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The combination and application of virtual reality and artificial intelligence

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Abstract. In recent years, virtual reality technology has gradually entered the public's vision. The rapid development of virtual reality technology has caused a great impact on people's cognition. Artificial intelligence (AI) is also a cutting-edge modern technology that can greatly affect human life. The combination of virtual reality (VR) and artificial intelligence is also seen as a new research direction. Based on this situation. By comparing with traditional virtual reality technology, this paper analyses the necessity and development situation of the combination of AI and VR, and expounds the feasibility and importance of AI+VR. At the same time, it explains how artificial intelligence can enhance the fidelity and interactivity of virtual reality technology to a certain extent. In addition, it also studies how AI can help VR in solving the current difficulties faced by VR technology. In addition, it also summarizes the application status of AI+VR, and looks forward to the impact of artificial intelligence and virtual reality technology on our life.

Keywords: Artificial intelligence, deep learning, virtual reality, combination and application.

1. Introduction

With the development of VR technology, traditional VR technology has been slowly unable to meet people's needs. In order to use VR in more areas and ensure virtual reality technology becomes lower cost, higher efficiency, faster transmission speed, make it more conducive to the development of social economy and productivity while giving users a better experience. VR technology in the future development must not fight alone [1].

In order for VR technology to become a future technology, experts should not just study existing technologies. Like crossroad surveillance, if not combined with the Internet, it's just a tool for fines. Once combined with the Internet, it can be used to solve traffic congestion. Therefore, only when VR is combined with artificial intelligence can it turn from a toy into an advanced technology that can solve problems and troubles. The rapid development of virtual reality technology has caused a great impact on human understanding. Artificial intelligence is also a cutting-edge technology that can affect human life. The combination of artificial intelligence and virtual reality is also seen as a new research direction. The combination of artificial intelligence and virtual reality technology may be a trend of future technological development [2].

At present, the global competition around artificial intelligence and virtual reality is increasingly fierce. A number of artificial intelligence products have emerged in the field of artificial intelligence. Microsoft trains intelligence drones in VR. Image Metrics developed the Makeup Genius, which enables

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customers to virtually try out cosmetics before deciding to buy them VR+AI, as a new advanced technology, is entering various fields in people's lives [3-5].

By comparing with traditional virtual reality technology, this paper analyzes the development situation and research necessity of the combination of AI and VR. At the same time, it explains how artificial intelligence can enhance the fidelity and interactivity of virtual reality technology to a certain extent. This paper describes the functions of AI in the VR system. And show the application status of AI+VR in the commercial field.

2. The reasons for combination of the virtual reality and artificial intelligence

2.1. Problems and solutions facing virtual reality

2.1.1. Content creation is difficult and time-consuming. The development of VR technology has become the leading force to push the society into the intelligent era. The research and development of artificial intelligence is also indispensable in other application fields. Although virtual reality has been widely used, the technology is not perfect. Meanwhile, VR content creation has been a major obstacle to the development of the industry. Content creation takes a long time, the technical barrier is high, and the risk is high [6]. When a user buys a VR headset or headset, they can only watch a few videos or play a few simple games. This does not meet the user's more needs. If developers do content development, it will lead to the increase of cost and the increase of product price. Sales became a problem again. In turn, it restricts the enthusiasm of content production. It will become a vicious circle.

For example, aerial photography is a big problem in the production of panoramic scenes. Many newbies to virtual reality have no idea how to do it. If the rendering is not done properly, it will make the aerial panorama look unreal. Eventually, the overall presentation of the effect is not good [7].

At this point, VR and artificial intelligence have to merge. The artificial intelligence in virtual reality is targeted. Specifically for VR to solve these problems. The AI here is very different from the AI in the broad sense. The AI here is much more specialized and precise, specializes in solving difficult problems in VR. Artificial intelligence engines can help VR developers quickly build VR scenarios and speed up VR content production. So, having a good AI engine can save a lot of development costs and greatly enhance the user’s experience [8].

2.1.2. Low fidelity and interactivity need to be improved. One user once said: VR games are really immersive, but they're still not real. Because you can't touch a lot of what you see. Many agents are also dull. Indeed, in the early VR applications, the number of agents is small and their behaviors are simple. They are usually required to do some simple actions or respond to several simple events. In this case, it is not enough to guarantee the fidelity and interactivity of VR, and VR+AI is far from enough to be taken into the field of science and technology as a mature technology [9].

