Research Article

Application of VR Technology in Brand IP Image Design

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Virtual reality (VR) refers to the computer-generated simulation of a three-dimensional image environment that can be interacted within a seemingly physical way by a person using special electronic equipment and making people interactive and immersive. VR technology is applied to communication activities, producing VR communication. VR technology is applied to news reports, giving birth to the emergence of VR news. The great significance of VR technology for news communication lies in the comprehensive intake and recording and transmission of news site materials so that news events can “reproduce” and “restore.” The most prominent feature of VR transmission is immersion. Immersivity is mainly reflected in the perceptual system and the behavioral system of the human body. The immersion of perception system includes visual immersion, auditory immersion, touch immersion, and other sensory immersion; behavioral system immersions includes the immersion of language system, direction system immersion, and expression system immersion. Immersive communication has experienced three development stages: interactive communication, invasive communication, infiltration, and audience experience. There are three hidden dangers in VR technology in the communication. One is the hidden danger of the technical operation level: the lack of security and stability of the production process may lead to the disappearance of the traditional reporter, the second is the ethical hidden danger: the degradation of “audience” to “mass,” and third is “body” weakening the authority of “addiction”: the emergence of “brain in the cylinder,” the emergence of snooping feast, and the formation of exposed carnival. There are three aspects to prevent VR hidden dangers, layout and top-level design, improve security, and communication efficiency, promote industrial application, enhance user stickiness, strengthen brand building, and create ace IP and quality content.

1. Introduction

VR art is the combination of art and technology. It is a new media art form based on the logical basis of modern art aesthetics and the latest science and technology. VR art uses new media digital images to realize deeper communication and interaction with users, which plays a good role in promoting the dissemination and promotion of the brand image [1].

In the aspect of VR art, artists need unlimited imagination to build products and give users a strong visual shock. On the contrary, science and technology are needed to improve the final visual effect. The production of VR art is inseparable from the support of related technology. First, augmented reality (AR) technology defines as it superimposes a computer-generated image on a user’s view of the real world. It enhances both real and virtual world. Through the golden information projection technology, the virtual information is superimposed into the real world [2]. Users can use vision to perceive virtual scenes or objects in the real environment, which is the increase and strengthening of the real world. Second, MR hybrid reality technology is a user environment in which physical reality and digital content are combined in a way that enables interaction with and among real world and virtual objects [3]. The transformation from real scene to virtual scene is realized through technology, so as to create a new visual environment in which users can interact with the virtual scene in real time and experience the reality of the scene. Third, VR technology is an artificial environment that is created with software and presented to the user in such a way that the user suspends the belief and accepts it as a real environment. Build a virtual three-dimensional space through science and technology, and use VR equipment to realize the multisensory interaction of
VR art is a new form of artistic language expression based on quasi-reality, mixed reality, and AR technology. It brings the audience a new and three-dimensional interactive cognitive experience through design thinking and scientific and technological means. VR art has the following characteristics. First is immersion, which refers to the authenticity of the virtual environment in the process of users participating in the project experience [5]. In VR art, computer technology is used for information processing to generate digital images, and behavioral immersion is formed through gesture, posture, gaze, and other action commands, and multisensory immersion is realized through visual, auditory, tactile, and other sensory experiences. It can be seen that the development of VR art makes users no longer passively accept information, strengthens users’ sense of participation and interaction, and makes users become a part of artistic creation. Second, interactivity refers to the user’s operability of things in the virtual environment [6]. In modern art design, designers begin to pay attention to real-time interaction with the audience. The audience perceives the designer’s emotional communication to the product through interactive experience. At the same time, designers can quickly accept the feedback of the audience to adjust the design scheme and marketing strategy. VR art can achieve the effect of real-time interaction through users’ free activity experience in the virtual space and controlling the experience of virtual objects in the space. Third is imaginative. VR art uses three-dimensional projection, three-dimensional sound positioning, and other technologies to build a virtual three-dimensional space for users. The digital image in the virtual space is an intangible image, a new material, and new environment based on the artist’s imagination. It originates from reality and transcends reality and makes it a new form of artistic expression [7].

