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Retraction

Retracted: Immersive 5G Virtual Reality Visualization Display System Based on Big-Data Digital City Technology

Mathematical Problems in Engineering

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] F. Tian, "Immersive 5G Virtual Reality Visualization Display System Based on Big-Data Digital City Technology," *Mathematical Problems in Engineering*, vol. 2021, Article ID 6627631, 9 pages, 2021.

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Research Article

Immersive 5G Virtual Reality Visualization Display System Based on Big-Data Digital City Technology

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The virtual reality visual display system creates a realistic virtual product display system, allowing users to swim in a three-dimensional virtual environment and perform interactive operations, fully simulating the process of shopping selection and payment in reality, so that users have an immersive feeling. The purpose of this article is to realize the design of an immersive 5G virtual reality visual display system through big-data digital city technology. This paper uses big-data digital city technology to design and implement an immersive virtual reality visualization system from the three-dimensional display mode of vision, hearing, and touch, creating a real and interactive three-dimensional visualization environment for users to have a more intuitive visual experience. The experimental results of this paper show that the smoothness of the virtual reality visualization system test can reach 60FPS, the excellent rate reaches nearly 33%, and the model scene-realistic feedback excellent rate is about 62.5%.

1. Introduction

With the rapid rise and development of the Internet, virtual reality technology has slowly entered people's lives and has also begun to be applied to people's lives and work. By creating and representing virtual spaces and virtual objects, information can be transmitted more intuitively and efficiently. Among them, the application of virtual reality technology in e-commerce is an important new development direction. Since the Internet used by e-commerce is a link between merchants and customers, this makes commodity trade no longer restricted by time and space for the traditional transaction process. Creating a virtual system to project products with a sense of reality, users can swim in a three-dimensional virtual environment and perform interactive functions. By fully simulating the purchase and payment process in reality, users can feel immersive.

Virtual reality technology is a computer system that can create and experience virtual environments, as well as an advanced interface technology. In fact, human auditory behavior is simulated in a real machine environment. Its advantage is beyond reality, and it is a new computer technology developed with the development of multimedia technology. Virtual reality technology uses a computer to create a more realistic virtual environment, combined with the auxiliary functions of different detection equipment, so that the user is completely immersed in the generated virtual environment, and then interacts with the virtual environment through the man-machine interface, so that the user will have a kind of illusion like the illusion that the user is in the real world.

Flores proposed a case study of a Brazilian city. The purpose of his research is to analyze Twitter information to contribute to a strategic digital city. He then analyzed Twitter and evaluated the information based on its characteristics, sources, nature, quality, intelligence, and organizational level. However, due to the high complexity of the numbers, the results obtained are not very accurate [1]. Gonzalez-Franco M studied how auditory visual cues regulate this selective listening. He achieves this by combining immersive virtual reality technology with spatial audio. By allowing 32 participants to participate in the lecturer's information masking task at the same time, it was found that there were significantly more errors in the decision-making process triggered by asynchronous audiovisual voice prompts. However, due to the small number of people in the experiment, the data obtained by the result analysis is not very accurate [2]. Huda M has explored and proposed framework models in the past ten years as a way for teachers to adapt to big data to help their teaching performance. His research will help to enhance teaching performance in the application guidelines in the era of big data, to support multiple channels for evaluating knowledge, and to extract new value insights in exploring adaptive teaching capabilities. However, because the proposed framework is too long, people do not agree with other frameworks [3]. Li H proposed that the Internet of Things (IoT) and big data are the two technological themes that have received the most attention in recent years, and there is a close relationship between them, that is, billions of “things” connected to the Internet will generate a lot of data. And, openness creates many opportunities in our lives. He predicts that the Internet of Things and big data may completely change the entire telecommunications industry [4]. However, these have not undergone large-scale market research, so the conclusions are not very theoretical [5].

Starting from the current appearance of products on the Internet, this article analyzes the advantages of virtual reality technology and tries to apply traditional concepts using virtual reality technology, computer technology, and network technology to design screens in network-based virtual screen systems.

1.1. Design of Interaction and Database Technology. In order to create a network-based virtual display system for digital shopping malls, a new three-dimensional product display method was created. The system aims to make up for the shortcomings of existing product launch methods, such as time and space constraints and poor product interaction on the Internet, to provide users with more free, genuine, and comprehensive services. The innovation of this article lies in the use of virtual reality technology to develop a digital shopping mall prototype with interactive functions. The system will be published on the Internet and will give full play to the advantages of high-speed and rapid Internet communication and perfectly combine two-dimensional with three-dimensional to create a system with good originality and an interactive commercial website.

