a transmission wavelength of 650 nm and a transmittance greater than 80% and a multilayer antireflection UV protective lens of the L37 Super Pro brand are installed [10, 11]. This specification filter can effectively filter out a large amount of arc light, and at the same time, let the laser structured light pass as much as possible and increase the signal-to-noise ratio of the image. The main function of the multilayer antireflection UV protection lens of L37 Super Pro grade is to prevent the splash and smoke generated during the process from polluting the filter [12]. This experiment uses the NI PCI-8254R acquisition card [13, 14]. The NI PCI-8254R capture card is equipped with reconfigurable I/O (RIO), IEEE 1394a interface devices compatible. The NI 8254R is driven by NI Vision Acquisition software, which includes all drivers in the NI Vision product line. With NI Vision Acquisition software, applications can be launched quickly and easily without having to go at the register level. The NI 8254R includes TTL controls for inputs and outputs, with isolated inputs and outputs for connecting to external devices such as lighting controllers, proximity sensors, and quadrature encoders. Behind the digital I/O of the NI 8254R is an FPGA that is preconfigured for the most common machine vision tasks. However, if this factory configuration function does not meet your requirements, the user can configure the LabVIEW FPGA Module for use on the FPGA. The NI 8254R provides a convenient 44-pin D-subconnector on its front panel for digital I/O [15].

The general visual sensor working system model is shown in Figure 2 [16, 17].

3.2. Digital Dissemination of Scene Art in Changbai Mountains. Within the scope of Jilin Province, Changbai Mountain, as a landmark geographical form, has a high degree of recognition and has an important historical and social status and the protection of ecological resources [18]. Changbai Mountain starts from the Liaohe River in the west, the Yellow Sea in the south, the Songnen Plain in the north, and the Mudanjiang River Basin in the east. Changbai Mountain has rich ecosystems and diverse species. There are animals such as sika deer, Siberian tiger, and mink and 2,639 kinds of plant resources, including spruce, fir, Yuehua, Korean pine, and sand pine, among which there are more than 960 medicinal plants, such as ginseng [19, 20].

The characteristics of Changbai Mountain art are reflected in its unique national characteristics, regionality, and history, and it is an art derived from nature and humanities. In the course of thousands of years of development, it integrates humanistic spirit and material needs and



FIGURE 1: The CCD video camera.

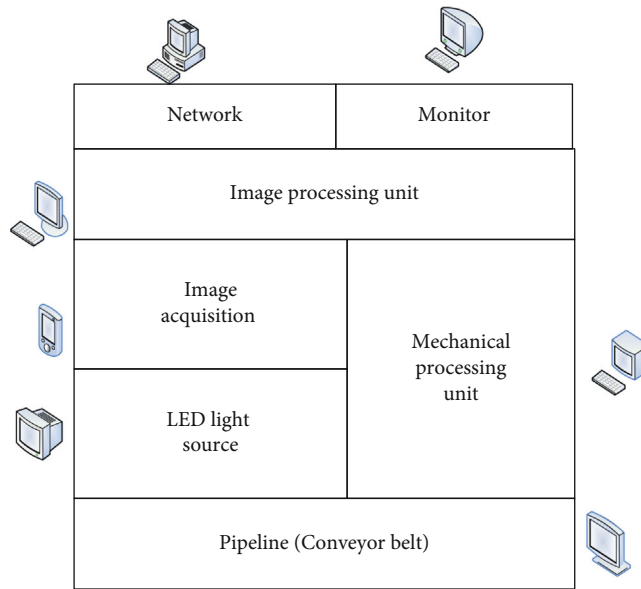


FIGURE 2: General visual sensor working system model.



FIGURE 3: Real scene of Changbai Mountain.

represents the spirit of “symbiosis and coexistence” of the Jilin people.

This is also the spirit of Changbai Mountain, the symbiosis, and coexistence of white mountain and black soil and the symbiosis and coexistence of water and fire. The real scene of Changbai Mountain is shown in Figure 3 [21].

The influence index system of tourist satisfaction in Changbai Mountain Scenic Spot is shown in Tables 1–3[22, 23].

Culture is the source of attraction for tourist landscapes. From the perspective of tourism resources, the landscapes, cultural relics, and other landscapes of the land of Shenzhou contain rich culture, and it is a treasure mine worthy of digging. No one will appreciate the beautiful tourism resources

without publicity, and they will not be able to show their value [24]. With the rapid development of China’s tourism industry, more and more tourist destinations are optimistic about the role of communication, and communication has become a key point in the development of tourism. The further development of tourism needs to rely on the mass and extensive dissemination of tourism information by the media. The weights of the influence indicators of tourist satisfaction in Changbai Mountain Scenic Spot are shown in Tables 4 and 5.

In the digital information society, digital communication affects the way of life and ideas of the modern public, and people have diverse needs for information acquisition and interaction. Visual and media-based communication

TABLE 1: Impact index system of tourist satisfaction in Changbai Mountain Scenic Area.

Order number	Influence elements	Quota
1		Scenic spot characteristic A1
2	Scenic spot	Ornamental value A2
3		Resource enrichment A3
4		Facilities safety A4
5	Service facility	Facility capacity A5
6		Facilities comfort level A6

TABLE 2: Impact index system of tourist satisfaction in Changbai Mountain Scenic Area.

Order number	Influence elements	Quota
7		Tour guide explanation service A7
8	Personnel service	Travel consulting services A8
9		Ticket staff service A9
10	Tourism traffic	Transportation convenience A10
11		Traffic safety A11
12		Traffic comfort level A12

TABLE 3: Impact index system of tourist satisfaction in Changbai Mountain Scenic Area.

