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Research Article

Digital Communication of Folk Art in Urban Scenes Based on Vision Sensor Images

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With the continuous development of China's socio-economic level and culture, some of China's folk arts are gradually declining, and the protection and dissemination of folk arts are extremely important. In today's modern society with digital information as the carrier, digital communication has more incomparable advantages than traditional communication methods. This paper proposes a research on the digital communication of folk art in urban scenes based on visual sensor images. This article introduces the related applications of visual sensor images and studies the spread of folk art in cities. The research shows that the application of visual sensors has greatly promoted the digitization of folk art. VR virtual reality technology is used as a visual sensor image. Important applications, and its industry scale is expected to reach 149.8 billion yuan globally in 2023. In this paper, by studying the combination of visual sensors applied to folk art, it is believed that visual sensor images can play a better role in promoting and protecting folk art.

1. Introduction

With the continuous development of today's society, economy, and culture, many folk arts have gradually lost their living environment. Take folk New Year paintings and shadow puppets as examples. Due to the rapid development and dissemination of printing and digital technology, they are quickly replaced by television, online video, etc., and they are already on the verge of extinction. Due to various reasons, many folk arts not only have not been well disseminated but also it is difficult to pass on. The situation of folk artists is deteriorating, and they have lost their enthusiasm for the dissemination and inheritance of folk art.

In response to the decline of folk art, many cities have gradually paid more attention to the protection and inheritance of folk art and have adopted relatively active protection measures, which have achieved certain results in society. This article believes that if folk art can be linked with modern technology, the effect of its protection and inheritance will be more optimistic.

In recent years, many local governments and people of insight have made certain efforts in the protection and dissemination of folk art. Some people think that it can vigorously promote social folk art, and some think that relevant departments can help artists who master folk art. And preferential treatment policies, some people think that more people should be encouraged to learn folk art. This article believes that the dissemination of folk art through visual sensors can better attract the masses and increase their love for folk art. For the application of vision sensor images, many scholars at home and abroad have conducted certain research. The vision sensor system proposed by Lee et al. using a single camera installed in the field of mobile robots has the advantages of small size, low energy consumption, and high flexibility. It plays an important role in the field of robotics. His experimental results show that the proposed method can achieve good positioning performance in a multimobile robot setting [1]. Zhou et al. have developed a three-dimensional catadioptric vision sensor that uses 20 to 100 lasers arranged in a circular array, called omnidirectional dot matrix projection (ODMP). The sensor with

ODMP they proposed can be maximized by adjusting the projection density and can minimize the loss of detailed information. When evaluating the performance of the sensor, actual experiments show that the designed sensor has high efficiency and high precision for the measurement of the inner surface of the pipeline [2]. Lauzon-Gauthier et al. have developed a machine vision sensor that uses paste structure analysis to predict deviations from the optimal amount of pitch in the anode formulation. It can help operators reduce the impact of the changing anode raw materials (coke and pitch), and their research has obtained good predictive results. In addition, the sensor can detect when the paste is at the optimal pitch of the two cokes and measure the deviation [3]. Yang et al. designed an active stereo omnidirectional vision sensor in this work. The experimental results show that the retrained Faster R-CNN has achieved good detection results in terms of speed and accuracy [4]. Su-In proposed a gait measurement system that uses the fusion angle data obtained by the IMU sensor and the vision sensor. His experimental results show that the research has good applicability and stability [5]. Lenero-Bardallo et al. proposed a new type of event-based visual sensor, and the sensor has two operating modes: intensity mode and spatial contrast detection [6]. Lee and Jin derive the geometric constraint equation, which represents the relationship between the image frame coordinates of the moving object and the estimated height of the quad-rotor UAV. Since the equations are based on geometric constraint equations, measurement errors may always exist. The proposed method utilizes the error between the observed and estimated image coordinates to locate the quad-rotor UAV. The Kalman filter scheme is suitable for this method. Its performance has been verified by computer simulation and experiment [7]. It can be seen that many scholars have done research on many aspects of visual sensors, but they have not designed the aspect of digital communication.

Therefore, this article combines visual sensors, digital communication, and urban folk art to study the effect of visual sensors on digital communication of urban folk art. This article fully demonstrates the positive effect of visual sensors on the digital communication of folk art by studying VR drama, VR acrobatics, digital stereoscopic imaging, and other technologies.

2. The Research Basis of Visual Sensor Images for the Digital Communication of Folk Art

2.1. Introduction and Application of Vision Sensor Images

2.1.1. Introduction of Vision Sensor. Vision sensing technology is one of the seven categories of sensing technology. The function of the vision sensor is to obtain the collected original images so that the machine vision system can process the collected data [8]. The vision sensor of the vision processor is composed of 1–2 graphics sensors, and sometimes other auxiliary equipment is needed to make correct judgments [9, 10]. Figure 1 shows the image sensor and its application (optical fiber sensor).

2.1.2. Application of Vision Sensor. Because vision sensors have the advantages of low cost and practical simplicity, they are widely used in industrial manufacturing. Vision sensors have functions such as inspection, measurement, detection, orientation, and sorting [11, 12] and are used in scenes such as automobile assembly plants and packaging production lines.

2.2. Introduction and Protection of Folk Art

2.2.1. Introduction to Folk Art. Folk art refers to art, handicrafts, and decorative ornaments made by ordinary people who have not received formal art training but have mastered established traditional styles and skills [13]. In a broad sense, folk art is art created by workers in order to meet their own needs. There are common art forms such as fine arts and music. Folk art is mainly made of natural materials and has a strong national style and regional color. Folk art is closely related to people's daily activities [7, 14].

With the development of the times and the continuous changes in today's society and culture, many folk arts have not received due attention and protection, and their influence has declined sharply. Many folk arts have gradually disappeared, and few of them can be passed on [15]. For this reason, if folk art can be combined with some advanced concepts and science and technology in modern times at that time, it is believed that it can lay a good foundation for the protection and inheritance of folk art [16, 17]. From Figure 2 we can see the paper-cut culture and embroidery culture in Chinese folk art.