2. Virtual Reality Visualization Method

2.1. Multiprojection Plane-Transformation Matrix Algorithm. Projection can turn a cone into a typical cube. In the left coordinate system of the camera space, if upward, downward, left, and right are projected onto the near-tangent plane of the camera point, the distance of these points is t, b, l, and r, and and r is the far-and-near tangent plane to the camera. If the distance of the viewing angle is (Z_f, Z_n), then the P matrix is expressed as follows:

$$P = \begin{bmatrix} \frac{2Z_n}{r-l} & 0 & 0 & 0 \\ 0 & \frac{2Z_n}{t-b} & 0 & 0 \\ \frac{r+l}{r-l} & \frac{t+b}{t-b} & \frac{Z_f}{Z_n - Z_f} & -1 \\ 0 & 0 & \frac{Z_n \cdot Z_f}{Z_n - Z_f} & 0 \end{bmatrix}. \quad (1)$$

In order to calculate the camera parameters quickly and conveniently, the camera space-distance parameters are converted to the CAVE coordinate system space for calculation. The parameters from the angle of view to the close-up level (t, b, l, r, and Z_n) in the camera space are proportional to the parameters from the angle of view to the viewing level (t, b, l, r, and Z_n) in the camera space. CAVE projection, namely,

$$\frac{t}{T} = \frac{b}{B} = \frac{l}{L} = \frac{r}{R} = \frac{Z_n}{Z_n'}. \quad (2)$$

Replace the calculation of the projection transformation matrix with the parameters of the CAVE projection space, then the front view is expressed as follows:

$$L_1 = -\frac{W_1}{2} - X, \quad (3)$$

$$R_1 = \frac{W_1}{2} - X, \quad (4)$$

$$B_1 = \frac{H}{2} - Y, \quad (5)$$

$$T_1 = \frac{H}{2} - Y, \quad (6)$$

$$Z_{n1} = \frac{W_2}{2} - Z. \quad (7)$$

Substituting formula (3) to formula (7) into formula (1) to obtain the front projection transformation matrixP_t:

$$P_t = \begin{bmatrix} \frac{W_2 + 2Z}{W_1} & 0 & 0 & 0 \\ 0 & \frac{W_2 + 2Z}{H} & 0 & 0 \\ \frac{-2X}{W_1} & \frac{-2Y}{H} & \frac{Z_f}{Z_n - Z_f} & -1 \\ 0 & 0 & \frac{Z_n \cdot Z_f}{Z_n - Z_f} & 0 \end{bmatrix}. \tag{8}$$

Using the above method, the fast calculation type of the other three channels is obtained. This method is very helpful for the user to calculate the projection matrix in real time according to the visual position [6].

2.2. Virtual Reality Technology Algorithm. If the origin and main axis are determined, the position represented by the point should be determined. The subject determines a direction and the number of directions, and the subject also represents the difference between two points. In the three-dimensional space, we also use (x, y, z) to represent a vector. According to the context, we can understand whether it represents a point or a vector [7].

A vector contains a quantity (the coefficient or length of the vector) and a direction. In computer graphics, we are more interested in the direction of vectors. An interesting and important point is to use three x, y, and z scales to indicate that a carrier has a lot of unnecessary information [8]. In fact, only two quantities are necessary. The space formed by all possible directions in the three-dimensional space is actually a two-dimensional space. The reason is that when we define a direction, we only need to look at the normalized vector (because the length of the vector is the key to independence). For any standardized entity (x, y, z), there are

$$x^2 + y^2 + z^2 = 1. \tag{9}$$

If you want to express the coordinates of a point in a three-dimensional space, you can assume that P is (x, y, z), and the distance between the origin O and P is $r = \sqrt{x^2 + y^2 + z^2}$. The vertical projection of the point P on the XY plane is represented by Q [9]. The angle b is used as the included angle between X axis and OQ, and the angle a is used as the included angle between Z axis and OP. According to the hypothesis, it can be known that if the angle $a = \Delta\mathrm{OPQ}$, then $\mathrm{OQ} = \mathrm{asin}\ r$ can be obtained.

Therefore, it is easy to use these types to calculate the corresponding Cartesian coordinates (x, y, z) according to the spherical coordinates (r, a, b). The reverse ratio can also be derived from the following formula:

$$a = a \cos \frac{z}{r}, \tag{10}$$

$$b = b \tan \frac{y}{x}. \tag{11}$$

The above derivation inspired us to express a vector in one direction in another way: use a set of angles to set a point in the unit sphere. It gives a unit symbol, the vector v is connected to it, and the intersection point is P. Starting from the point P, make the vertical direction of the XY level equal to the level and Q. The direction of the vector v can be determined by two XOQ = and ZOP = v [10]. According to this, it can be concluded that the sum of all direction vectors can be reproduced in the two-dimensional space, as shown in the following:

$$\Omega = \left\{(u, v) | 0 \le u < 2\pi, -\frac{\pi}{2} \le v \le \frac{\pi}{2}\right\}. \tag{12}$$

Assuming that the area surrounding the point P on the sphere is A, the solid angle of A is defined as follows:

$$\Gamma = \frac{A}{r^2}. \tag{13}$$

In equation (13), r is the radius of the sphere. The unit of measurement becomes a solid radius. The entire sphere contains a three-dimensional radius $\hat{r}2$. The calculation of the solid angle is similar to the normal angle, which is equal to the ratio of the length of the area around the radius of the circle.