VR art combines the dual attributes of art design and science and technology, has the incomparable creativity, imagination, and immersive sense of other art forms, and more reasonably coordinates the relationship between people and computers and between people. Designers can give better play to their imagination and creativity in the process of creation and make design closer to the care of human nature. Therefore, VR art should abide by the following laws in the creative process. First is people-oriented [8]. VR art advocates the creation law of people-oriented, which is first reflected in the selection of design themes. Design should be people-centered, focus on the development of people and society, pay attention to social life and people’s psychological needs, and design creation and formal expression on this basis. Secondly, in the selection of design purpose, the design should focus on human experience and realize highly real user sensory experience through immersive interaction mode. Second is insight into needs [9]. In today’s society, consumers begin to pursue deeper spiritual needs while meeting material needs, but sometimes they are limited by objective material conditions, people’s own physical conditions, and rational social rules. At this time, VR art meets people’s spiritual needs with its unique perception. The first is the expression of the designer’s own emotional needs. The designer combines his imagination with real life, processes and creates visual image content, and forms a perceptible virtual space. Second is the sublimation of consumers’ emotional needs. Consumers enjoy products relatively freely and unrestricted with the unique experience of VR art. Third is the combination of deficiency and reality. VR art well combines the advantages of traditional physical art and emerging digital art. Based on physical art, it uses digital information technologies such as digital modeling and holographic image to create a virtual three-dimensional space, integrates the real world with the virtual world, and creates a new way of life for users [10].

The arrangement of the paper is as follows. Section 2 describes the emergence of VR news in detail. Section 3 discusses the brand image communication strategy based on VR art. Section 4 explains the method of brand image construction based on VR art. Section 5 analyzes the influence of VR strategic marketing model on M company’s marketing. It has 6 sections to completely discuss the influence. Section 6 concludes the paper [11].

2. The Emergence of VR News

VR news is just like the development of VR technology before. Its emergence does not come from the sudden “flash of light,” which is caused by the inevitability of the connection behind it. At the beginning of the twenty-first century, human society has stepped into web2. In the 0 era, all kinds of new things are emerging, old things and old concepts are constantly being updated, replaced, or dying, the development of information technology and communication technology is accelerating, accelerating the metabolism of society, and its influence is also increasing [12]. Driven by this background, robot news, data news, AR news, and VR news gradually appear. The emergence of these new things has undoubtedly had a strong impact on the news industry and has more far-reaching significance. In fact, it is not difficult to find that the birth of these new things is interrelated, and there is a logic that cannot be ignored, which is the strong relationship formed under the joint action of Moore’s law and big data [13].

Through Moore’s law and the promotion of open-source software, RFID technology and communication tools are more flexible, portable, and popular. Such a general trend has directly resulted in entering the VI Eb2.0 platform with the rapid rise of UGC (user generated content) at the level of active users 0 mode: from the Internet to the Internet of things, it has changed the fixed communication mode in the past. Under the integration of the two, “big data” came into being [14].

It is precisely because of this driving role that the news media should closely follow the trend of historical development, breakthrough the traditional restrictions, and obtain new life. Portugal should also continue to provide better services for the majority of audiences, so as to promote the reform road of “data-driven journalism” (see Figure 1). First,
the news industry gave birth to “data news” under the interpretation of data and visual data. Secondly, the news industry calculated and matched different data to give birth to artificial intelligence and “robot news”: AR news generated under the interaction between the data information base and the physical layer of news. Finally, in the process of news material collection, through video shooting and recording technology, the image presents a 360° panoramic view and further obtains various data in the environment, thus forming VR news [15]. What can VR technology bring to journalism? The development of human communication technology can be studied from two dimensions: transmission media and recording media. Recording and transmission are interrelated. The strong recording ability can provide strong support for the strong effect of transmission. The great significance of VR to news and communication is to “reproduce” and “restore” news events through the omni-directional uptake, recording and transmission of news live materials. Transformation logic of journalism driven by big data is shown in Figure 1.