2.3. Vision Sensor Image Algorithm and Formula

2.3.1. The Definition and Influencing Factors of Image Matching. Simply put, image matching can be defined as the registration of two images in position space and gray space. Assuming that images U_1, U_2 are images to be registered, where we use $U_1(x, y)$ and $U_2(x, y)$ to represent the pixel value (i.e., gray value) at the corresponding spatial position, then the matching problem can be expressed mathematically as

$$U_2(x, y) = f(U_1(h(x, y))). \tag{1}$$

In equation (1), h is a coordinate transformation in two-dimensional space, namely,

$$(x', y') = g(x, y), \tag{2}$$

where f is the transformation function of one-dimensional grayscale.

2.3.2. Capflag Condition and Paraxial Lens Imaging Formula. Scheimpflug condition, Kapfrag condition: the extension lines of the laser axis, the main plane of the objective lens, and the photoreceptor baseline should intersect at a point or be parallel to each other.

Figure 1: Image sensor and fiber optic sensor.

(a) (b)

Figure 2: Paper-cutting and embroidery.

$$n = \frac{\tan a}{\tan b}. \tag{3}$$

Among them, n is the lateral magnification; a is the angle between the optical axis of the laser beam and the optical axis of the receiving lens, which is defined as the working angle; and b is the angle between the receiving plane and the optical axis of the receiving lens, which is defined as the imaging angle.

$$\frac{1}{a} + \frac{1}{b} = \frac{1}{h}. \tag{4}$$

Among them, a is the distance from the intersection of the optical axis of the laser beam and the optical axis of the receiving lens to the front main surface of the receiving objective lens, which is defined as the working distance. b is the distance from the main surface of the receiving objective lens to the center point of the imaging surface, which is defined as the image distance. h is the focal length of the lens.

2.3.3. Thermal Noise of CMOS Image Sensor. Random noise in CMOS image sensor includes shot noise of photodiode, thermal noise of reset tube, source follower and line strobe tube, and shot noise, noise, and reset noise of reset tube.

Thermal noise is the most basic noise source of pixel units. The thermal noise can be reduced by increasing the device size, but for a fixed input bandwidth, this will increase power consumption. The rms voltage of the resistance thermal noise is

$$\langle V_{\text{th}} \rangle = \sqrt{4KTBR}. \tag{5}$$

Since thermal noise is white noise and covers the entire frequency range, it is determined by the actual measurement bandwidth. The thermal noise current can be expressed as

$$\langle I_{\text{th}} \rangle = \sqrt{\frac{4KTB}{R}}. \tag{6}$$

The thermal noise voltage generated by the channel resistance of the tube is

$$\langle V_{\text{th}} \rangle = \sqrt{4KTBR_{(\text{channel})}}. \tag{7}$$

Generally speaking, the power spectral density of thermal noise is inversely proportional to the aspect ratio and is also related to the current flowing through the device. Thermal noise is usually expressed by electronic noise density ($NE\ D$):

$$\text{NED} = \left[\frac{e_n(f)C_1}{q}\right]^2, \tag{8}$$

where $e_n(f)$ is the equivalent output voltage of the output terminal and C_1 is the capacitance of the input terminal, including gate capacitance, diffusion capacitance, and so on. $e_n(f)$ includes all factors that affect gain, such as transistor size and drain-source current.

2.3.4. Based on the Weighted Average Image Fusion Method. Because there is no need to do any transformation and decomposition of the source image and other related processing, and its own algorithm fusion speed is fast, the algorithm is simple and other advantages, making the weighted average method the simplest and easy to understand fusion method, for the signal-to-noise ratio of the fused image Aspects can also be greatly improved, especially in image sequences (multiframe images), the fusion effect is better, when the gray value of each source image has large differences, the shortcomings of the weighted average image fusion method will be exposed. Observed by the human eye, you will see obvious splicing traces. The occurrence of this phenomenon will also cause relatively large troubles for subsequent image processing and recognition. The final fusion effect picture is also not as expected. Here, we mainly take the fusion of two source images as an example so that it is easier to understand and describe, and it can be obtained by analogy for multiple source images. First, suppose there are two source images, which are defined as K_1 and K_2, respectively. The size of the two images is $A \times B$, and the capital letter M is used to represent the fused image. Then, after the weighted average fusion, $K1$ and $K2$ are two sources. The image can be changed to

$$M(a,b) = w_1 K_1(a,b) + w_2 K_2(a,b), \tag{9}$$

where a is the row number of image pixels and b is the column number of image pixels; the weighting coefficient of image K_1 is w_2; the weighting coefficient of image K_1 is w_2, usually:

$$w_1 + w_2 = 1, \tag{10}$$

when

$$w_1 = w_2 = 0.5. \tag{11}$$

It is the average fusion.

2.3.5. Image Fusion Method Based on Image Pixel Gray Value Selection Size. The following image fusion results are the pixel-based gray value selection of large and the pixel-based gray value selection of small:

$$\begin{aligned} R(a,b) &= \text{Max}\{F_1(a,b), F_2(a,b)\}, \\ R(a,b) &= \text{Min}\{F_1(a,b), F_2(a,b)\}. \end{aligned} \tag{12}$$

It can be understood that in the fusion image processing, first compare the size of the pixel values at the corresponding positions of the two source images F_1 and F_2. The method based on the gray value of the image pixels is to select the pixel value with the larger gray value as the fused image R in the pixel at position (a,b), and the method of selecting a smaller gray value based on the image pixel is to select a pixel with a lower gray value as the pixel at the (a,b) of the fused image R. This method is fast to realize and simple to operate is its biggest advantage, and it can get better fusion effect in a few individual applications. However, the application of this fusion method is very limited, and it is far from meeting most of our practical requirements.

2.3.6. Depth of Field of Optical Imaging System. The depth of field is the depth of the object space at which a "clear image" is obtained on the image plane. The depth of field varies with the focal length of the lens, aperture value, and shooting distance.