The differential fixed angle is the fixed angle corresponding to the "differential area." The small area on the surface of the sphere that tends to zero is the differential area. Usually, dw is used to represent the differential region. Here, we have given a formula to find the two angles u and v corresponding to the direction or point of the ball, from which we can see the relationship between the above concepts.

2.3. Method of Establishing Water Surface Grid. In the specific process of graphic simulation, one is to establish a mesh model, and the other is to simulate the movement of the vertices of the water surface. From the camera's perspective, the output of the object grid in the scene is very large, which limits the user's perspective. This will cause a waste of efficiency and resources and easily lead to low real-time efficiency [11]. The amount of water surface simulation calculations is reduced to ensure real-time performance of water production.

The projection grid is actually a grid projected into the space. This is not a grid created in the world space, but placed in the camera space. Like the LOD technology, according to the user's close observation of high-detail objects and low-detail objects, the waste of performance resources in the remote project of the LOD network is reduced to ensure the real-time effect of performance. The projection process is analyzed through four spaces: object space, global space, view space, and projection space [12].

In the 3D simulation program, the object in the screen space is transformed into an image through three matrix transformations, namely, $M_{\text{world}}, M_{\text{view}}$, and $M_{\text{projector}}$, which transforms the object into the global space according to the global transformation table, and the projection table transforms the space projection in the object coordinate space from the global transformation table. Finally, the transformation of the coordinate object in the projection space is mapped through the projection matrix. The viewing area corresponds to the screen space, and a viewing grid is created in the final screen space. The conversion is as follows:

$$P_{\text{projector}} = M_{\text{view}} * M_{\text{project}} * P_{\text{world}}, \tag{14}$$

where $P_{\text{projector}}$ is the display space position and$P_{\text{world}}$is the global space object position. After this type of inverse transformation, the position of the grid can be obtained in the global space. The initial type can be displayed at the top of the grid in the screen space, and the reverse conversion is as follows:

$$P_{\text{world}} = \left[M_{\text{view}} * M_{\text{project}}\right]^{-1} * P_{\text{projector}}. \tag{15}$$

The first step of the grid algorithm is to create a direction where the grid level is perpendicular to the camera. The second step is to calculate the grid level. Calculated by the conversion equation (15), each peak position in the world space is calculated by the wave-making algorithm. Yes, the top of the grid is compensated vertically, the final matrix function (14) is converted, and the rendered water surface can be brought to the screen space [13].

3. Virtual Reality Visualization Display System Experiment

3.1. Data Collection. For data collection, this paper obtains real-time data, normal information data, and stable data in the big data of the power grid. Real-time information and regular information data mainly come from our company's engineering production management system. This paper proposes an operating method for seamless access of PMS data based on the GIS system in order to obtain real-time data and enhance the maximum display effect [14]. The application programming interface (API) requires access to the PMS database for data updates, such as power transmission and conversion monitoring status, grid line power consumption, and distribution. The correction data of images, soils, and substations in our region are mainly completed through early aerial photography and modeling. After entering the data into the system, they remain unchanged for a long time [15].

3.2. Visualization System Software and Hardware Integration. The software and hardware of the system are integrated with the following description. Integrate the big data of the power supply network through the GIS back-end system, and then, distribute the corrected image to it. Based on the front-end image fusion engine, the spliced corrected image is divided into multiple projection signals, which are finally displayed on the website screen by the headlights. At the same time, users can control 3D GIS performance scenes, lighting, and real-time sound effects through an interactive system [16].

Among them, the virtual reality GIS, as the main component of the system software, effectively integrates various data, is responsible for the sorting and management of big data and belongs to the image fusion correction of virtual reality scenes performed on the system graphics workstation. The material of the system is mainly composed of four parts: interactive system, central control system, CAVE system, and lighting and sound system, which communicate with each other through Wi-Fi connection. The central control computer is a system interface that connects the interactive system, GIS system, and main tunnel control system and directly controls external audio and lighting systems. The interactive system includes a touch screen, a mobile terminal, and a three-dimensional mouse, which integrates external devices and systems. The communication link can improve the practicability and ease of use of the system. The main CAVE control system has a complex structure and is the main component of the system. A data visualization screen is composed of a stereo projection system and a graphic combination system [17, 18].