Order number	Influence elements	Quota
13		Environmental health A13
14	Scenic area environment	Environmental protection A14
15		Environmental capacity: A15
16		Shopping price A16
17	Travel shopping	Shopping features the A17
18		Shopping quality A18

endows the tourist audience with more independent choices, provides the tourist audience with richer and more vivid and intuitive image information, and expands the scope and depth of the tourism culture of Changbai Mountain.

In modern society, it is necessary to communicate at the spiritual level through various means, and various forms of digital interaction invisibly promote the continuous extension and expansion of this new type of network communication system. Currently, in the era of rapid development of digital technology, we should pay attention to the fit of people's culture, feelings, and values, and we must break through the way of cultural cognition, the obstacles of emotional communication, and the direction of value concepts.

The ways in which digital is experienced is diverse, and the paths it presents are overwhelming. The development of digital technology in the art world is also multi-interactive, and the corresponding information obtained by the audience can be decomposed and expressed through digital technology. People, things, events, society, and nature will eventually be expressed in the form of sound, language, text, image, animation, etc. Massive and complex information storage is the advantage of digitalization, and it is an art for the audience to recognize and share this information.

In the traditional information transmission process, the audience's cognition of information is a flat, one-way source of information. Digital technology has changed this status quo. In the abstract digital information world, audiences can obtain multidimensional, multifaceted, multidirectional, and various forms of information content or abstractly explain and invent information. Familiar or unfamiliar events and objects or some other sources of information about events and objects themselves have been continuously processed and extended through various virtual abstract means such as network, program application, and digital technology. Information based on digitization will inevitably bring new cognition, new aesthetics, new thinking, new concepts, new experiences, and new perceptions. In addition, it can promote people to transform from practical behavior in the real society to a breakthrough in thinking in the virtual world, and the practical behavior built on the virtual world model gradually becomes a kind of trial and habit of people. Communication and exchange in the virtual world will become a new way of practice and information transmission.

All information should have the characteristics of cognition and sharing, as well as the characteristics of restoring events, feelings, and scenes. Digital art itself is a restoration and transmission of information, which can make it more convenient for the audience to send and transmit information, and realize the exchange of material, spiritual, and cultural information between audiences in different regions. All information will have a suitable artistic expression and characteristics, and these expressions and characteristics can be felt through the various sense organs of the audience. This feeling is a sublimation of art and superior to art.

Due to technical reasons, transmission methods, representational functions, and limitations of media forms, the information of digital art is different from other information content such as pure art, pure text, pure music, and pure video. Digital art is the integration of digital technology, art, and concept, and they will virtualize, sensualize, and abstract all information in our minds. Digital art is from the perspective of transmitting information through digital media, so as to examine the degree of influence of its information transmission. The greater and wider the influence of general information transmission, the easier it is for people to accept this digital art. For example, Weibo has the attributes of combining concept, art, and digitization, and it is a digital medium that absorbs massive information sources. It transmits information to the audience, and being recognized and shared by the audience is the ultimate goal of digital art. The information of digital art is a process in which

TABLE 4: Personnel service weight distribution table.

Personnel service	Facility distribution density	Ticket staff service	Guide explanation service	Weight
Facility distribution density	1	2.7672	3.2328	0.5923
Ticket staff service	0.3614	1	0.4476	0.1555
Guide explanation service	0.3093	2.2328	1	0.2522

TABLE 5: Table of weight distribution of service facilities.

Service facility	Security of facilities	Facilities hygiene	Facility capacity	Weight
Security of facilities	1	4.45	2.55	0.5872
Facilities hygiene	0.2247	1	0.2198	0.0959
Facility capacity	0.3922	4.55	1	0.3169

various divergent ideas are created and shared. It can also cross regions, narrow distances, break through various bottlenecks, and form innovative cultural exchanges and visual information of spiritual resonance.

In today's era of information superhighway, digital art has excellent artistic innovation and expansion. In the era of rapid progress of digital technology, in order to grasp the needs of the audience and complete the information transmission, it is necessary to use diversified, novel, and special information expression methods. The connotations and ideas contained in various digital forms of information in art cannot be reflected in traditional information transmission. It has better expansion space and development direction and combines virtual imagination with real appearance. In other words, digital art is a symbol of the information environment in the new era, it can be recognized and perceived, and it can also be innovatively and virtually exploited the advantages of the new world information environment. The audience can create and recreate digital art with the concept of thinking, form virtual abstract art information, and carry out infinite horizontal and vertical divergence of information transmission in the entire digital age.

Information transmission is the purpose of digital art, which invisibly forms a dynamic platform for communication and sharing. The message itself is real long before the audience wants to present their own thoughts and concepts. At the same time, only efficient, fast, profound, and accurate information can be quickly received and shared by the audience. However, in the process of information transmission and sharing, whether the audience's tolerance and feedback are good or bad, and whether directly related information can be transmitted and shared again, such complex and repeated sharing is a dynamic performance of information transmission.

There are many forms of expression and knowledge involved in digital art. In order to promote the information transmission of digital art efficiently, accurately, and quickly, it is necessary to consider the connection between digital art and information transmission. In this way, the familiarity and cognition of each individual in human, nature, and society will be promoted, and people will be familiar with and build material civilization and spiritual civilization.