3. Brand Image Communication Strategy Based on VR Art

In the 5G era, mobile terminals and Internet information technology constitute the diversification of brand image communication media, and the interactive and immersive VR art will become an important way of brand image communication media, and the interactive and immersive technology constitute the diversification of brand image in the 5G era, mobile terminals and Internet information technology will constitute an important way of brand image communication media, and the interactive and immersive technology can be studied from two dimensions: transmission media and recording media. Recording and transmission are interrelated. The strong recording ability can provide strong support for the strong effect of transmission. The great significance of VR to news and communication is to “reproduce” and “restore” news events through the omni-directional uptake, recording and transmission of news live materials. Transformation logic of journalism driven by big data is shown in Figure 1.

Based on VR Art

In the 5G era, mobile terminals and Internet information technology constitute the diversification of brand image communication media, and the interactive and immersive VR art will become an important way of brand image communication in the future, providing a new innovation space for brand communication and promotion.

Brand image refers to the personalized characteristics of enterprises, products, or other added value different from other competing brands in the same market. The clear brand image can affect the public’s overall cognition of the brand. Only by positively and effectively implanting the brand image into the hearts of consumers can we get consumers’ loyalty to the brand and quickly occupy the market of similar commodities. Therefore, designers should accurately locate the brand image in combination with the market and consumers before design and promotion. First is the visual image of the brand. Research shows that vision is people’s first impression and 87% of perception needs to obtain elements through vision. Therefore, in brand design, the brand’s visual image and its expression form are very important. The traditional brand visual image mainly refers to the design of brand logo, graphics, text, color, and visual application system. The brand visual image based on VR art is different from the traditional two-dimensional expression form and pays more attention to the presentation of three-dimensional space. VR art creates a new form of brand image perception and brand marketing communication mode and then guides the Hori rise of many art spaces full of fantasy and simulated reality. Its narrative structure is completely different from the previous traditional concepts and creative modes. For example, the Pokemon game jointly launched by Nintendo, Elven kebaomeng, and Niantic integrates the elements of enhancing reality and allows players to find pocket elves in the real society. The success of the project lies in the visualization and dynamics of Elven kebaomeng so that the audience can feel the fun of the game in interaction and strengthen the influence of pocket elves P and enhance the influence and market share of Nintendo game brand [16].

Secondly is the spiritual image of the brand. While making the first impression on consumers through visual stimulation, an brand image should begin to pay attention to the sustainability and long-term brand effect and adopt the brand communication strategy of Qingliang to affect consumers’ overall cognition of the brand. Firstly, the brand image based on VR art should pay attention to convey the cultural elements of the brand. The cultural connotation of the brand is formed with the continuous accumulation and precipitation of the historical process. In different times, the same brand will carry out different forms of communication in combination with the current social development. For example, in the process of brand image communication, under the rural revitalization strategy, VR technology will be used to create virtual art museums and virtual art exhibitions to convey its cultural connotation [17].

From the perspective of brand image communication, VR art applies the design principles of timeliness and interaction in contemporary art to the extreme, creating an avant-garde form of party expression. Brand image communication based on virtual art: first, designers should create virtual brand images to spread the concept of spleen and spleen; secondly, in the process of interaction, collect information such as customer choices, preferences, and consumption habits, in order to strengthen the improvement of customer service and consumer relationship. Finally, through the additional virtual service experience, we can achieve a one-to-one service model with the audience to improve customer satisfaction and brand continuity. In the process of brand image design, VR carries out artificial regeneration and artistic processing, creates a new sensory world, transforms this specific time and space into a special language environment, and constructs a new artistic landscape, resulting in a new artistic reality.

BICC, also known as the brand image classification combination, classifies the brand image and defines the image characteristics of the brand in each stage of the communication process, so as to determine the direction of creativity. In the process of brand image design using VR technology, we should first clearly understand the positioning and classification of brand image, determine the development stage of brand marketing, accurately locate consumer groups, and convey brand ideas. The first stage, illustrative brand image stage, is the first stage of brand communication and promotion. Combined with VR art, it explains the functions and services of products. The second stage, the technical brand image stage, mainly focuses on the R&D and improvement of science and technology,
production facilities, and enterprise innovation. The emergence of VR art is the result of the development of modern science and technology. The effective integration of the two can make the brand image better publicized and promoted. The third stage, the value brand image stage, refers to the benefits brought to customers after the completion of product or service functions. VR art can enable consumers to quickly experience the product process, understand the brand demands, and improve consumer satisfaction [18].