3.3. Function Design of the Visualization System. The overall goal of this system is to establish a data center virtual reality visualization display system based on B/S architecture. The system is a practical solution to various problems encountered in the display of a large amount of information generated by the daily operation of the data center computer room [19]. The visual information display system of the data center is designed from different angles:

(1) The system will handle the creation of the data center computer room, the conversion of required equipment models and model forms, how to introduce virtual reality scenes, and how to standardize the entire process.

(2) Be able to browse the overall environment of the data center computer room from all angles. The system provides users with a three-dimensional view of the data center computer room. Users can click to enter and monitor the current status of the computer room from all angles.

(3) Different virtual reality methods are used to provide data information in the data center computer room; the computer management and data management center of the computer room are convenient. The system uses different three-dimensional display methods to display computer room data information on virtual reality scenes, visually and emotionally analyze and process computer room functions, and improve the management efficiency of computer room managers. Managers can also observe the operating conditions of the computer space from

different angles and can quickly make decisions about the operating conditions of the equipment in the computer room and deal with the damage on time [20].

According to different system functions, the system is divided into three main units: virtual reality scene projection function module, data-visualization information display function module, and database information query module, as shown in Figure 1. The computer room function virtual reality scene-display unit mainly includes the virtual reality display in the computer room, stage tour, and rapid placement. The functional unit of visual display of data information should specifically include three methods to change the color and texture of materials; the database query module mainly includes the query of room equipment data information [21, 22]. The system uses a tree display, with the data center computer room as the root node for display. Each node contains a virtual reality computer room view, scene roaming (you can browse the entire computer room environment), quickly place and change the color or texture mode of the material, and use the progress line mode and the moving text mode to display data information. Computer room operators can learn about the use of equipment in the data center computer room by requesting relevant information from the database. The specific functions of the system will be described in detail below.

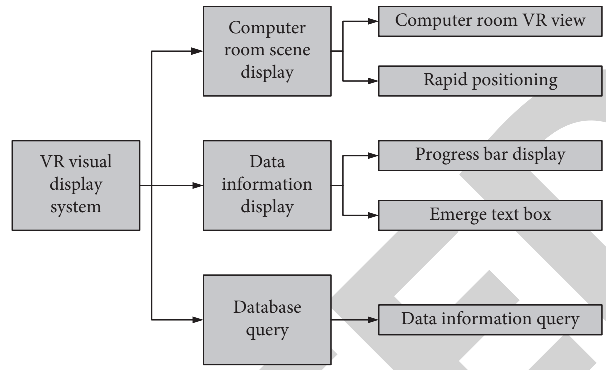

Figure 1: Visualization system function diagram.

4. Analysis of Results of the Virtual Reality Visualization Display System

4.1. Experience Analysis of the Virtual Reality Visualization System. In order to test and analyze whether the demand analysis and immersion experience of the system meet the standards, a questionnaire is designed around various indicators of the system. The question content of the questionnaire design includes system UI beauty, system stability, system ease of use, system interaction, and system emulation [23]. By providing VR system experience to 40 volunteers, the PC-side workstation configuration is shown in Table 1, and finally, the experience is counted and fed back. The calculation and analysis results are shown in Figure 2.

The results show that the overall experience of users after using the visualization system is still very good. Among them, the immersive experience of the system is the best, and 18 of them are very satisfied with it, accounting for almost 50% of the total. The stability of the system is also not bad, and 15 people commented very satisfied with this. Users are satisfied and very satisfied with the other performance of the system, and only a few people think the system is good, accounting for about 5% [24].

From the analysis of the results, it can be concluded that comprehensive, rigorous, and standardized tests have been conducted in the user's site environment in terms of function, performance, environment, reliability, and user interface. At the same time, the design system, test plan, and tests related to fluency and immersion were also investigated. According to the displayed results, it is determined that the system's functional use cases and nonfunctional goals are completed to the expected requirements of the software, meets the relevant design requirements, and has the following characteristics. (1) The system structure is reasonable and concise, and the system structure is clear, which can meet the target needs of the subject. (2) The function is more comprehensive. The system is composed of the interactive operation input system, scene management control module, scene model library, collision detection and terrain detection, visual rendering module, sports camera module, etc., covering business functions such as tree visualization, realistic rendering, and immersive roaming experience. Tree visualization and immersive virtual scene experience achieve a high sense of reality and immersion. (3) The security of the system is better. The Unity PlayerPrefs technology and offline mode are used to safely store local data to ensure real-time operation of visual rendering. There is no drastic change of screen connection in the system, and the fluency is high, which can effectively alleviate the dizziness caused by wearing a virtual helmet. (4) The system is flexible to use. The system implements six-degree-of-freedom roaming and collision detection in compliance with physical rules, and users can perform panoramic and flexible roaming and observation experiences. After the initial adjustment and adaptation of virtual helmet-related hardware devices, the default connection mode is adopted, that is, the system can be automatically connected and run at any time. (5) The system has high reliability. For the user to restart the device after power off or forcibly shut down, you can continue to re-run the system according to the default method to experience [25].