Calculation formula for depth of field:

Deep prospects:

$$\Delta M_1 = \frac{F\delta M}{f^2 + F\delta M}. \tag{13}$$

Back depth of field:

$$\Delta M_2 = \frac{F\delta M}{f^2 - F\delta M}. \tag{14}$$

System depth of field:

$$\Delta M = \Delta M_1 + \Delta M_2 = \frac{2f^2 F\delta M^2}{f^4 - F^2\delta^2 M^2}. \tag{15}$$

2.3.7. Construction Scale Space of Sift Algorithm. The purpose of constructing the scale space is to construct the multiscale characteristics of the image data, which can be achieved by Gaussian convolution. The construction method is as follows:

$$A(x,y,\sigma) = B(x,y,\sigma) * C(x,y). \tag{16}$$

Equation (16) is the image coordinate of pixel (x, y) and σ is the image scale. $B(x,y,\sigma)$ is the variable-scale Gaussian kernel function.

The construction method of Gaussian difference scale-space (DOG scale-space) is

$$B(x, y, \sigma) = (G(x, y, k\sigma) - G(x, y, \sigma)) * C(x, y),$$
$$D(x, y, \sigma) = A(x, y, k\sigma) - A(x, y, \sigma). \quad (17)$$

2.3.8. Perspective Projection Theorem. The straight line is still a straight line after the perspective projection transformation, so the points A', B', C', and D' are collinear, and the principle of constant intersection ratio can be obtained:

$$R(A, B, C, D) = R'(A', B', C', D'). \quad (18)$$

Applying the construction scale space of the Sift algorithm and the perspective projection theorem to the visual sensor for the spread and inheritance of folk art can effectively improve the masses' intuitive feeling and experience of folk art.

2.4. Introduction and Application of Digital Communication. Digital communication is also called network communication. It is an information communication activity that uses computers as the main body, multimedia equipment as auxiliary equipment, and multiple network communication methods to handle multiple functions [18, 19]. Digital communication is an interactive activity that combines various data and text, graphics, animation, music, language, image, film, and video information on a computer. The content of digital dissemination is more personalized, and content providers can extract part of the content needed for the socialized life of the program [20]. This move has greatly increased the number of digitally transmitted content programs, and the program content has become more colorful [21, 22]. The personalized service provided by digital communication has various advantages such as high efficiency and ease of satisfaction [23, 24]. It can introduce users' favorite program content according to the needs of users, and digital communication is gradually being loved by people. The main applications of digital communication in life include text processing and digital video processing [25, 26].

3. Digital Dissemination of Folk Art in Urban Scenes with Visual Sensor Images

3.1. The Importance of Digital Communication. Speaking of digital communication, vision and images have become an indispensable factor in people's real life. With the gradual enhancement of people's visual image perception, people are no longer limited to the more traditional visual image perception of television but have higher requirements for vision and image perception. Digital communication has just adapted to people's requirements for vision and images.

The urban scene plays an important symbolic role in the spiritual outlook and cultural connotation of the entire city. It continues the historical context of the city and shapes the image of a unique place [27].

The rapid development of the computer industry and the electronics industry has made digital technology widely used in all aspects of society. Folk art also plays a very important role in urban scene planning. For example, roads and walls decorated with folk art illustrations not only increase the look and feel of the entire city but also highlight the characteristics of the city [28]. If the visual processor and folk art are brought together, I believe this will have a positive and profound impact on the spread of folk art.

The vision sensor integrates multidisciplinary technologies and interacts with computers and multimedia systems by virtue of the recent scientific and technological achievements of the sensor. With the interactive experience of "Grab the Dream Lantern" in the Shanghai World Expo's Information and Communication Pavilion, there is a wall in front of the audience. Various colorful "dream lanterns" float on the wall. Participants only need to reach out and grab them. The projection recognition technology will send instructions to the background computer by collecting the image information of the hand, and the computer will transmit the preset image effect to this wall. If the participant catches the "dream lantern," the lantern will become colorful fireworks. Another example is the digital display and dissemination platform project of Tujia traditional villages. It takes virtual reality technology as the core; selects typical traditional villages of the Tujia people; and designs, develops, and creates digital content for national intangible cultural heritage resources such as opera, dance, and traditional skills that are representative of the Tujia people [29, 30].

As shown in Figure 3, the text is to study the internal connection between visual sensor technology and the digital communication of folk art through VR virtual reality technology and discuss the positive effect of visual sensor technology on the spread of folk art.

Taking the folk art of urban scenes as the theme, with VR virtual technology as the technical support, the folk art is presented in a visual way through visual sensors.

3.2. Application of Vision Sensor Image. The vision sensor is the direct source of information for the entire machine vision system, and its main function is to obtain enough raw images to be processed by the machine vision system. VR virtual reality technology is an important application of visual sensor images. Users can experience many of the most realistic feelings in the VR virtual reality world. The VR virtual reality world not only has the sensory function of visual experience but also has human perception systems such as hearing, touch, taste, and smell; combines the super visual experience it provides with digital communication, and delivers visual experience to users by means of digital signals [31]. VR reality realizes real human-computer interaction with a super simulation system. Participants can simply operate at will and get the most realistic environment and perceptual feedback. China's VR industry has developed rapidly this year. In 2016, 1,900 VR-related companies were established, and the annual registration growth rate was as high as 65%. In 2019, the number of annual registrations of VR-related companies in China exceeded 3,000, and in 2020, China added 3,400 VR-related industries. In the industry classification, the information service industry accounts for 23.4% of VR-related companies, and the technology service industry accounts for