4. Brand Image Construction Based on VR Art

Compared with the traditional new media art, VR art pays more attention to the communication and interaction with users and brings users a brand-new immersive experience through the artistic characteristics of immersion, interaction, and multiperception. Make the audience change from the appreciator of art to the participant of art, better interact with the product, and understand the connotation of the product and brand culture. Three basic features of VR technology are shown in Figure 2.

In the process of brand image communication, VR technology can be used to create a multifunctional virtual display platform integrating social interaction, experience, and service. The experimenter can move and track the space according to the tips and guidance of the content, clarify the page setting and experience tips in the process of interaction, and experience and integrate the scene through the immersive characteristics of interactive art. First, create a virtual network community by using the virtual platform and connect users distributed in different places with the virtual network. Users can communicate and experience cooperatively through the virtual space. Secondly, the virtual platform is used to create a virtual image for users, and AR technology is used to project the virtual image to the real world so that the user can be completely immersed in the VR scene. In the process of experience, through the real-time monitoring of users’ senses and the real-time dynamic rendering technology of images, the corresponding virtual scene can be quickly generated to meet the potential needs of users. For example, Ali launched the buy+ program, established a 3D commodity library with many business brands, and realized the shopping experience in the virtual world through the user’s expression recognition, gesture recognition, speech recognition, eye tracking, and other technologies. Second is the field quantity of augmented VR. The construction of augmented VR scene is not only to use the VR technology to simulate the real world but also allows consumers to choose different experience modes according to the set procedures and purchase after experience. The successful promotion of pseudoreal brand image requires that the online style design be controlled as if it were a copy of the real world.

According to the different brand image positioning and user experience VR immersion, various VR systems are divided to build VR scenes with different themes. It is immersive VR scene. Through data helmets, data gloves, position trackers, motion capture systems, and other equipment, the user’s sensory systems such as perception, hearing, and touch are closed so that the user can be completely immersed in the VR scene. In the process of experience, through the real-time monitoring of users’ senses and the real-time dynamic rendering technology of images, the corresponding virtual scene can be quickly generated to meet the potential needs of users. For example, Ali launched the buy+ program, established a 3D commodity library with many business brands, and realized the shopping experience in the virtual world through the user’s expression recognition, gesture recognition, speech recognition, eye tracking, and other technologies. Second is the field quantity of augmented VR. The construction of augmented VR scene is not only to use the VR technology to simulate the real world but also to use it to enhance the participants’ feelings of the real environment, that is, to
enhance the feelings that cannot be or is inconvenient to obtain in reality. For example, in the shaping of brand image, abusive graphic and text information can be superimposed in the surrounding environment so that yellow eliminators can quickly understand product information and use methods, avoid reading product manuals, or use AR technology to smell and describe products, so as to realize the integration of real world and virtual world. Third is desktop VR scene. It is the most widely used brand form of VR at present. It uses the computer screen as a window for participants or users to observe the virtual environment. Consumers experience the virtual scene and operate virtual goods through relevant equipment. It has the advantages of low cost and easy implementation. However, due to the limitation of technology, the function is also better than the single. Application scenarios and features of VR products are shown in Table 1.

Based on the product expression form of VR art, the traditional static display form is transformed into a dynamic art experience process that can be explored. The display experience can be carried out through the following two communication channels. First, the online virtual brand image art exhibition uses VR art to build a display space and provide the audience with personalized theme scenes that can be freely selected. Consumers can independently measure the display content of the virtual space through image operation, voice explanation, video playback, and panoramic roaming. At the same time, taste experience games and hidden checkpoints are added in the virtual space so that the fee collectors can understand the product attributes, brand image, brand strength, and other related contents in the process of interaction, so as to build an experiential and interactive business service model and enhance your sensory experience and brand recognition. Second is offline virtual brand image experience store. Holographic image technology and ray tracing algorithm can be used to reproduce the three-dimensional image of real products, holographic playback of dynamic video can also be used, or VR art can be used to create VR products to increase user experience, for example, the popular virtual fitting experience. At the same time, due to the characteristics of offline and consumers’ willingness to share and upload experience in new media communication, we can more accurately locate the customer group. In short, VR products can make consumers have a more intuitive and real experience process. Diagram of the basic elements of strategic marketing is shown in Figure 3.