4.2. Algorithm Analysis of the Virtual Reality Visualization System. This paper compares and evaluates the proposed HCDDSL algorithm and the existing heterogeneous system algorithms, such as HEFT, CPOP, and HCNF. Use SLR and acceleration value to evaluate the performance of this algorithm and previous methods. The scheduling length ratio (SLR) is the ratio of the scheduling length to the scheduling length of the critical path task weights on the fastest processor. The task scheduling algorithm that gives the lowest SLR value of the graph is the best performing algorithm [26]. The average SLR pair of each algorithm is shown in Table 2.

The acceleration value speedup of the algorithm is calculated by dividing all the calculation time executed

Table 1: PC-side workstation configuration.

CPU		RAM	System type	GPU		USB
Intel (R)	Xeon (R)	32 GB	Windows7	NVDIA	Quadro	Four USB3.0
E5-2620v32.4 GHz		SP1 (64 bit)	K2200		USB2.0	

sequentially to the completion time of the algorithm. Sequential execution time is calculated by assigning tasks to the single processor with the smallest cumulative communication cost. The task scheduling algorithm that gives the highest acceleration value of the graph is the algorithm with the best performance. In order to compare the scheduling algorithms, this paper made a random task graph generator, which can generate a large number of DAGs with different characteristics by inputting several parameters.

This paper compares and evaluates the proposed HCDDSL algorithm and the current heterogeneous system algorithms, such as HEFT, CPOP, and HCNF [27]. Figure 3 shows the performance of the algorithm for 5 different CCR values (average SLR and average acceleration value), and Figure 4 shows the performance of the algorithm for 5 different size tasks. From these figures, it can be concluded that the average SLR value of the HCDDSL algorithm is better than the HEFT by 15.34%, CPOP algorithm by 16.24%, and HCNF algorithm by 9.16% for all generated graphs; the average acceleration value of the HCDDSL is better than the HEFT algorithm by 14.48%, CPOP algorithm by 18.17%, and HCNF algorithm by 5.88%. The efficiency of HCDDSL algorithm task scheduling has been greatly improved [28].

According to the data in the figure, it can be seen that a new algorithm called the HCDDSL is finally proposed, which is used for the scheduling of multicore heterogeneous processor-system program graphs, so as to solve the high computational complexity of stereo image matching. The algorithm optimizes the DAG topology by using clustering and locates the task position in the DAG topology in the classification stage. Through this method, all key nodes in DAG have high priority [29]. In order to reduce the scheduling length and reduce the task span time, the insertion interval and task replication are considered in the task allocation stage. Experiments are carried out by using a large number of randomly generated task graphs with different characteristics to verify the performance of the algorithm. Simulation results show that the HCDDSL algorithm is significantly better than other existing algorithms, such as the HEFT, CPOP, and HCNF. With the increase of the number of tasks and processor cores, the advantages of the new algorithm become more obvious [30].

4.3. Analysis of Virtual Reality Roaming Function. Collision detection can also be called contact detection, which is a common phenomenon in real life: two impenetrable objects cannot share the same area of space. Collision detection is a very important part of the 3D visualization system. Its main task is to judge between object models, models and scenes, judge whether they collide, and give information such as the location of the collision [31].

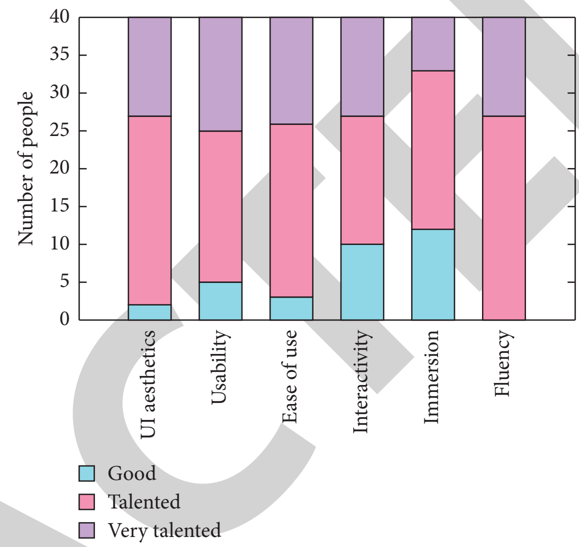

Figure 2: Visualized system experience results.

Table 2: Average SLR value of each algorithm.