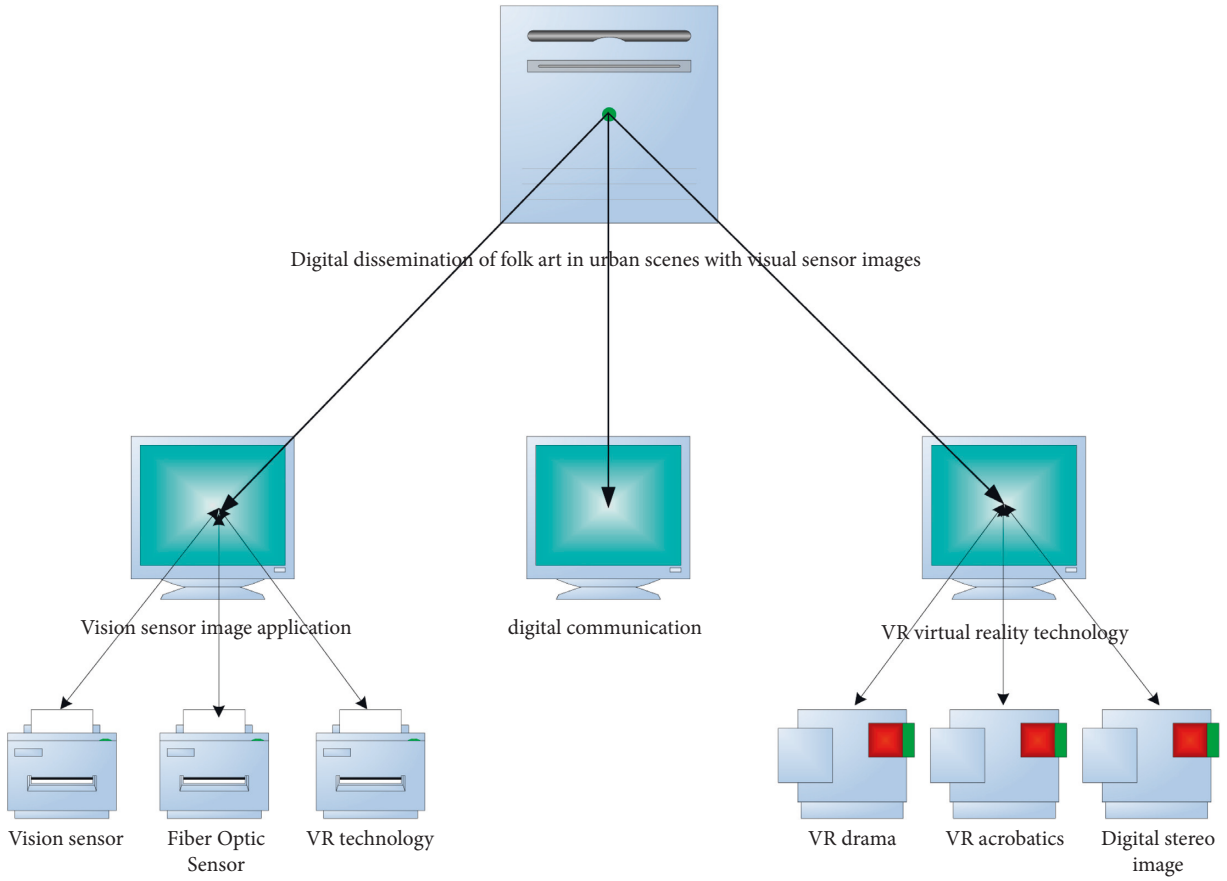

Figure 3: Visual sensors and VR virtual reality technology, the spread of digital folk art.

22.7%. The market of China's VR industry and the scale of industry consumption expenditures have expanded rapidly. The market scale has rapidly grown from 3.46 billion in 2016 to 46 billion in 2020. The industry consumption expenditure forecast has also increased from 3.038 billion in 2018 to 65.208 billion in 2023. In Figure 4, we can see the market classification and scale of China's VR industry in recent years.

Among the market segments of China's VR market in 2016, VR headsets dropped from 59.2% to 37.6% in 2021, and consumer-level content grew rapidly from 7.7% to 35.3%, which also reflects the fact that the VR industry has grown from the original technology pole and has changed to the service pole. In Table 1, we can see the statistical results of the 2016 China VR market segmentation statistics.

In Table 2, we can see the statistical results of the statistics on the proportion of each segment of the Chinese VR market in 2019.

According to statistics, the size of China's VR headset market in 2016 increased from 2.05 billion yuan at the beginning to 29.75 billion yuan in 2021. In 2016, China's VR headset shipments increased from 9.625 million units in 2016 to 10524.8 in 2021. Figure 5 shows the changes in the market size and shipments of VR headsets in China.

In Figure 6, we can see a general trend of changes in the market scale and consumer spending scale of China's VR industry.

From a global perspective, the global VR/AR industry is also growing rapidly. It is estimated that in 2023, the industry development scale of the global VR industry will reach 149.8 billion yuan. It can be seen from Table 3 that the global VR/AR industry scale is increasing year by year.

Due to the continuous rise and development of the VR industry, the hardware price and the price of the underlying technology are gradually decreasing. In 2022, the global shipment of VR equipment will reach 50 million units. In Table 4, you can see the number of global VR/AR devices shipped and the main body of consumption.

Various data show that the VR industry, as a branch of visual sensors, has a huge market consumption scale around the world. Whether it is currently or in the future, VR virtual reality technology will profoundly affect people's real lives.

3.2.1. VR and Theater Art. Dramatic art is a relatively traditional folk art. In China, there are many types of operas. There are more than 360 types of operas by region, and there are tens of thousands of traditional data. Take Britain's Elizabethan reign as an example. There are two to three thousand plays created, but now, only more than five hundred are left. Various data show that, however, with the rapid development of the film industry, traditional culture is not taken seriously, and many traditional dramas have gradually become bleak. However, many people of insight