In visual communication, audio-visual, graphics, and video are used to disseminate information, and the requirements for cultural level and reading ability are reduced. Visual communication presents the most intuitive and perceptual information content for tourist audiences, which can mobilize more sensory responses to perceive information. In the environment of digital media, with the development and progress of digital technology and communication technology, more diverse forms of visual expression and experience will inevitably emerge, which influence people's understanding and experience of Changbai Mountain tourism culture to varying degrees.

In an era of transition from text communication to visual communication, visual culture and visual communication have grown into a crucial part of Baishan tourism culture communication. The 21st century has entered an era of image competition, and the visual image of tourist destinations has become the dominant force in competition. It establishes a tourism visual image with a clear visual image and distinctive personality, which can give tourists a good impression and improve the cultural awareness, reputation, and influence of the tourist destination. Therefore, the role of the visual image of Changbai Mountain's tourism culture has also changed from "informing" to "persuading" and then to further influence the decision-making behavior of tourists and potential tourists. Therefore, we must pay attention to the visual communication design of Changbai Mountain tourism culture and improve the communication ability of Changbai Mountain tourism culture visual image information. Through the outgoing information, it can obtain the audience's approval, influence their attitude, and become interested in the tourist destination. Finally, after the perceptual knowledge, it can influence the audience's behavioral decision and attract them to travel to the tourist destination.

The emergence and development of mass media have profoundly affected the development of human society. With the help of the mass media, information on the earth can be disseminated synchronously. Space-time distance and difference are being eliminated by mass communication, and the concept of "global village" has become a reality. Mass communication has also made a fundamental change in the communication of Changbai Mountain tourism culture, and the communication form of Changbai Mountain

tourism culture has changed, showing new characteristics that are different from the past: there are more and more channels for disseminating Changbai Mountain tourism culture; the speed of disseminating Changbai Mountain tourism culture is getting faster and faster; the amount of Changbai Mountain tourism culture disseminated is increasing; the content of Changbai Mountain tourism culture disseminated is more and more abundant. Through the mass media, people have gained more convenience in carrying out tourism and cultural activities in Changbai Mountain, and their aesthetic ability to Changbai Mountain tourism culture has also been enhanced. The scope and depth of Changbai Mountain tourism culture have been greatly expanded.

In the information age, mass communication is an important channel for people to understand information. In Changbai Mountain's tourism and cultural communication activities, the basic function of digital media is to spread cultural information. It is responsible for informing and conveying tourism information such as recent new trends in the tourism industry, policies, and regulations, new changes in scenic spots, tourist routes, and cultural knowledge of tourist destinations. All forms of mass media can become the carrier of Changbai Mountain tourism culture. Among them, newspapers, magazines, books, and other flat paper media have the advantages of low cost, convenient storage, and repeatable reading. The content is specialized and has a certain depth, which can focus on the in-depth interpretation of the tourism culture of Changbai Mountain. The disadvantage is that the timeliness is poor, there are certain requirements for the audience's educational level, thus limiting the scope of the newspaper's dissemination of the audience; television, radio, and other film, and television media spread relatively fast, with many people, wide spread, and vivid content. It can act on the audience's audio-visual senses to produce a strong sense of authenticity and appeal and has a great impact on the audience's emotions. It is a popular communication method for tourism audiences; the Internet is the "fourth media" after newspapers, radio, and television. Network communication is a new trend in the dissemination of tourism culture in Changbai Mountain. Its rise and development have brought greater convenience and advantages to the dissemination of tourism culture in Changbai Mountain. Online media provide tourist audiences with timely and rich Changbai Mountain tourism cultural consultation, vivid Changbai Mountain tourism cultural content display, and humanized Changbai Mountain tourism cultural services, etc., to meet the needs of tourists for diversified access to information and interactive exchanges. The Internet has become the most important area for the dissemination of Changbai Mountain tourism culture. Various domestic and foreign tourism units and related enterprises and institutions have used the Internet to spread the Changbai Mountain tourism culture. Various types of Changbai Mountain tourism and cultural websites came into being and flourished, creating a new course of Changbai Mountain tourism culture communication and development.

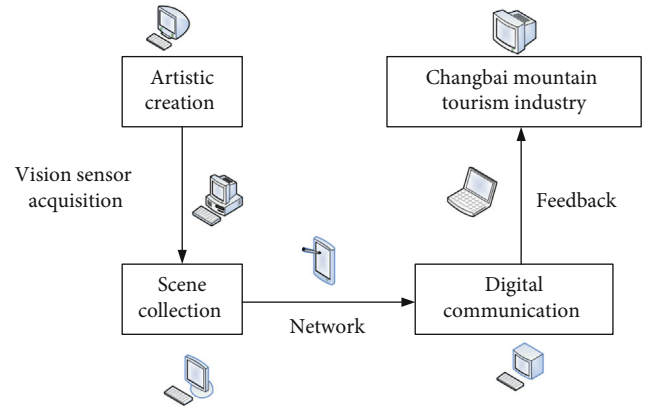


FIGURE 4: Changbai Mountain scene art digital communication framework.

The rise and development of digital art have penetrated into various media and various information service fields, and the communication activities of Changbai Mountain tourism culture are inevitably affected by it. From the perspective of communication, communication is the flow of information, and the communication of Changbai Mountain tourism culture is also the flow of cultural information. The following will use Laswell's famous "5W communication model," namely, communicator research, content research, media research, audience research, and effect research, to analyze the impact of digital art on Changbai Mountain's tourism culture, so as to have a clearer understanding and understanding of the transmission of Changbai Mountain tourism culture in the digital age. Figure 4 shows the digital communication framework of scene art in Changbai Mountain.