5. Analysis on the Influence of the VR Strategic Marketing Model on M Company’s Marketing

With the increasing improvement of VR technology, the popularization of input devices, and the construction of Internet 5G, VR technology is applied in ten fields: shopping platform, game, event live broadcast, medical care, real estate, car affairs, tourism, film, engineering, and education. VR subverts traditional images, and users will get a more comprehensive, richer content and more real VR world, becoming the leader of the new stage. Technology comes from society and reacts on society. It is a VR of the whole space. It is an emerging science and technology that enables consumers to feel the real situation only through relevant VR equipment under the prospect of the rapid development of electronic computers, the gradual maturity of simulation technology, and the wide application of artificial intelligence. It realizes the creation of virtual information environment in multidimensional information space so that the experiencer can be immersive without leaving home. It has the characteristics of multiperception, existence, interaction, autonomy, and so on.

At present, the domestic automobile industry rarely applies VR technology to the marketing mode, and most of the successful cases of VR marketing mode in the automobile industry belong to some old automobile companies, among which the most representative is Mercedes Benz VR panoramic advertising. The successful operation of the project has brought great economic benefits to Mercedes Benz.

5.1. Build the Model and Extract Variables. In order to study the improvement of the marketing effect value of the integration of VR technology into the strategic marketing mode, based on the establishment of the system in which the composition of VR technology units and the relationship between each unit and the strategic marketing mode are established, it is necessary to understand the structure of the system, and an effective method is to establish the structural model of the system; through some basic assumptions and related operations of graphs and matrices, the reachability matrix can be obtained. Then, through the man-machine combination, the reachability matrix is decomposed, and the complex system is decomposed into a multilevel hierarchical structure.

In order to better analyze whether the strategic marketing mode after integrating VR technology can solve the problems existing in the current marketing mode of M enterprise, the research plans to establish an explanatory structure model. Through the analysis of the model, find out the advantages and necessity of integrating VR technology into strategic marketing mode and establish a theoretical basis for proposing the establishment of VR marketing mode, so as to put forward relevant optimization measures for optimizing the strategic marketing model of M company.

Around the VR technology system, this study summarizes the immersive, interactive, and imaginative characteristics from society and reacts on society. It is a VR of the whole space. It is an emerging science and technology that enables consumers to feel the real situation only through relevant VR equipment under the prospect of the rapid development of electronic computers, the gradual maturity of simulation technology, and the wide application of artificial intelligence. It realizes the creation of virtual information environment in multidimensional information space so that the experiencer can be immersive without leaving home. It has the characteristics of multiperception, existence, interaction, autonomy, and so on.

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technology and practice, and discussing them, finally, 11 factors related to the integration of VR technology into strategic marketing mode affecting enterprise marketing are determined, and the results are shown in Table 2.

5.2. Build the Interpretation Structural Model. Interpretation structural model (ISM) is an effective scientific method to solve the problems in complex systems through models with the help of people’s real experience, relevant technical knowledge, and the establishment of relevant mathematical models. This method decomposes the studied system into a multilevel structure by studying the system relationship and structural relationship between relevant elements. Through research, find out the structural relationship between various elements and find out the key elements.

5.2.1. Determine Adjacency Matrix. The extracted 11 VR technologies are integrated into the strategic marketing model, and the influencing factors of how to affect the development of enterprises are numbered and named, including immersion, interactivity, conception, marketing organization level, customer satisfaction, customer loyalty, enterprise profitability, and product added value whether the brand design is complete and whether the corporate brand culture and customer purchase behavior are set as $F_1, F_2, F_3, F_4, F_5, F_6, F_7, F_8, F_9, F_{10}, F_{11}, F_{12}, F_{13}, F_{14}, F_{15}$, and $F_{16}$. On this basis, based on the analysis and discussion opinions of experts, the discussion results are quantified according to the construction principle of the adjacency matrix. If the influencing factors have a direct impact on the influencing factors, the value in adjacency matrix $A$ is 1, otherwise it is 0. If the influencing factor has a direct effect on the influencing factor $M$, the value in the adjacency matrix $A$ is 1, otherwise it is 0. According to the above regulation, the adjacency matrix $A$ is

$$A = \begin{bmatrix}
1 & 0 & 1 \\
0 & \ddots & 0 \\
1 & 0 & 1
\end{bmatrix}. \quad (1)$$