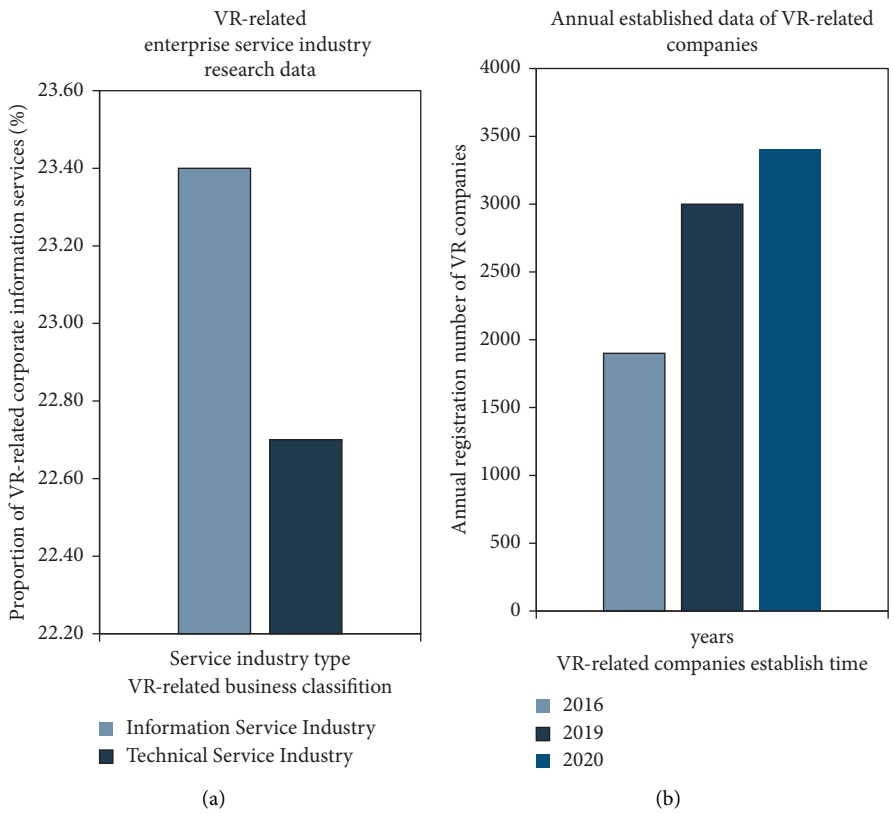

Figure 4: Data display of the service industry and market size of China's VR industry. (a) VR-related enterprise service industry research data; (b) annual establishment data of VR-related companies.

Table 1: Statistics on the proportion of each segment of the Chinese VR market in 2016.

Market segmentation	Enterprise content (%)	VR marketing (%)	Consumer content (%)	VR camera (%)	VR experience hall (%)	Other hardware (%)	VR headset (%)
Proportion in the first quarter	0.1	1	7.7	9.8	10.4	11.8	59.2
Proportion in the second quarter	0.9	1.2	10.1	9.6	10	11	57.2
Proportion in the third quarter	1.5	1.3	11	9	9.6	10.5	56.2
Proportion in the fourth quarter	2.1	1.5	13.6	8.8	9.3	10.2	52.6

Table 2: Statistics on the proportion of each segment of the Chinese VR market in 2019.

Market segmentation	Enterprise content (%)	VR marketing (%)	Consumer content (%)	VR camera (%)	VR experience hall (%)	Other hardware (%)	VR headset (%)
Proportion in the first quarter	9.1	2.1	32	3.8	7.3	6	39.6
Proportion in the second quarter	10.2	2.2	33.1	3.2	7.1	5	38.2
Proportion in the third quarter	10.8	2.3	34.3	2.5	6.8	4.7	38.8
Proportion in the fourth quarter	11.1	2.5	35.3	2.2	6.6	4.6	37.6

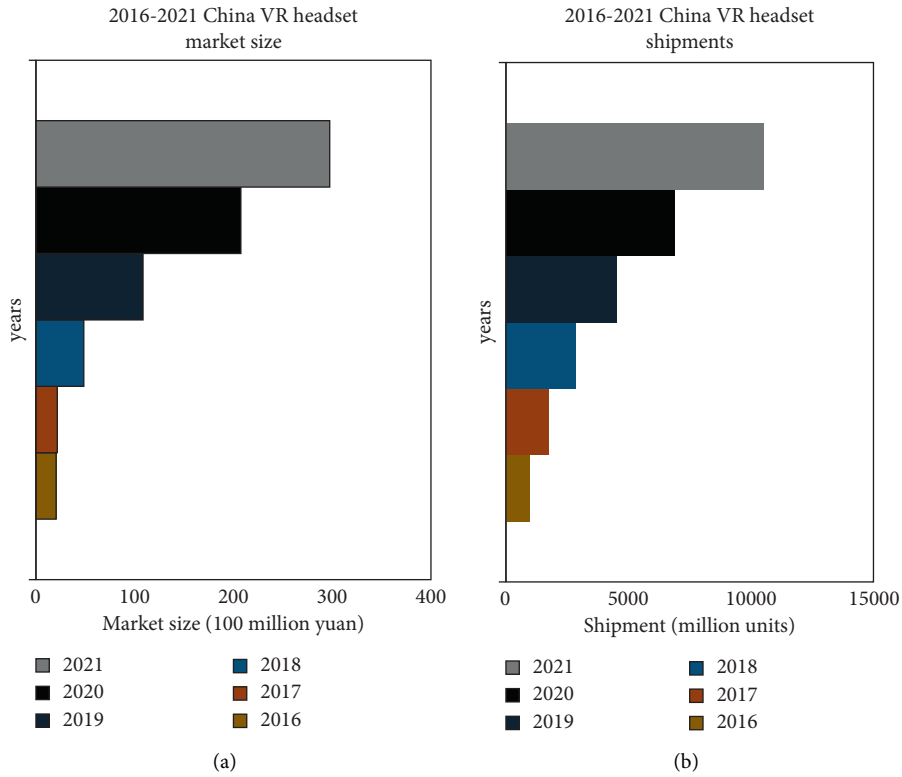

Figure 5: China's VR headset market size and shipments. (a) 2016–2021 China VR headset market size; (b) 2016–2021 China VR headset shipments.