3.2.1. The Relationship between Transmission and Reception: From Single Passive to Active Interaction and Acceptance. The theory of reception aesthetics holds that literary works are not mere texts produced exclusively by writers. In the process of text interpretation, the interactive participation of readers occupies an extremely important position. It can be said that the reader not only appreciates the work but also participates in the creation of the work together with the writer, and the real value and life of the work lies in the endless interpretation of the reader. Reception aesthetics raises the status of the audience to a new height, emphasizes the audience's participation in the process of information decoding, and plays a very important role in the acceptance of the entire work.

Introducing the theory of reception aesthetics to the dissemination of Changbai Mountain tourism cultural information, readers are tourists, and literary works are the Changbai Mountain tourism cultural information or works provided by the media. The general expectations and requirements of the audience for the travel news works provided by the media are as follows: the content is true and accurate, fresh, and interesting, the form is novel and lively, and the image is vivid, that is, the pursuit of aesthetic artistry in the way of information presentation. The most important feature of digital art works is that they can conduct real-time

“interaction” and “communication” with the audience through the Internet, which greatly stimulates the enthusiasm of tourists. The dissemination of information in the 21st century is active information dissemination, which is more receptive and effective than traditional passive information reception. Digital art relies on digital technology to reemerge active communication. The audience can actively “pull” the required cultural information of Changbai Mountain from digital media, changing the one-way passive communication of traditional media. By attracting audiences to participate in the dissemination of Changbai Mountain tourism culture, it enhances the appeal and influence of Changbai Mountain tourism culture.

3.2.2. Forms of Dissemination: Multiple Forms of Dissemination Coexist. Digital art can strengthen the visual perception of Changbai Mountain tourism culture through the rational use of digital technology and creative art design. Through the use of dynamic visual modeling language, it sets off and renders the artistic atmosphere and artistic conception of Changbai Mountain tourism culture and meets people’s new aesthetic needs. Human’s audio-visual perception experience is rich, dynamic, and endlessly changeable. The dynamic communication method helps our audio-visual senses to better perceive the cultural information and connotation of Changbai Mountain tourism. If tourism communicators skillfully use the combination of words, sounds, pictures, and images in the process of communication, they will receive better communication effects. The comprehensive use of a variety of communication media helps to impress the recipients and enhance the communication power. Pictures, texts, images, sounds, animations, and other comprehensive media forms present a more realistic, vivid, and intuitive image of Changbai Mountain’s tourism and cultural content. This can bring people an all-round and three-dimensional audio-visual experience, improve the audience’s immersive sense of the scene, and make the cultural performance of Changbai Mountain more appealing and influential. This can also attract the audience to actively participate in the activities of Changbai Mountain tourism culture communication, so as to open up a new vision of Changbai Mountain tourism culture communication and realize the efficient interactive communication of Changbai Mountain tourism culture.

3.2.3. Communication Media: Integrated Communication of Multimedia

(1) *From Single media to Multiple Media.* When digital media was not yet popularized, the dissemination of Changbai Mountain tourism cultural information mainly relied on newspapers, books, radio, television, outdoor, etc. The dissemination of information capacity was small, and timeliness was low. This is because the traditional mass communication media is a single communication medium, its own communication characteristics, and the limitation of the communication medium. Due to the limitation of space and time in the communication activities, it can no longer meet the needs of Changbai Mountain tourism cul-

ture communication in the information age. With the development and application of digital technology, all information can be expressed in the form of digital combinations of “0” and “1.” The unified digital form enables many single traditional media to form a multimedia integrated crossmedia communication platform-digital communication media. The tourism website gives full play to the integration effect of digital multimedia, collects, organizes, and typesets the Changbai Mountain tourism culture information on the mass media, provides the audience with rich and massive Changbai Mountain tourism culture information, and becomes the main way for the tourist audience to obtain the Changbai Mountain tourism culture. The tourist audience under the digital network can choose the tourist cultural information of Changbai Mountain that they need to the greatest extent and have more right to choose independently. However, no matter what kind of communication media has its own flaws and deficiencies, a single form of dissemination is also not conducive to the maximum dissemination of Changbai Mountain tourism cultural information. Therefore, various media should be comprehensively measured as a whole system in dissemination activities. As an integrated diversified media, digital media is the product of the combination of information technology and multimedia technology and has obvious advantages compared with traditional mass media. It has influenced the way of tourism culture in Changbai Mountain, which has played a great role in the dissemination of tourism culture in Changbai Mountain. Digital media integrates the functions of traditional media such as newspapers, radio, and television for information dissemination, forming a high-efficiency, high-capacity, and diversified dissemination method, breaking the boundaries of time and space, and giving tourists sufficient selectivity and autonomy. Therefore, digital technology and media technology have brought profound changes to the dissemination of social information. The communication of Changbai Mountain tourism culture should also adapt to the development of the times. It should not only be satisfied with the communication mode of a single media but should make full use of the comprehensive communication effect of digital multimedia. According to the content of Changbai Mountain tourism culture information and the characteristics of tourism audience, this paper understands the advantages and disadvantages of various media, optimizes the combination of media, and makes full use of the integrated communication advantages of the media to achieve the best communication of Changbai Mountain tourism culture.

