

Three-dimensional Digital Reconstruction and Application of AR_MR Technology in Medicine

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Abstract: With the rapid development of modern medical technology, the training of medical imaging professionals is changing with each passing day, and science and technology are developing rapidly, especially 3D digital reconstruction and AR_MR technology are applied to medical clinic and medical education. With the continuous transformation of medical technology mode, it is the most important problem for modern medical technology to discuss how 3D digital reconstruction and AR_MR technology can better meet the convenience characteristics and connotation of early diagnosis and treatment. Aiming at the discussion of 3D digital reconstruction and AR_MR technology, this paper applies 3D digital reconstruction and AR_MR technology to many technologies and directions in medicine. Combining with practical medical application and continuous exploration, this study systematically analyzes the application of AR_MR technology and 3D digital reconstruction technology in medicine, which proves the operability, feasibility and sustainable development of 3D digital reconstruction and AR_MR technology in medical technology. It provides a new idea and perspective for the development of modern virtual imaging and the integration of virtual reality technology and medicine.

1. Introduction

With the changes of the times and various professions, the rapid development of science and technology today is the application of three-dimensional digital reconstruction and AR_MR technology in medicine. By shaping and building a more realistic clinical scene and environment, the overall controllability, safety and repeatability of all aspects in medical clinical and practical teaching are improved. With the traditional virtual reality construction technology, professional technicians and large-scale instruments and equipment are needed to build it, which makes it a long-term and convenient application, which can achieve early diagnosis and prevention of diseases in the new era. It is a modern aspect [1].

With the rapid development of modern medical imaging technology, the role of virtual reality and three-dimensional analog imaging technology in medicine has been strengthened as a whole, so that relevant majors can develop the virtual reality of the whole medical image, and the three-digit

digital reconstruction and AR_MR technology can be applied in many stages of medical technology. Relevant experts and scholars have developed virtual reality (VR) of medical images, combined 3D digital reconstruction with articles in practical application and continuous exploration, and systematically analyzed the application direction of 3D digital reconstruction and AR_MR technology in medicine, and made clear the operability, feasibility and sustainable development of 3D digital reconstruction and AR_MR technology in medical technology. It provides a new idea and perspective for the development of modern virtual imaging and the integration of virtual reality technology and medicine [2].

In terms of overall objective technology, it is mainly limited to the traditional two-dimensional form, while the two-dimensional form has great deficiency in medical clinic, human anatomy and organ transplantation, which makes people's research on the human body unable to be completely in-depth, while the three-dimensional mode technology of anatomy is slightly insufficient. With the development of modern science and computer technology, the development of virtual digital construction [3], rapid prototyping technology and virtual modeling technology, The technical aspects of exploring the purpose of three-dimensional digital construction are mainly limited to the traditional two-dimensional learning form, but the traditional three-dimensional model such as anatomy has high cost. This paper discusses the application of three-dimensional digital reconstruction and AR_MR technology in medicine. It plays an important role in enhancing doctors' and medical students' understanding of the three-dimensional spatial relationship of human anatomical structure and carrying out simulation practice before operation, so as to have more intuitive and direct observation during operation [4].

2. Research Background

2.1. Overview of 3D Digital Reconstruction Technology and Development

In the process of overall modeling, in order to ensure the non-abstract concept of everything, modeling itself is to establish a model body, which is a holistic display of things [5]. It is mainly divided into physical and non-physical modeling models, and its main modeling methods are in medicine. There are many modeling methods about human bodies and organs, and medical technical methods are mostly based on the form of three-dimensional virtual modeling. Therefore, the overall method of modeling today is to scan and upload point data according to various scanners, so that the point data can be quickly built into a curved surface model, and the secondary optimization and processing can be realized on the computer[6], so that it can finally achieve high-precision physical processing, so as to meet its high accuracy requirements and meet the overall situation and methods of students for medicine (Figure 1)[7].