In addition, if the interactivity of the system is not perfect, the audience is likely to lose track of the clues and plot when experiencing the VR scene. Because VR is 360° panoramic view. The users can see where they want to see. But there are certain scenes that are not plot clues. If the user's attention is focused on some unnecessary view, it is easy to miss the main development. So have a strong AI system to support VR system. And allow people to return to the main story or trigger different stories in various situations.

The AI in VR is dedicated to the entire VR system. AI will get rid of other redundant features, and strive to improve the user’s experience. Adding a separate AI system to the virtual reality system will cause agents in the environment to act and react like humans. And it gives the user a sense of being there. One of the biggest challenges for VR is how to render realistic graphics using today's consumer hardware. Rendering too complex will result in pixelation and latency. This leads to a poor user experience. At this point, AI can be used for selective rendering. Only the part of the scene that the viewer is viewing is dynamically generated with full visual fidelity. In this way, the computational cost is saved [9].

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If the human-computer communication between the audience and the media system is to achieve a natural and smooth effect, the system is required to have good human-computer interaction and machine learning functions [3]. The fidelity of VR content is a key factor in determining the user's experience. Therefore, it is necessary to combine artificial intelligence to achieve high-quality VR environment construction, analyze all kinds of information in VR content, and understand user behavior as accurately as possible. In addition, interactivity is also one of the important characteristics of virtual reality technology. People not only need to make new breakthroughs in VR interactive equipment, but also to overcome the impact of new technology on industry and concept. VR technology has been widely used in all walks of life, and artificial intelligence technology will also help the development and innovation of VR.

2.2. How to combine VR and VR?

To some extent, the research directions of VR and artificial intelligence technology are two different paths. The main research object of virtual reality technology is the external environment, while artificial intelligence technology is to explore the nature of human intelligence. AI is used to give devices intelligence, while VR is used to construct virtual environments that enable users to achieve an immersive experience [2]. So when the two are combined, virtual objects can be given intelligence in virtual environments. This kind of virtual-real transformation can transform the virtual things that people cannot express in reality into physical objects. To help people understand and learn better.

VR and AI have a subtle relationship. With the continuous development of virtual reality technology, people's requirements for the experience in VR environment are also increasing. Hence the emergence of Agent modeling in AI. VR and AI are mutually reinforcing.AI enhances the intelligence of VR interaction and the intelligence and automation of VR object and content production.

The enabling effect of artificial intelligence on virtual reality is reflected in three aspects: first, the intelligence of virtual objects: Virtual and human intelligent behavior will appear more and more in various virtual environments and virtual reality applications; Second, the interaction mode is intelligent. Second, the interaction mode is intelligent: Intelligent interactive system will integrate visual, auditory, olfactory and other perceptual channels to bring a new interactive experience, so that virtual reality can truly turn virtual reality into reality ; Third, intelligent research and development and production of virtual reality content: Artificial intelligence will enhance the intelligence and automation level of virtual reality production tools and development platforms, improve modeling efficiency, and then enhance VR content productivity.

The convergence of the two technologies will open up a new generation of information technology industry and a new source of growth [7]. In addition, in view of the time-consuming creation of VR content and the high technical threshold, some companies directly generate VR scenes by the designer's design drawings through AI engines. The AI engine can capture 3D models and scenes stored in databases and reproduce the design results with great efficiency.

The AI system provides several main functions for the VR system.

- Independent control agent：Generally, in VR system, in addition to the objects controlled by users, some agents controlled by artificial intelligence are acting autonomously according to the requirements of VR system. The behavior of these agents is completely controlled by AI system, which is the main content of AI research in VR system.
- Auxiliary control user agent In the VR system, the user joins the virtual world as a special agent, and the artificial intelligence is replaced by the user, while other parts may be exactly the same as other agents——For example: in a multiplayer game, the player controls a character, but to the rest of the players, the character is no different from the computer NPC. Although the agent behavior of the user is specified by the user, in some cases, considering the user experience and other situations, the agent still needs artificial intelligence to direct its actions. For example, in the Horizon game, users can directly select the specified destination for the agent they control, but path planning and other joint work are still done by artificial intelligence [8].