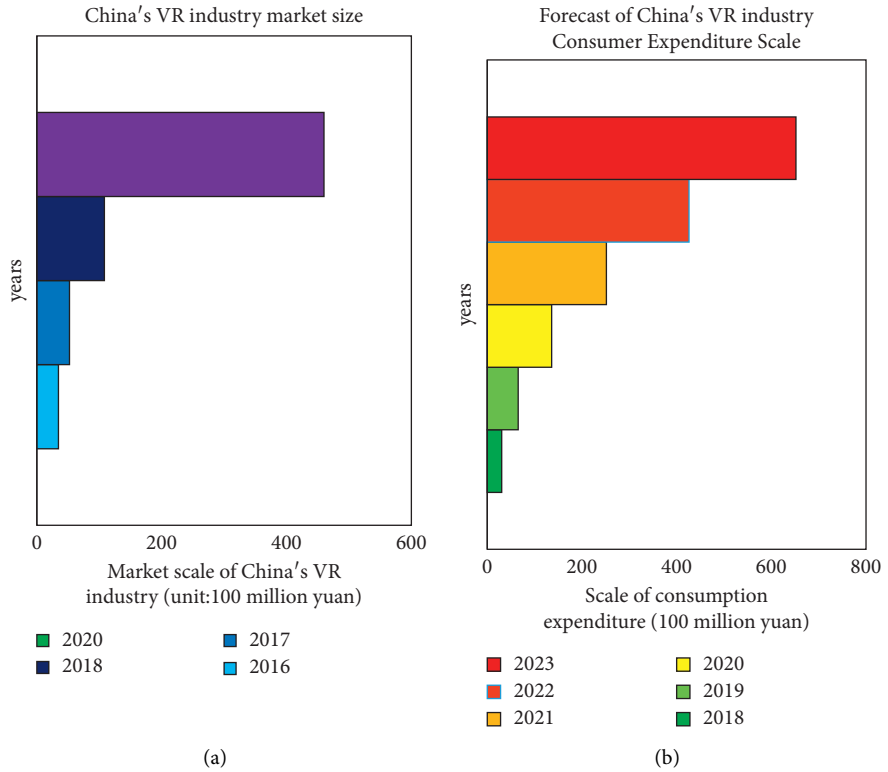

Figure 6: Market scale and consumer spending scale of China's VR industry. (a) China's VR industry market size; (b) forecast of China's VR industry consumer expenditure scale.

Table 3: Global VR/AR industry scale statistics (US$100 million).

	2018	2019	2020	2021	2022	2023
Development scale (100 million US dollars)	199	447	807	1080	1206	1498
Consumption scale (100 million U.S. dollars)	103.48	232.44	419.64	561.6	627.12	778.96
Expenditure scale (100 million U.S. dollars)	23.88	53.64	193.68	259.2	289.44	359.52
Other scale (100 million U.S. dollars)	23.88	53.64	193.68	259.2	289.44	359.52

Table 4: Global VR/AR equipment shipment (millions).

	2018	2019	2020	2021	2022
Shipment quantity (million units)	5	10	15	30	50
The quantity that consumers need (million units)	4	8	13	24.3	42
Quantity required for distribution and service (million units)	0.8	1.7	1.4	4.7	6
Quantity required by the public sector (million units)	0.2	0.3	0.6	1	2

have never given up on the inheritance and development of drama. As can be seen from Figure 7, several applications of visual sensing technology, VR and drama art, VR and acrobatics, and digital stereo images are important manifestations of VR virtual reality technology.

As early as 1987, people were thinking about how to apply computer animation technology and digital technology to the theater stage. A virtual reality theater art research institution named, i.e., VR established by the University of Kansas in the United States has launched three experimental dramas with hybrid VR technology. These three experimental dramas are similar to the present, and the audience can experience the illusion of "immersive experience." Regardless of the advent of VR or in today's society, VR virtual technology is to add some virtual elements to the computer. These elements can be computer-synthesized elements or synthesized virtual actors.

Wings is the second experimental drama released by VR. This drama is composed of a monologue by Emily, a female pilot suffering from a stroke and a language disorder. In this drama, the female pilot Emily reflects to the audience her mental disorder, pain, and depressed inner world. This successful drama is a masterpiece of VR virtual reality technology. It has been put on the film and television stage many times since its first appearance. Unfortunately, this drama only has the human sense of hearing, but it is enough for the audience. We feel Emily's inner world.

Wings use i-glasses, which are widely sought after virtual reality glasses. These glasses are the prototype of AR glasses. The half-silvered mirror on the glasses allows the audience to see the theater actors on the stage and the LCD image on the mirror at the same time. The director uses such a way to let the audience blend into Emily's world. This kind of experience for the audience is also unprecedented. There is a very interesting phenomenon. Some viewers want to take off the i-glasses while watching a drama. Some people feel uncomfortable wearing them. Some people feel that the sense of substitution is too strong. They want to take off their eyes to soothe it, and some people want to see it. The situation of the stage when not wearing glasses, and these also reflect the appropriate combination of VR virtual reality technology and folk art. In Figure 8, we can observe the situation of i-glasses and the audience watching the show.

If VR virtual technology is becoming more and more popular, it must be attributed to Facebook. Facebook spent 2 billion yuan to acquire the VR virtual reality company Oculus. When Biqian VR first came out, it was hard to imagine that the concept of VR did not change much, but the previous technology could not be compared with the current technology. Due to the emergence of immersive theater (Immersive Theatre), VR virtual technology has turned audiences into actors, and audiences can perform immersively on the stage. People used to watch VR only on a fixed stage, but now audiences can move freely and enter other stages or scenes. What is impressive is that in the two masterpieces of immersive drama, "Negligence" and "Xianyuan," the audience can interact with the actors, move freely, and influence the plot on the small stage, and the audience has also become an actor.

"Negligence" is a VR movie created by Cinemarsia. This movie has obvious theatrical features and lasts for 40 minutes. This movie is a homicide case triggered by lottery winning. There are 4 scenes for the audience to choose. This movie uses the blue cursor as a clue guide. The audience can freely rotate their perspective and choose which scene to enter. And in order to achieve the purpose of real time, the refresh rate of the video image is not less than 15 frames per second. This brings a lot of attention to the audience and good interactive experience.