(2) *Continuation and Integration of Old and New Media.* Some people may think that the new digital media will replace the old media, and the old media will withdraw from the stage of history. Facts have proved that the old media has not disappeared in the tourism and cultural communication activities of Changbai Mountain. Because travel audiences have the habit and preference of using certain media, different audience groups differ in choosing media to obtain travel information, and young groups with high income and high education use new online media more, while older groups

prefer traditional media such as newspapers and television. In the face of the rise of digital media, traditional media have also begun to use digital technology to realize the comprehensive digitalization of program content production and dissemination. It can be seen that both old and new media are constantly changing and blending. Both old and new communication media play a role in the field of Changbai Mountain tourism culture communication, and the digital communication method of Changbai Mountain tourism culture is the general trend. However, no matter what kind of media the Changbai Mountain tourism culture relies on, its dissemination method is based on the purpose of disseminating content and the needs of the audience and will only develop in a more humanized and interactive direction. The communication of Changbai Mountain tourism culture in the digital media environment should make full use of the technological advantages and artistic advantages of digital art to expand the breadth and depth of Changbai Mountain tourism culture communication.

3.2.4. Communication Effect: Multiple Reinforcement of Cognitive Psychology. The cognitive and psychological situation of the tourist audience is the basis and premise for the dissemination of Changbai Mountain tourism culture. Under the influence of digital art, the information dissemination method of Changbai Mountain tourism culture and the way tourists receive information have undergone new changes compared with traditional dissemination. The new forms of expression and communication will inevitably have an impact on the cognitive psychology of tourism audiences. The following will analyze the cognitive psychology of tourist audiences from three aspects: selective attention, selective understanding, and selective memory.

(1) Vivid and Interesting Forms Attract Selective Attention. Tourists hope to obtain fresh, interesting, novel, and lively Changbai Mountain tourism cultural information. Digital art relies on nonmaterial digital technology and comprehensively uses a combination of media such as text, sound, graphics, and images to provide tourism audiences with an all-round, multisensory interactive audio-visual experience. It is good at creating a vivid, relaxed, and lively immersive atmosphere, directly stimulating the sense organs of tourists and attracting the attention of tourists' visual perception. It also stimulates and satisfies its curiosity and desire for inquiry and pleasure, so as to better understand and memorize the content of Changbai Mountain tourism cultural information.

The one-way passive information dissemination method of traditional mass media has limited the time and space of information dissemination. Digital art relies on digital network media to spread Changbai Mountain's tourism culture, which has obvious advantages, allowing tourists to notice the information to the greatest extent, including information dissemination beyond the limitations of time and space, and tourists can access anytime, anywhere. At the same time, the mass, diversification, and personalization of information content can fully satisfy tourists' full autonomy and right of

choice, and the interactive and participatory nature of dissemination forms creates a good dissemination environment, which can easily win the favor of tourists.

(2) Diversified Designs Help Selective Understanding. Understanding is a complex process and an important part of effective communication. The understanding of tourists is similar to a filter, and different tourist audiences can make different interpretations and conclusions about the cultural information or works of Changbai Mountain. The stimuli felt by tourists in this process are selected, organized, and transformed into their own comprehensible range. Due to differences in cultural background, age, gender, occupation, education, and interests of each audience, their understanding of Changbai Mountain tourism cultural information or works is also different.

The humanized digital technology and multidimensional design language of digital art have the characteristics of "media integration." It integrates visual, auditory, and tactile functions and can provide tourists with diversified, multisensory, all-round, and entertaining Changbai Mountain tourism cultural information services and create an immersive environment. Many exhibition halls, museums, and other places are dedicated to interactive multimedia displays, including interactive games, recognition interaction, video interaction, and other high-tech and experiential games, which combine the original plain graphics with creative interactive games. It integrates the display content and achieves a perfect integration, which helps the tourist audience to understand the information in the process of participating in the interactive game, so as to better realize the effective dissemination of Changbai Mountain tourism cultural information. For tourists, not only can they appreciate the external perceptual beauty composed of elements such as the shape, sound, color, and taste of natural landscapes but also the "inner beauty" of natural landscapes and cultural landscapes. The cultural connotation and symbolic meaning of "inner beauty" can expand one's own aesthetic experience and improve the aesthetic realm.

For the communicators of Changbai Mountain tourism culture, in addition to trying their best to express the external perceptual beauty of the natural landscape, they should also dig and display the cultural connotation contained in the natural landscape and improve the aesthetic value and cultural content of the natural landscape. For the communicators of Changbai Mountain tourism culture, in addition to trying their best to express the external perceptual beauty of the natural landscape, they should also dig and display the cultural connotation contained in the natural landscape and improve the aesthetic value and cultural content of the natural landscape. The charm of human landscape culture is more reflected in the historical and cultural values contained in the landscape. Only by understanding the era background of the human landscape and the historical meaning it contains can tourists better appreciate the human landscape and truly appreciate the unique aesthetic charm of the human landscape.

L_1	L_2	L_3
L_4	L_5	L_6
L_7	L_8	L_9

FIGURE 5: Definition of l in the domain of 3×3 .

4. Image Processing Algorithms

The definition of the Laplace operator of a two-dimensional function $\delta(\mu, \nu)$ is the second derivative as follows:

$$\nabla^2 \delta = \frac{\partial^2 \delta}{\partial \mu^2} + \frac{\partial^2 \delta}{\partial \nu^2}. \quad (1)$$

For a 3×3 area, the following two forms are often used in practice:

$$\nabla^2 \delta = 4l_5 - (l_2 + l_4 + l_6 + l_8), \quad (2)$$

$$\nabla^2 \delta = 8l_5 - (l_1 + l_2 + l_3 + l_4 + l_6 + l_7 + l_8 + l_9). \quad (3)$$

In the formula, the definition of l is shown in Figure 5. The commonly used template of Laplacian operator is shown in Figure 6.