5.2.2. Generate Reachability Matrix. Reachability matrix refers to the degree that the length of a path between the nodes of the connection graph is described in the form of matrix. The calculation method of the reachability matrix uses the operational properties of the Boolean matrix, which reflects the binary relationship between recursion between system elements and any transmission level.

The calculation method is as follows. Firstly, the sum $(A + I)$ of matrix $A$ and identity matrix $I$ is solved according to the adjacency matrix. Secondly, continue to promote the matrix $(A + I)$ according to the rules of Boolean operation until formula (2) is satisfied. When the maximum number of
Matrices are generated in the matrix $M$ of how the integration of VR technology into strategic factors, this study constructs an explanatory structure model. Furthermore, according to the relationship between the factor $F_i$ and $F_j$, and factor $F_j$ and factor $F_k$, there exists a reachable path between factor $F_i$ and factor $F_k$. The goal of constructing the reachability matrix is to express the direct or indirect influence of each factor.

According to the reachability matrix $M$, the influence relationship and the relationship between various influencing factors are summarized together. The influence interaction is called the realizable set, represented by $R(F_i)$, and the affected relationship is called the antecedent set, represented by $(F_i)$, as shown in Table 2. In the grading process, $R(f)$ a $(F_i)$ is the condition for determining the highest-level element. After defining the highest-level element, remove the element from the table, then determine the next level element according to the judgment conditions until the last level element is divided, and then reconstruct the accessibility matrix $m$ with the result to complete the hierarchical processing, as shown in Table 3.

It can be seen from the hierarchical matrix that a hierarchical structure is composed of each unit matrix on the diagonal. Based on this principle, how to integrate VR technology into strategic marketing mode and how to affect enterprise development can be divided into four levels: the first level is $F_1$, $F_2$, and $F_3$, the second level is $F_4$, $F_5$, $F_6$, and $F_7$, the third level is $F_8$, and the fourth level is $F_9$. Furthermore, according to the relationship between the factors, this study constructs an explanatory structure model of how the integration of VR technology into strategic marketing model affects the influencing factors of enterprise development. The interpretative structural model of VR technology is shown in Figure 4.

Figure 4 describes four floors of the structural model of the VR technology. First floor consists of purchase imagination and customer behavior. It deals with the behavior of customer dealing and demand. Second floor describes the situation of marketing, customer satisfaction, and customer loyalty to make the VR technology more comfortable. In the third floor, the added value of product and integrity of brand is discussed. Fourth floor estimates the profit percentage.

### Table 2: Factors affecting the development of AR.

| Bedding plane                  | The specific factors that affect | Explanatory note                                                                 | Extraction source       |
|-------------------------------|---------------------------------|---------------------------------------------------------------------------------|-------------------------|
| Immersibility (F1)            | Users seem to be totally submerged in the virtual world and physically present in a nonphysical world and feel the besieged state in the virtual world | Document collection        |
| Interaction ability (F2)      | In the virtual world, the operability and feedback of users to objects   | Document collection          |
| Imaginative (F3)              | Gradually acquires new knowledge, so as to raise awareness from the perceptual and the rational and inspire new ideas | Document collection        |
| Marketing organization hierarchy (F4) | According to the different types of customers and customer value to establish different marketing agency, such as big customer marketing group, the small customers, and dealers’ marketing group | The interview of induction  |
| Customer satisfaction rate (F5) | Paid or unpaid activities that act for and benefit others | Document collection        |
| Customer loyalty (F6)         | It refers to the degree that customers feel about the products or services of an enterprise due to many factors such as quality, price, and service and long-term repeated purchase | Document collection        |
| Enterprise profitability (F7) | Enterprise profit ability | Document collection          |

### Table 3: Hierarchical processing of the reachability matrix.

| X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 |
|----|----|----|----|----|----|----|----|----|-----|
| 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   |
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   |
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   |
| 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| X1 | X3 | X1 | X2 | X4 | X5 | X6 | X1 | X8 | X9  |
| 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| X3 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| X1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| X2 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| X4 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| X5 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| X6 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| X7 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
Figure 4: Interpretative structural model of VR technology.