CCR	HEFT	CPOP	HCNF	HCDDSL
0.1	1.6	1.5	1.3	1.5
0.5	1.8	1.7	1.5	1.6
1	2.2	2.1	1.9	1.8
5	4.5	4.4	4.2	4.1
10	5.4	5.3	5.0	4.7

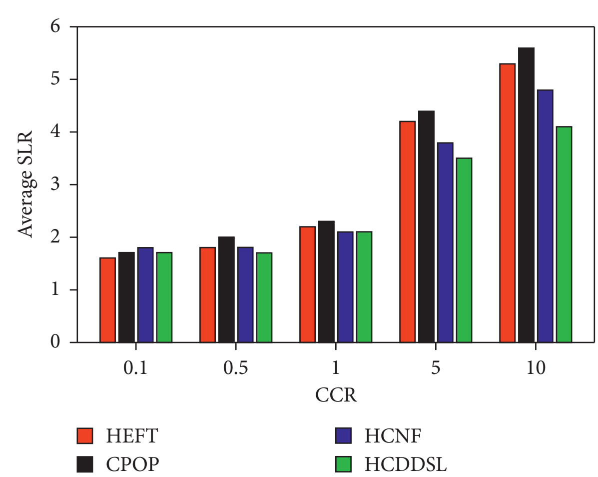

Figure 3: Average SLR comparison of algorithms.

Collision detection is an important part of building a 3D visualization system, which allows users to interact with 3D scenes in a more natural way. During the movement, the physical model in the three-dimensional scene is likely to

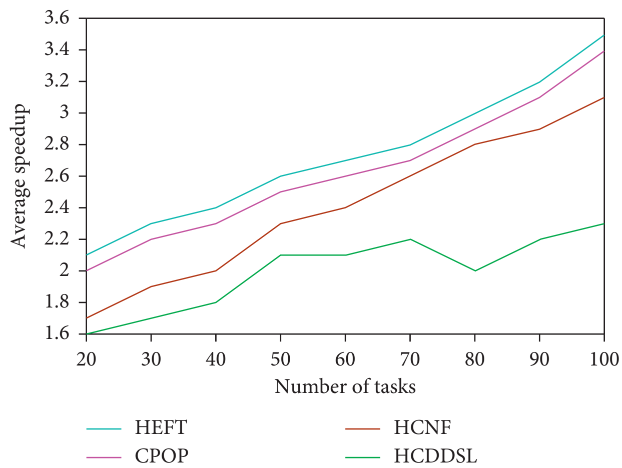

FIGURE 4: Comparison of average speedup values of algorithms.

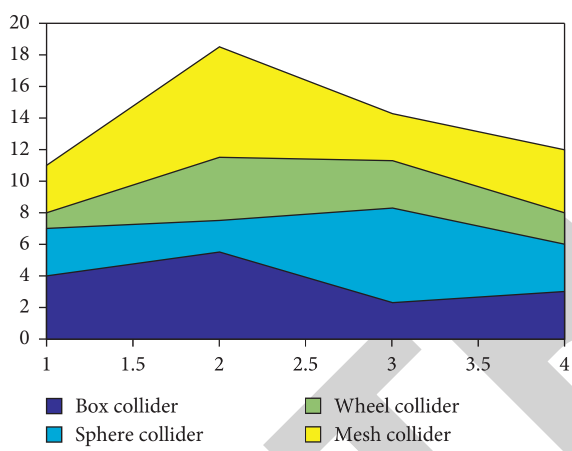

FIGURE 5: Cube objects use different bounding box areas.

collide, contact, and involve in other forms of interaction. A three-dimensional scene based on a physical model must be able to detect this interaction between objects and respond accordingly; otherwise, unreal phenomena such as mutual penetration or overlap between objects may occur. What needs attention in scene driving is collision detection. Whether it is the walking mode or free view mode, the physical properties of the object must be set so as not to "pass through the wall." With the continuous development of virtual reality technology, collision detection algorithms have also been continuously improved. Current collision detection algorithms are roughly divided into image space-collision detection algorithms and object space-based collision detection algorithms. Unity3d′s own physics engine can complete the collision detection algorithm based on the bounding box [32].

The primary problem in realizing a 3D scene is to realize the collision detection between the physical model and the ground to avoid the physical model from crossing the ground. The Unity3d engine provides developers with several space-based hierarchical bounding boxes, namely, BoxCollider, SphereCollider, WheelCollider, and MeshCollider. The size of the area is used to determine the effect of collision with the ground, as shown in Figure 5. By adding different types of bounding boxes to the model, different degrees of collision detection can be achieved [33]. When implementing the scene roaming function, the first-person view object adds the SphereCollider bounding box, which can realize the collision effect with the ground, thereby avoiding "passing through the ground" [34].

5. Conclusions

This article applies the design of the imaging system and divides it into three functional units: Visual unit, information query unit, and functional connection unit, and database query and equipment characteristic information: the connection method of the database and Unity3d query function. This system uses three different three-dimensional data display methods to display the characteristic information of the center, that is, the three-dimensional method should further study the occurrence to obtain more data appearance forms. It will be reviewed in future investigations. Other forms such as oil meter, thermometer, and linear meter are used to display data information; in addition, the next step should consider the operation of data transmission and reception.