Gaussian smoothing function is as follows:

$$\chi(\alpha) = -e^{-\mu^2 + \nu^2 / 2\varepsilon^2}. \quad (4)$$

The corresponding Laplace operator of this function is as follows:

$$\nabla^2 \chi(\alpha) = -\left[\frac{\mu^2 + \nu^2 - \varepsilon^2}{\varepsilon^4} \right] e^{-\mu^2 + \nu^2 / 2\varepsilon^2}, \quad (5)$$

where ε is the standard deviation.

Threshold for cluster binarization is as follows:

$$\varphi_j = \frac{1}{2}(\phi_1 + \phi_2), \quad (6)$$

where ϕ_1 and ϕ_2 are the average gray values of all pixels in the two regions.

New threshold value is as follows:

$$\Delta \varphi_j = \left| \varphi_j - \varphi_{j-1} \right| s. \quad (7)$$

All pixels of the image are divided into two groups, and the probability of these two groups are as follows:

0	-1	0	-1	-1	-1
-1	4	-1	-1	8	-1
0	-1	0	-1	-1	-1

FIGURE 6: Convolution kernel of the Laplace implementing formula (2) and formula (3).

$$\gamma_0 = \sum_{j=1}^p \frac{e_j}{E} = \gamma(p), \quad (8)$$

$$\gamma_1 = \sum_{j=p+1}^G \frac{e_j}{E} = 1 - \gamma(p),$$

where e_j is the pixel with gray level j , E is the number of pixels in the entire image, and $\gamma(p)$ is the sum of the frequencies of gray level j .

The overall average grayscale of the entire image is as follows:

$$\phi_\varphi = \phi(\varphi) = \sum_{j=1}^G j q_j, \quad (9)$$

where q_j is the frequency of occurrence of gray level j .

The respective average grayscale values of the two groups are as follows:

$$\phi_0 = \sum_{j=1}^p j q_j, \quad (10)$$

$$\phi_1 = \sum_{j=p+1}^G j q_j$$

The variance between the two groups is as follows:

$$\kappa^2(p) = \gamma_0 (\phi_0 - \phi_\varphi)^2 + \gamma_1 (\phi_1 - \phi_\varphi)^2. \quad (11)$$

Open set ξ using struct ω is as follows:

$$\xi \circ \omega = (\xi - \omega) \oplus \omega. \quad (12)$$

Closing set ξ using struct element ω is as follows:

$$\xi \bullet \omega = (\xi \oplus \omega) - \omega. \quad (13)$$

The principle of least squares fitting a straight line is as follows:

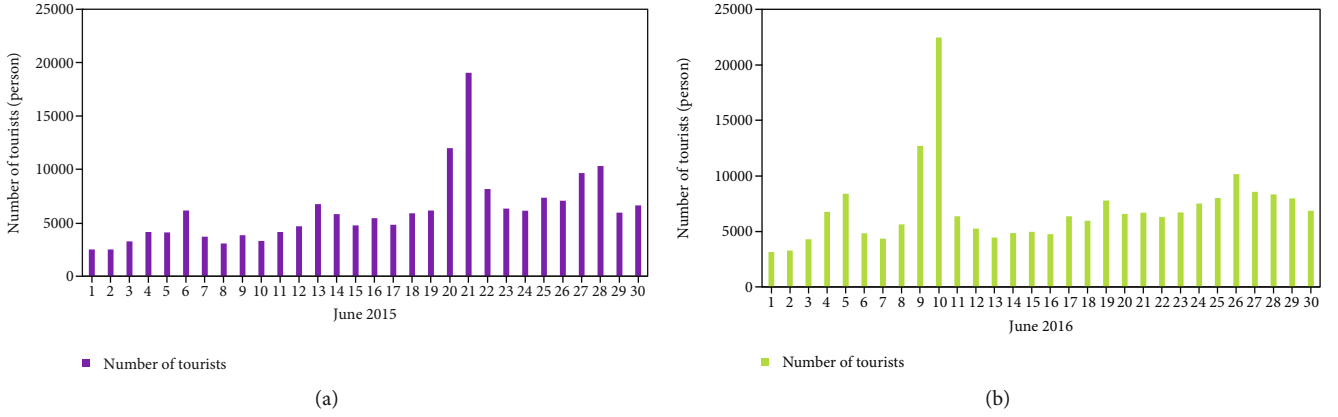


FIGURE 7: Tourists of Changbai Mountain from 2015 to June 2016.

