

Research on Construction and Application of Virtual Campus Empowered by Metaverse

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Abstract

Immersive interactive virtual service experience is the basic feature of the metaverse, and the virtual campus empowered by metaverse is one of the current application scenarios. The advantages, disadvantages and uses of common methods for constructing digital scenarios of virtual campus are summarized; it is mainly analyzed the ideas, technologies and application scenarios of AI empowerment from the digital human, ride of virtual and real integration, finally, the basic idea of service intelligence based on big data is presented. The research provides a way of thinking and method for the metaverse empowerment.

Keywords

Metaverse; Virtual Campus; AI Empowerment.

1. Introduction

Metaverse is a combination and upgrade of new technologies such as virtual reality, digital twin, artificial intelligence, blockchain, it is also a new type of Internet and social form. In 2021, when Facebook was renamed "Meta", which sparked a boom in research and application of metaverse, and quickly moved from concept to real life [1]. The immersive virtual campus is becoming a good carrier for students to socialize and learn virtually, and form human-computer interaction and emotional communication[2].

This paper starts from the practical case of campus empowered by metaverse, delves deeper the digital construction method of virtual campus, conducts creative interpretation of common campus life scenarios for digital human, virtual ride, and virtual and real integration based on AI empowerment education, and presents the basic idea of metaverse service intelligence. The research provides a way of thinking and method for the virtual campus ideas, technologies, application scenarios and life creativity empowered by metaverse in the current digital learning environment.

2. Digital Scenario Construction of Virtual Campus

Digital scenario construction is the infrastructure construction of metaverse and the first step of metaverse application construction. As the next form of the Internet, the development path of metaverse has three forms [3]:

- from real to virtual
- from virtual to real
- real and virtual integration

The digital modeling of virtual metaverse campus mainly has three methods.

Modeling based on modeling software such as 3DMax: this method can model real scenario models and fictitious scenario models, but the work is huge. As shown in Fig.1, it is the application scenario model of the virtual self-study room.



Fig. 1 Model of the virtual self-study room

Modeling based on panoramic image: first, the specific method in this paper is to use SLR to take photos, and synthesize the panoramic image; and then paste the image inside the sphere in Unity, and design the panoramic image sequence.

The whole campus modeling based on satellite elevation data: the advantage is that it can achieve 1:1 3D replica of large-scale campus, the disadvantage is that the model is huge.

Therefore, the most critical and difficult task of virtual campus modeling is to achieve optimal control, on the one hand, a strict script design is carried out on the model requirements in the system requirements, on the other hand, a suitable compromise is done between the simplification of the model and the accuracy of the analysis results, Fig.2 shows the overall model of the campus obtained by fusing the above three technologies.



Fig. 2 Model of the virtual self-study room

3. AI Empowers Metaverse Campus

AI will become the core of the metaverse, provide technical support for a large number of application scenarios in the metaverse, and open up a world of virtual and real integration [4].

3.1. Virtual Campus Digital Human

At present, there are four kinds of educational applications of digital human in virtual campus ecology: virtual classroom, virtual student, virtual simulation laboratory and multimodal wisdom course, whose educational, interactive, virtual and anthropomorphic nature greatly enhance the authenticity, immersion and interactivity of virtual campus empowered by metaverse [5]. Modeling and rendering technology can bring strong visual impact, but only AI empowerment can bring soul with digital people[6]. Fig.3 shows the virtual classroom, AI algorithms analyze and identify the input contents of digital human (teachers and students) and decide the next output based on the analysis results. With the development of AI technologies such as natural language processing and speech recognition, their application value will grow, which activate the ecology of the campus metaverse[7].



Fig. 3 Virtual classroom & digital Human

3.2. Intelligent Ride of Virtual and Real Integration

There are two main types of current intelligent ride of virtual and real integration: one is to project different themed 2D scenarios onto a large screen, and the other is create 3D immersive space with virtual or real panorama through VR headset. No matter which form belongs to static form. after AI empowerment, the system can not only dynamically change the environment at any time, enhance entertainment and interactivity, but also give reasonable advice on running health through real data analysis of the ride. As shown in Fig.4, it is a ride in 3D campus and set up various riding methods: VR ride based on real bicycle, simulated ride based on keyboard or mobile touch screen.



Fig. 4 Virtual intelligent ride of virtual and real integration

4. Intelligence of Metaverse Service

Metaverse campus empowers the virtual campus, which not only breaks through time and space limitations, enhances entertainment, but also better serve teachers and students and promote their progress by empowering application scenarios[8]. This paper obtains data through the system backend database, performs mathematical modeling, make intelligent evaluation on virtual teacher and student and give reasonable suggestions.

The basic idea of the algorithm: By calculating various modules(p_i)and weighting(k_i), the final evaluation value S is obtained via summation, and its calculation formula is:

$$S = \sum_{i=0}^n k_i p_i \tag{1}$$

for example, the food structure is inferred by the data of the virtual restaurant module and the total score p_1 is calculated, the exercise type, length and total score p_2 are obtained through the exercise module, after weighting, the student's comprehensive score is:

$$P = k_1 * p_1 + k_2 * p_2 \tag{2}$$

5. Conclusion

This paper practices and studies the idea, technology and application scenarios of virtual campus empowered metaverse, discusses the digital construction of metaverse, AI empowerment and application scenario needs as the core elements of its development, and provides some feasible practice cases and references for metaverse empowerment.

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