Only half a year later, "Xianyuan" created by Innerspace VR came out. "Xianyuan" has very strong digital artistic characteristics, strong game attributes, and strong audience interaction. This film and television work is also called a game work by people. In "Xianyuan," the audience plays a prince who wants to steal the eternal flower from the fairy. "Xianyuan" and "Negligence Murder" are also narrative dramas. The audience is no longer confined to the auditorium but enters a real stage. These two works are different from Wings. Wings integrate virtual reality elements into a real theater, while "Xianyuan" and "Negligence Murder" create a virtual world. In addition to these two technologies, there is another. The real scene is reproduced and viewers can watch it online. These three methods have established the basic spatial concept

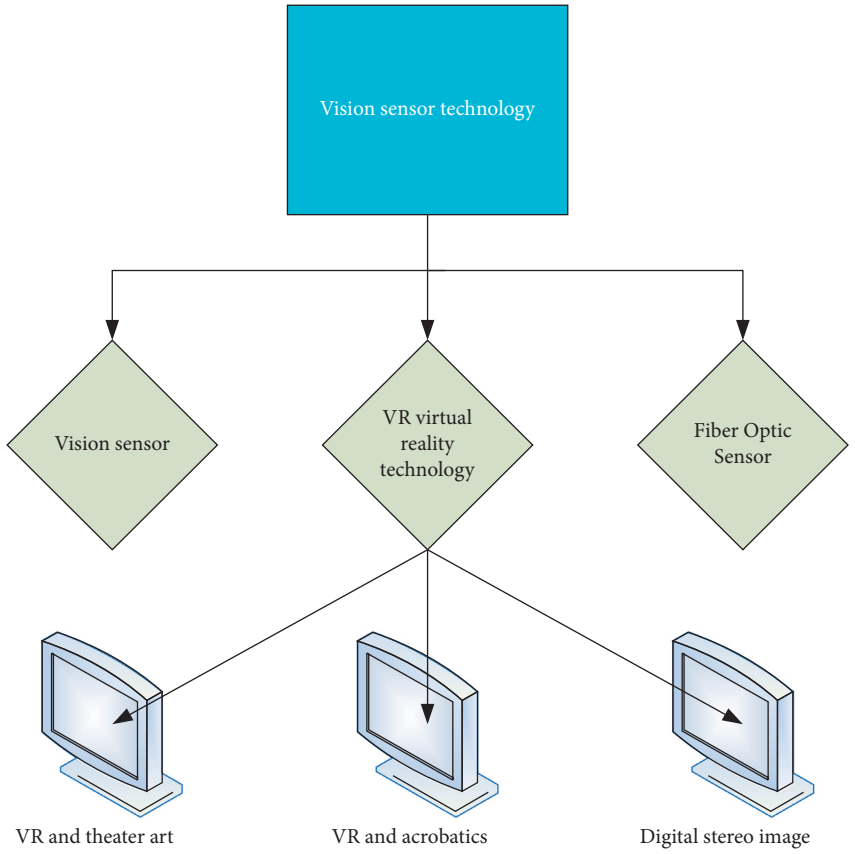

Figure 7: Introduction to visual transmission technology and its application.

of modern VR drama, and I believe they will also have a profound impact on future drama and even human entertainment. Figure 9 shows the performance scenes of the famous dramas "Obsolete Murder" and "Xianyuan."

3.2.2. VR and Acrobatics. Acrobatics means various skills, and it is a performing art that includes physical stamina and skills. As early as the Neolithic Age, Chinese acrobatics had already developed into a budding stage. At that time, primitive people showed a kind of self-entertainment art performances called acrobatics when they were resting and entertaining. After the Tang and Song Dynasties, in order to distinguish other songs and dances, it is called acrobatics. In modern times, acrobatics are mainly Jiu-Jitsu, tightrope walking, and animal training. Speaking of acrobatics, the most thrilling thing is the high-altitude tightrope walk. Many viewers will be frightened when watching the high-altitude tightrope walk, and the emergence of VR virtual reality technology can make many people who have not been trained can experience high altitude. The irritation of walking was a tightrope.

In the VR version of "Fighting Four Seats" exclusively provided by Migu, audiences can experience the performance of Four Seats of Technology through the mobile cloud VR headset, APP, or the Migu video VR area without going to the scene. With the help of VR filming technology, the audience can not only rotate the screen at will but also

Figure 8: i-glasses and the audience watching the show.

experience the excitement of walking a tightrope at the same time as the acrobats. With the 360-degree panoramic view of VR, every movement of the acrobat can be clearly seen by the

Figure 9: "Negligence" and "Xianyuan."

audience. Figure 10 shows the performance of the acrobats. People can adjust the viewing distance and angle to watch the drama actors bring their wonderful performances more realistically.

In the Guangzhou Grand Theatre, the large-scale contemporary acrobatic drama "Hua·Butterfly" presents the ancient folk love story "The Butterfly Lovers" in the form of acrobatics.

The stage of this acrobatic show is rich in connotation, very skillful, and artistic. The audience can watch the acrobatic show up close. The difficult movements of the acrobatic performers are recorded in all directions, and the audience also feels the scene immersively.

In addition, for folk arts such as embroidery, clay sculpture art, paper-cutting, calligraphy, and porcelain, which require high manual operation, VR virtual technology can be used to reinterpret the important craftsmanship and key steps of these arts. The spread and inheritance of folk culture also have a very important practical value and role.

3.2.3. Digital Stereo Image. Digital stereo image is a form of expression and dissemination based on digital art. On the basis of 2D digital images, digital three-dimensional images add a dimension and can also free the artistic works from the shackles of traditional two-dimensional space. In a three-dimensional space, digital three-dimensional images can well show the artistic characteristics of its spatial sense. The digital stereo image has high-definition image quality, and the original appearance and details of the work can be understood very clearly. In digital three-dimensional images, if the lighting angle and definition are properly configured, it can even achieve an effect that exceeds the actual object.

The ultra-high-definition 3D digital stereo image simulates the way the human eye observes things so that people can get a three-dimensional feeling of things. If people want to see a three-dimensional image, they need to project the images observed by the left and right eyes at the same time.

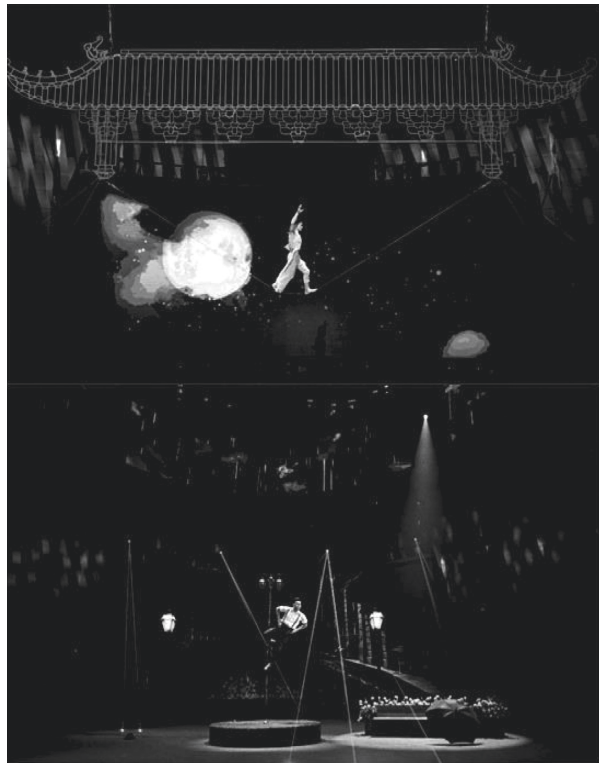

Figure 10: VR and high-altitude tightrope walking.