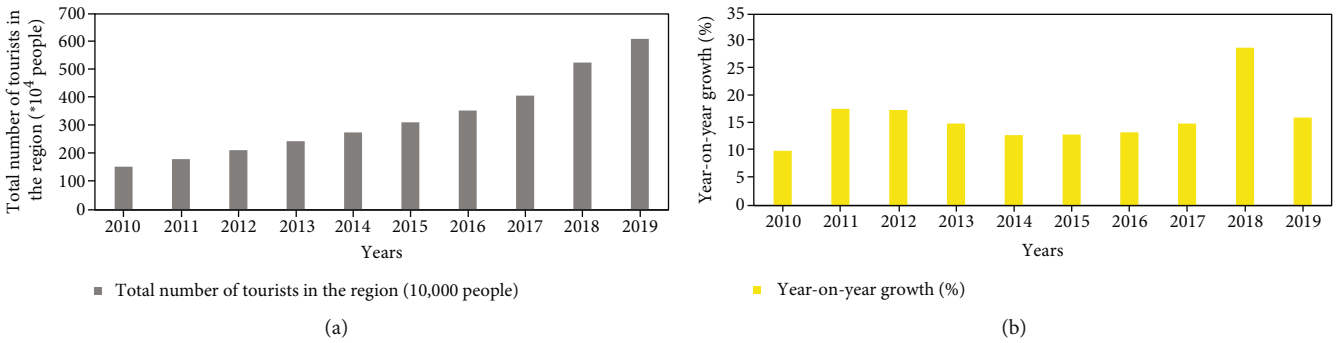


FIGURE 8: Statistical results of the total tourism number and year-on-year growth in Changbai Mountain from 2010 to 2019.

A series of data points are known:

$$D = \{(\mu_1, \nu_1), (\mu_2, \nu_2), \dots, (\mu_s, \nu_s)\}. \quad (14)$$

Set the function prototype of the line to be fitted:

$$v = p\mu + \beta. \quad (15)$$

Minimize the sum of squared errors:

$$M(p, \beta) = \sum_{j=1}^s [(p\mu_j + \beta) - \nu_j]^2. \quad (16)$$

Find the parameters p and β by formula (16):

$$\begin{cases} \frac{\partial M}{\partial p} = \sum_{j=1}^s 2[(p\mu_j + \beta) - \nu_j]\mu_j = 0, \\ \frac{\partial M}{\partial \beta} = \sum_{j=1}^s 2[(p\mu_j + \beta) - \nu_j] = 0. \end{cases} \quad (17)$$

Linearity of the fitted line is as follows:

$$K = 1 - \frac{S}{T^2}, \quad (18)$$

where T is the distance range from the point to the line.

All lines passing through valid feature points in the image domain satisfy the equation:

$$\mu \cos \omega + \nu \sin \omega = \psi, \quad (19)$$

where ψ represents the distance from the line to the origin, ω represents the angle between the normal and the μ -axis, and (μ, ν) represents the coordinates of the pixel in the image domain.

The tourism situation of Changbai Mountain in June 2015 is shown in Figure 7(a). The tourism situation of Changbai Mountain in June 2016 is shown in Figure 7(b).

Figure 7 shows that in June 2016, Changbai Mountain Scenic Area received a total of 210,225 domestic and foreign tourists, a year-on-year increase of 14.4%. Among them, June 10 ushered in the day with the largest number of tourists in a single day, with 22,466 tourists. In addition, in the first half of 2016, Changbai Mountain Scenic Area received a total of 467,607 tourists, a year-on-year increase of 9.9%.

The statistical results of the total number of tourists and the year-on-year growth in Changbai Mountain from 2010 to 2019 are shown in Figure 8.

Figure 8 shows that from 2010 to 2019, the total number of tourists in Changbai Mountain increased year by year, and in 2018, the year-on-year increase was the largest, with a growth rate of 28.9%.

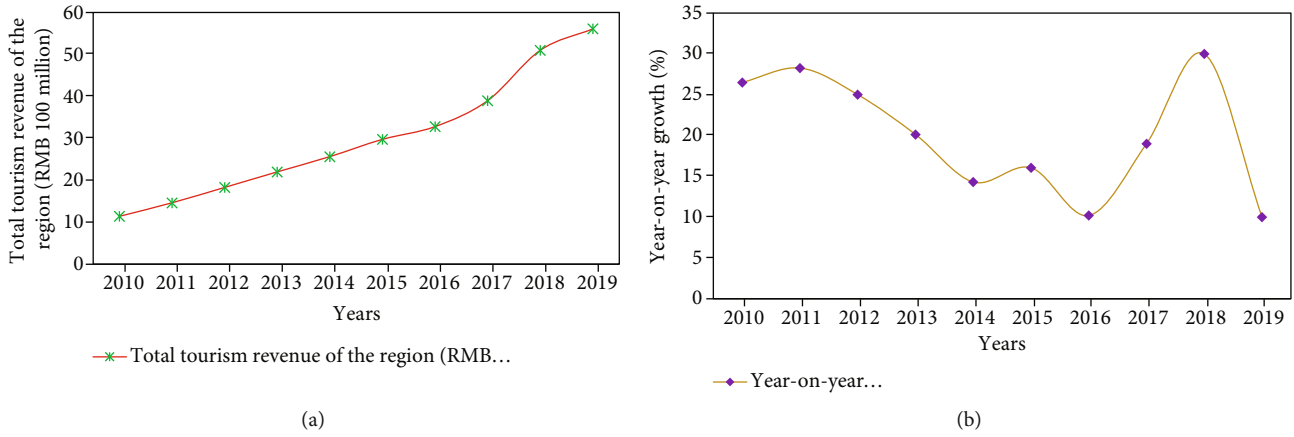


FIGURE 9: Statistical results of total tourism revenue and year-on-year growth in Changbai Mountain from 2010 to 2019.