This article uses a visualized virtual reality system combined with physical equipment to solve the problems of virtual reality technology, but it has more complex and time-consuming problems for visualization. In the future work, the author will further explore how to produce more efficient and better reconstruction methods. At the same time, when building a virtual reality system, study the frame rate to avoid dizziness and bring users a better virtual reality stimulation experience.

This article provides a reference for virtual reality imaging technology, but the next virtual reality of the cabin environment should be more real, and the functions of the system need to be further improved. When the user uses the system to monitor the data center, the system should issue an alarm in real time. It may be related to the actual control system. The system detects abnormal conditions in the computer room. The control system can process the equipment in the computer room in real time. For example, it can receive different types of alarm messages in real time and use sounds, images, etc. For protrusions, ensure the normal operation of the equipment compartment.

Data Availability

No data were used to support this study.

Conflicts of Interest

The author declares that there are no conflicts of interest.

References

[1] C. C. Flores and D. A. Rezende, "Twitter information for contributing to the strategic digital city: towards citizens as

co-managers," *Telematics and Informatics*, vol. 35, no. 5, pp. 1082–1096, 2018.

[2] M. Gonzalez-Franco, A. Maselli, D. Florencio et al., "Concurrent talking in immersive virtual reality: on the dominance of visual speech cues," *Entific Reports*, vol. 7, no. 1, p. 3817, 2017.

[3] M. Huda, Z. Haron, M. N. Ripin et al., "Exploring innovative learning environment (ILE): big data era," *International Journal of Applied Engineering Research*, vol. 12, no. 17, pp. 6678–6685, 2017.

[4] H. Hamidi and M. Jahanshahifard, "The role of the Internet of things in the improvement and expansion of business," *Journal of Organizational And End User Computing*, vol. 30, no. 3, pp. 24–44, 2018.

[5] H. Li, R. Lu, and J. Misic, "Guest editorial big security challenges in big data era," *IEEE Internet of Things Journal*, vol. 4, no. 2, pp. 521–523, 2017.

[6] B. Shen, T.-M. Choi, and H.-L. Chan, "Selling green first or not? A Bayesian analysis with service levels and environmental impact considerations in the Big Data Era," *Technological Forecasting and Social Change*, vol. 144, no. JUL, pp. 412–420, 2019.

[7] R. Aljawahiri and E. Milne, "Resources available for autism research in the big data era: a systematic review," *PeerJ*, vol. 5, no. 8, Article ID e2880, 2017.

[8] G. J. D. Smith, L. Bennett Moses, and J. Chan, "The challenges of doing criminology in the big data era: towards a digital and data-driven approach," *The British Journal of Criminology*, vol. 57, no. 2, pp. 259–274, 2017.

[9] A. Cocciolo, "Community archives in the digital era: a case from the lgbt community," *Preservation, Digital Technology and Culture*, vol. 45, no. 4, pp. 157–165, 2017.

[10] A. A. Genlott, A. Groenlund, and O. Viberg, "Disseminating digital innovation in school – leading second-order educational change," *Education and Information Technologies*, vol. 24, no. 5, pp. 3021–3039, 2019.

[11] E. Parteka and D. Alcides Rezende, "Digital planning of the city of Barcelona and its relations with the strategic digital city," *Journal of Technology Management and Innovation*, vol. 13, no. 4, pp. 54–60, 2018.

[12] M. Huda, A. Maseleno, M. Shahrill, K. A. Jasmi, I. Mustari, and B. Basiron, "Exploring adaptive teaching competencies in big data era," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 12, no. 03, pp. 68–83, 2017.

[13] C. Ekstrand, A. Jamal, R. Nguyen, A. Kudryk, J. Mann, and I. Mendez, "Immersive and interactive virtual reality to improve learning and retention of neuroanatomy in medical students: a randomized controlled study," *Cmaj Open*, vol. 6, no. 1, pp. E103–E109, 2018.

[14] S. S. Gill, I. Chana, and R. Buyya, "IoT based agriculture as a cloud and big data service," *Journal of Organizational and End User Computing*, vol. 29, no. 4, pp. 1–23, 2017.

[15] Y. Jing, Y. Bian, Z. Hu et al., "Deep learning for drug design: an artificial intelligence paradigm for drug discovery in the big data era," *Aaps Journal*, vol. 20, no. 3, p. 58, 2018.

[16] K. Chamilothori, J. Wienold, and M. Andersen, "Adequacy of immersive virtual reality for the perception of daylit spaces: comparison of real and virtual environments," *Leukos the Journal of the Illuminating Engineering Society of North America*, vol. 15, no. 1-4, pp. 203–226, 2018.