When two overlapping images appear, people will automatically draw a three-dimensional image in the brain. 3D stereoscopic images are not limited by time and space. The audience can watch things immersively. The 3D stereoscopic images will also have a strong impact and a strong sense of interaction on the audience.

According to a survey by the Consumer Electronics Association of America (CEA), a quarter of adults have watched at least one 3D movie in a year, and 53% want to be able to watch 3D programs at home. People only need to wear 3D glasses to watch 3D programs without leaving home.

According to the estimates of DisplaySearch in 2012, there will be 15.6 million 3D TV shipments. Surprisingly, in 2010 alone, 3D TV shipments have far exceeded DisplaySearch's forecast. Last year, the shipment volume of the year has reached 24 million units. ISuppli analysts predict that by 2015, 3D TV shipments will reach 78 million units, which can account for more than 30% of flat-panel TVs. Data from DisplaySearch show that the shipment rate of 3D TVs will reach 196 million units in 2018. As can be seen from Figure 11, 3D TV programs have a very large market consumer demand, and the future prospects must be bright.

4. Discussion

Image sensor technology has developed rapidly, and its application prospects are very broad. Compared with traditional methods, image sensor technology has a profound influence on the spread of folk art, and users are more willing to learn about folk art through multimedia technology and

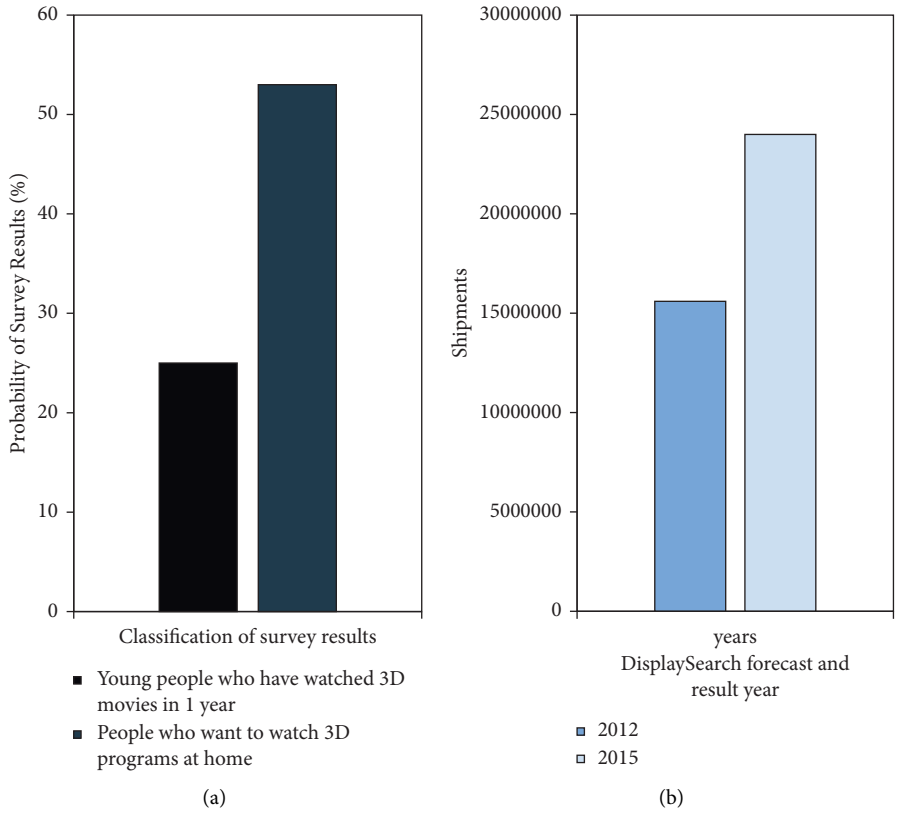

Figure 11: Consumer electronics association (CEA) and 3D TV shipment forecast. (a) Consumer electronics association (CEA) survey; (b) 3D TV shipment forecast.

online. However, some problems have gradually emerged in technologies such as VR virtual reality technology and digital stereoscopic images, such as the stability rate of product returns. Many companies need to spend a lot of money when purchasing equipment. Users appreciate and understand the profits that folk art brings to the company, and it is also an important issue that needs to be considered. VR virtual reality technology sometimes brings discomfort to users. Due to problems such as the clarity and refresh rate of the device, it will cause poor user experience, which will also affect the development and popularization of VR virtual reality technology. The price of multimedia equipment will also have a negative impact on its own development. In many countries, the price of multimedia equipment is not stable enough. If users want to have a good artistic experience, they must pay a certain high price. The content of folk art will also determine the user's acceptance of VR and other technologies. The rate of return and profit of VR and other industries are more difficult to predict than other industries. The content and creation of folk art will also increase the difficulty of enterprises.

5. Conclusion

In this paper, through the introduction of VR virtual reality technology and digital three-dimensional image technology, the digital communication of some folk art in today's world urban scenes is carried out to a certain extent. This article applies visual sensors and multimedia technology, VR virtual reality technology and folk art in urban scenes to the dissemination of folk art. Many folk art can be preserved and disseminated through digital methods. Urban folk art will also enter a new stage of development. Combining visual sensor technology with folk art has become a new development trend. While preserving folk art, it also greatly promotes the spread of folk culture and art. People can learn about different folk arts online without leaving home.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no potential conflicts of interest in this study.

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