Although VO algorithm provides good obstacle avoidance conditions, many underlying obstacle avoidance algorithms are based on VO algorithm; VO algorithm does not consider the surrounding agents when calculating the speed of agents, and the same algorithm will be used to calculate the speed. Therefore, when agents gather together, agents will choose the speed outside VO to avoid obstacles. After a period of time, when the speed is outside VO, it will choose the original speed again, so as to go back and forth, and there will be a phenomenon of shaking back and forth.

Now, select one of the blue agents as the reference. Its initial position is \((-12 \text{ M}, 10 \text{ m})\) and the target position is \((12 \text{ M}, -10 \text{ m})\). As shown in Figure 4, the X-axis is the abscissa of the agent and the Y-axis is the ordinate of the agent. The blue line is the change of the position information of agent I using the VO algorithm. This position coordinate is obtained every 1.5 s. It can be seen from the broken line diagram that agent I obviously shakes briefly in the case of collision.

5.5. Optimal Speed Algorithm. When no collision is detected in the virtual engine, VO algorithm is used, which undoubtedly increases the amount of CPU calculation. Therefore, this study proposes the optimal speed algorithm. When no collision is detected, only the constraints of velocity and acceleration need to be considered. Velocity \(v(t)\) and acceleration \(a(t)\) need to meet

\[
|v(t)| \leq v_{\text{max}}, |a(t)| \leq a_{\text{max}}.
\]

In the crowd simulation, the initial speed of the virtual human is 0. After the simulation starts, the virtual human accelerates with the maximum acceleration, moves at the maximum speed when the speed reaches the maximum speed, and decelerates with the acceleration as the maximum acceleration when reaching the target point.

5.6. RVO2 Algorithm. In the RVO1 speed calculation formula, we assume that each agent undertakes half of the obstacle avoidance responsibility, but in practice, each agent has different transaction priorities, and its obstacle avoidance weight is different. Suppose that the obstacle avoidance
responsibility weight of agent \( B \) is \( \alpha_B^A \leq 1 \), and the obstacle avoidance responsibility weight of agent \( A \) is \( \alpha_A^B = 1 - \alpha_B^A \). Assume that the current location of agent \( B \) is \( \text{LOC}_{\text{Current}} \); when its speed is within the set of \( \text{VOB}_B \), the position of agent \( B \) is \( \text{LOC}_{\text{Base}} \); then, the weight of agent \( B \) shall meet formulas (3)–(8):

\[
\alpha_B^A = \frac{\text{LOC}_{\text{Base}}}{\text{LOC}_{\text{Current}} - \text{LOC}_{\text{Base}}} \quad (8)
\]

6. Conclusion

With the continuous development of VR technology and crowd simulation technology, crowd simulation in virtual environment is becoming more and more popular. The simulation results can be used for path planning of large venues and simulated military exercises. This study mainly carries out crowd simulation for virtual engine. The main work is as follows. The built model is used to build the environment in the illusory engine. For the large-scale terrain of the campus, the method of block loading is adopted: a large number of vegetation are generated by programming to reduce human and material resources. For a large number of models, this study uses the double-layer clipping algorithm to improve the "sudden crossing" phenomenon of the traditional LOD algorithm and other algorithms. In this study, the capsule bounding box is used for collision detection according to the shape characteristics of virtual human. Compared with the traditional bounding box technology, this technology has relatively good tightness. Throughout the historical development process, art and technology are always intertwined and cooperate to promote the harmonious development of human society, and VR art makes the two achieve the best integration. The development and popularization of VR art will constantly stimulate people’s imagination and creativity, enrich people’s material experience and spiritual compilation, and build a new way of life for people.

Data Availability

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

Conflicts of Interest

The author declares that he has no conflicts of interest.

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