[17] A. P. Anderson, M. D. Mayer, A. M. Fellows, D. R. Cowan, M. T. Hegel, and J. C. Buckey, "Relaxation with immersive natural scenes presented using virtual reality," *Aerospace Medicine and Human Performance*, vol. 88, no. 6, pp. 520–526, 2017.

[18] S. Rouhani, A. Ashrafi, A. Z. Ravasan, and S. Afshari, "Business intelligence systems adoption model: an empirical investigation," *Journal of Organizational and End User Computing*, vol. 30, no. 2, pp. 43–70, 2018.

[19] Z. Lai, Y. C. Hu, Y. Cui, L. Sun, N. Dai, and H.-S. Lee, "Furion: engineering high-quality immersive virtual reality on today's mobile devices," *IEEE Transactions on Mobile Computing*, vol. 19, no. 7, pp. 1586–1602, 2020.

[20] D. Dong, L. K. F. Wong, and Z. Luo, "A novel approach for assessing prospective memory using immersive virtual reality task," *Psychology*, vol. 07, no. 10, pp. 1315–1325, 2017.

[21] P. K. Roos, V. Wim, C. Jacqueline et al., "Anxiety partially mediates cybersickness symptoms in immersive virtual reality environments," *Cyberpsychology, Behavior, and Social Networking*, vol. 21, no. 3, pp. 187–193, 2018.

[22] R. S. Bhadoria, N. S. Chaudhari, and N. S. Chaudhari, "Pragmatic sensory data semantics with service-oriented computing," *Journal of Organizational and End User Computing*, vol. 31, no. 2, pp. 22–36, 2019.

[23] C. Gagliardi, A. C. Turconi, E. Biffi et al., "Immersive virtual reality to improve walking abilities in cerebral palsy: a pilot study," *Annals of Biomedical Engineering*, vol. 46, no. 571–576, pp. 1376–1384, 2018.

[24] B. Chau, I. Phelan, P. Ta et al., "Immersive virtual reality therapy with myoelectric control for treatment-resistant phantom limb pain: case report," *Innovations in Clinical Neuroence*, vol. 14, no. 7-8, p. 3, 2017.

[25] I. Sudiartha and I. C. Bawa, "Bandwidth optimization on design of visual display information system based networking at politeknik negeri bali," *Journal of Physics Conference Series*, vol. 953, no. 1, Article ID 012050, 2018.

[26] N. Ochiai and H. Kondo, "Color functionality used in visual display for occupational and environmental safety and managing color vision deficiency," *Journal of Uoeh*, vol. 39, no. 1, p. 35, 2017.

[27] S. Barathi, G. Loganathan, and V. R. Rajan, "Knowledge management," *Advances in Computational Ences and Technology*, vol. 10, no. 5, pp. 1479–1486, 2017.

[28] R. K. K. V. Giri and V. R. Mandla, "Study and evaluation of carbon sequestration using remote sensing and GIS: a review on various techniques," *International Journal of Civil Engineering and Technology*, vol. 8, no. 4, pp. 287–300, 2017.

[29] H. Pavan, M. Shettar, and M. C. Gowrishankar, "Investigation of mechanical properties of glass fiber – chicken feather hybrid composite," *International Journal of Technology*, vol. 8, no. 3, p. 408, 2017.

[30] V. R. Isaksson, N. Kristin, L. Heewon et al., "A qualitative study of barriers to genetic counseling and potential for mobile technology education among women with ovarian cancer," *Hereditary Cancer in Clinical Practice*, vol. 16, no. 1, p. 13, 2018.

[31] P. A. Beata, A. E. Jeffers, and V. R. Kamat, "Real-time fire monitoring and visualization for the post-ignition fire state in a building," *Fire Technology*, vol. 54, no. 4, pp. 995–1027, 2018.

[32] B. B. Rao, V. R. Raju, and B. B. V. L. Deepak, "Estimation and optimization of heat transfer and overall pressure drop for a shell and tube heat exchanger," *Journal of Mechanical Science and Technology*, vol. 31, no. 1, pp. 375–383, 2017.

[33] S.-Y. Lin, V. R. Parasuraman, S. L. Mekuria, S. Peng, H.-C. Tsai, and G.-H. Hsiue, "Plasma initiated graft polymerization of 2-methacryloyloxyethyl phosphorylcholine on silicone elastomer surfaces to enhance bio(hemo)

compatibility," *Surface and Coatings Technology*, vol. 315, no. Complete, pp. 342–349, 2017.

[34] V. R. Anderson, N. Nepal, S. D. Johnson et al., "Plasma-assisted atomic layer epitaxial growth of aluminum nitride studied with real time grazing angle small angle x-ray scattering," *Journal of Vacuum Ence and Technology A Vacuum Surfaces & Films*, vol. 35, no. 3, Article ID 031508, 2017.