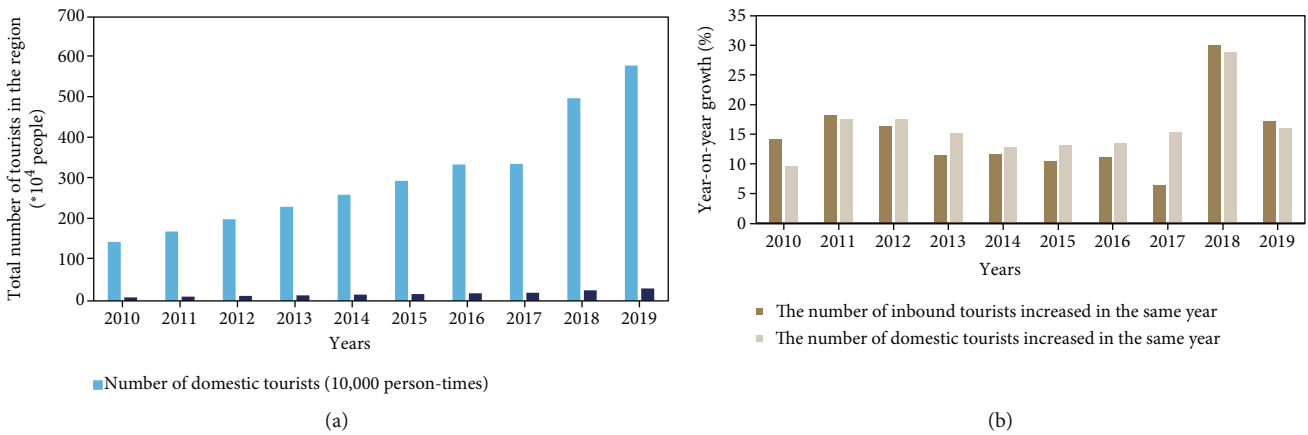


FIGURE 10: Statistical results of the number of domestic tourists, inbound tourists, and the corresponding year-on-year growth in Changbai Mountain from 2010 to 2019.

The statistical results of the total tourism revenue and year-on-year growth of Changbai Mountain from 2010 to 2019 are shown in Figure 9.

Figure 9 shows that although the total tourism revenue of Changbai Mountain in 2019 was the highest at RMB 5.61 billion, the year-on-year growth was the lowest, only 10%.

The statistical results of the number of domestic tourists and inbound tourists in Changbai Mountain from 2010 to 2019 and the corresponding year-on-year growth are shown in Figure 10.

Figure 10 shows that although the proportion of inbound tourists to the total number of tourists in Changbai Mountain is still low, it is still increasing year by year. The year-on-year growth in the period from 2012 to 2017 was greater than the year-on-year growth of domestic tourism, which shows that the digital communication of scene art in Changbai Mountain has played a very important role in tourism culture.

5. Discussion

The technical means and artistic design of digital art have penetrated into all aspects of Changbai Mountain tourism

culture communication activities, not only the transmission, promotion, exhibition, and display of Changbai Mountain tourism culture information but also the digital collection of historical relics and monuments in Changbai Mountain tourism culture. As time goes by, more and more historical and cultural relics will be buried by time. It will be the general trend to use modern digital technology to record and preserve more permanent and complete historical and cultural information for human beings.

Secondly, digital art has a certain impact on the transmission of Changbai Mountain tourism culture, from the perspective of the relationship between transmission and reception. From single passive to active interactive acceptance, the autonomy and participation of tourism audiences in acquiring Changbai Mountain tourism cultural information have been improved. Compared with the passive reception of information in traditional mass communication, this makes the communication of Changbai Mountain tourism culture more accepting and conveying and can enhance the appeal and influence of Changbai Mountain tourism culture; from the perspective of communication form, the coexistence of multiple communication forms has been realized, bringing people all-round and multisensory audio-visual effects, which will help the tourist audience to better perceive

the information and connotation of Changbai Mountain tourism culture, thereby enhancing the communication effect of Changbai Mountain tourism culture; from the perspective of communication media, the integrated communication of multimedia forms a high-efficiency, high-capacity, and diversified communication method, which transcends the boundaries of time and space, gives tourism audiences full selectivity and autonomy, and promotes the scope of Changbai Mountain tourism culture communication; from the perspective of communication effect, the vivid and interesting forms of digital art can attract the selective attention of the audience, and the diversified design helps the audience to selectively understand and improve the perception and aesthetic ability of Changbai Mountain tourism culture. In addition, the comprehensive application of various means can deepen the audience's selective memory of Changbai Mountain tourism culture, which is conducive to the effective dissemination of Changbai Mountain tourism culture.

6. Conclusion

As an emerging art form, digital media art integrates the expression techniques and characteristics of traditional art and at the same time has unique artistic characteristics and dissemination advantages, which can more vividly display and disseminate the tourism culture of Changbai Mountain. In the development, utilization, and dissemination of Changbai Mountain tourism cultural resources in Changbai Mountain, the Changbai Mountain Changbai Mountain tourism culture communication under the digital media art mainly transmits information with audio-visual symbols. Before the information is delivered, the design must be made. The distinctive feature of digital media art is that computers are mainly used as creative tools or display means. With new changes in media attributes, Changbai Mountain tourism culture will inevitably show a new design language. Among them, the dematerialization and virtuality of design language are the development trend of Changbai Mountain tourism culture in the information age. At the same time, the new design language also brings time-sharing, immersive, and popular aesthetic characteristics, enriches the aesthetic information of the tourist audience, expands the aesthetic experience of the tourist audience, and improves the aesthetic realm. This different design language and aesthetic characteristics can inject fresh blood and vitality into cultural dissemination, which is helpful for the effective dissemination of Changbai Mountain tourism culture in Changbai Mountain.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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