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3. The Application of AI+VR

3.1. VR+AI equipment manufacturing: Training aerial drones

Microsoft has been open sourcing an aerial information and robotics platform for years. his is a system that trains artificial intelligence through advanced virtual reality [5]. It can train drones by simulating countless detailed scenarios in virtual environments in VR. It saves a lot of boring and time-consuming work, and at the same time, it can comprehensively cover the obstacles of the UAV.

In addition, the system could be used not only to train aerial drones. The system uses advanced graphics processing technology to provide details of VR virtual worlds, such as varying levels of shadows, glare, haze and reflections from glass. It is in this complex physical environment that the system can also be used to test driverless cars, logistics robots and any other device that requires autonomous driving. With the increasing development of logistics and e-commerce, unmanned delivery will also usher in an explosion. This way of training Al with VR can also play a role in the development of unmanned delivery [6].

3.2. VR+AI shopping

VR is already being used to enhance the shopping experience. Consumers can try out the product they are considering in a virtual environment before making a purchase. For example, they can try on clothes or test drive cars. While virtual shopping is certainly exciting, artificial intelligence will further enhance the experience. Through immersive virtual reality environments, AI's applications can test products or retail ideas that have not yet hit the market. These items are placed on virtual shelves to see how consumers react to real-time products [3]. For example, shoppers interested in buying furniture could use VR to test out sofas and chairs they're interested in. The AI can act as a virtual sales assistant who can make suggestions, answer questions and even make a sale. The integration of AI and VR not only benefits consumers, but also provides unlimited possibilities for enterprises. It will give the company the opportunity to learn more about shoppers so that the company can make improvements and increase turnover [10].

3.3. VR+AI travel

Much of the travel industry is already using VR+AI. Airlines, hotels, resorts, playgrounds and many high-end tourist attractions use the technology to let their potential customers know what they are about to experience. VR allows travelers to see what they'll be like at the resort by watching panoramic scenes, it allows people to 360° explore the facilities and environment of the destination before arriving at the scene, so that passengers can better understand the destination they choose. Adding AI to the mix gives travelers the opportunity to experience potential trips in a more dynamic way [11]. They can use VR to visit places and facilities they are interested in, and can use AI to help them make travel decisions. VR allows travelers to take a look at the scenery and facilities of a hotel resort when they choose one, while AI can handle actual travel reservations, such as flight routes.

3.4. VR+AI education

The integration of VR and AI is very suitable for the educational application of virtual simulation. Such technologies, which enable intelligent interactions in virtual classrooms and facilitate inquiry-based, adaptive learning, may have a positive impact on education in the future. VR+AI education application system will help students realize personalized learning and specialized learning with the assistance of VR+AI. The combination of artificial intelligence and virtual reality can help students learn by constructing virtual teachers [12]. It is possible that in the near future, virtual teachers will be able to communicate with students in the classroom and help students solve difficult problems with their vast knowledge and fast problem-solving speed.

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4. Conclusion

For VR technology to become a reality technology, it must be supported by an independent artificial intelligence system. VR+AI is the main front of future technological development. To be sure, virtual reality technology still has many imperfections: the lack of core technology, content creation is difficult. Therefore, there is an urgent need for a targeted artificial intelligence system to solve these problems. Through the control and assistance of independent AI systems, the above problems will be solved, and VR technology will become more feasible, and the prospects of the entire industry will be brighter. That's the kind of technology we want to see in the future.

As cities slowly become smarter, people are already seeing technological changes. VR and AI are also slowly merging. But before this, each system or technology is still doing its own thing, it is difficult to form a unified control or scheduling through a single device or system. The combination of AI and VR will make it easier to manage and control, while being more responsive, faster to build, and more useful than previous technologies. The combination of VR's virtual-reality experience and AI's learning ability enables machines to create endless ideas from a single form of technology, just like humans. The combination of virtual reality technology and artificial intelligence will change people's lives.

In the near future, VR will not only appear in our lives as an entertainment project. AI+VR technology will be applied in medical care, real estate sales, construction engineering, coal and oil, electricity, advertising, toys, home decoration, tourism, industrial manufacturing and maintenance, education, e-commerce, media broadcast. The product of the combination of virtual reality technology and artificial intelligence will penetrate into every corner of people's lives, and is likely to become an indispensable part of human life.

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