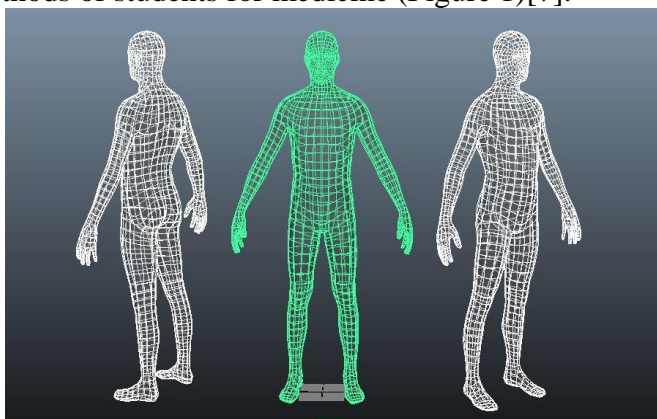


Figure 1: Concept map of 3D modeling technology

2.2. Overview of ar _ Mr Technology and its Development

The development of augmented reality (AR) and MR technology, including the development of three-dimensional modeling technology [8], is to create a whole simulation virtual environment and carry out a virtual interactive three-dimensional virtual mode, so that users and doctors can directly experience the whole virtual interactive mode[9]. AR technology originated from the head-mounted display device in 1986, and the application of virtual world is displayed in a picture through creation and simulation. In recent years, in addition to the development of AR technology, MR technology has also developed with each passing day. The overall construction of AR technology is the perfect integration of "real scene" and "virtual scene", which is the concrete expression of users' ability to perceive the surrounding environment, and is the overall enhanced version and enhancement of AR technology [10]. The overall visibility of AR technology is slightly stronger than that of AR technology. AR can clearly distinguish and identify, but MR can't make a clear distinction. Although VR technology is illusory and can't be confirmed, it brings the overall consciousness of users into the illusory natural environment [11]. What technology can know is that both AR and MR have brought the research direction of MR technology development to human beings to a certain extent. Nowadays, in the application of MR and AR, the latest hot spots and research progress are mainly focused on auditory and visual aspects, which makes the whole research institution think that they have a market. However, there are still some ambiguities in their market development and market concepts in the future. Nowadays, the technical development of VR and MR still faces some problems, which need to be constantly solved and improved (Figure 2) [12].



Figure 2: Concept map of ar technology

At present, there is a lack of a mature and complete definition for AR and other technologies. Taking AR technology and development as an example, many of them are based on multi-modality and multi-method medical image research, which makes them have the technical ability of high analysis and high processing [13], so that they can be applied to the improvement of the whole computer image, so as to build a variety of data-based human organ morphology and virtual reality medical improvement and construction environment. On this basis, the interactive facilities and experimental methods related to tactile sensation are carried out, so that it has high interactive exploration skills and technical forms, and no doctor provides high number of virtual simulation modeling means and technologies, so as to realistically complete the overall way and process of clinical surgery, so that it has the effect, method and form of implementation improvement in the overall interactive process, and interactive models such as AR develop, which has the

characteristics of immersion and interaction [14]. It can complete the accommodation and development of human organs as a whole, so that the whole surgical deduction can complete the construction of teaching situation, and improve the technical realization on this basis, and finally realize a good learning experience technology, which makes the overall simulation an inevitable development trend of medical technology reform (Figure 3) [15].



Figure 3: Conceptual diagram of Mr Technology

3. Advantages and Application Significance of 3D Digital Reconstruction and AR_MR Technology in Medicine

3.1. 3D Digital Reconstruction and the Advantages of AR_MR Technology in Medicine

With the development of the times, in recent years, with the continuous development of three-dimensional digital reconstruction and AR_MR technology [16], the development of its technology has been gradually applied in various situations, making everyone focus on it [17]. Its technical application has become the development trend and hot spot in medical and technical teaching, which can promote the overall professional level and quality, and provide reference basis and ability for the basic medical development without virtual simulation technology. The introduction of three-dimensional modeling technology helps the medical field to seek new paths and new possibilities, which increases the visual process and effect, and develops the overall pathological process and pathogenesis more intuitively and simply [18]. On this basis, there is the principle of drug action, etc., which enables medical workers to build an overall medical model, make symptomatic diagnosis, improve the overall model simulation form by adjusting various parameters, and help doctors build an overall medical scene [19]. Yes, virtual scenes are interactive and immersive, so that students can be very good. Through the understanding of space and the diagnosis of the relationship between me and human organ structure, we can clearly understand the relevant technical requirements displayed in the scene in the virtual space and build the model structure. Overall, however, the experiencers are immersed in the virtual scene to enhance the training and education of various skills. The original VR can't be used because it is only a visual sense of virtual reality, and it can't see the overall real scene, and it can't directly interact with the real scene to improve, which will affect the overall improvement quality [20]. It is necessary to show the actual stability and real-time response of AR technology in the real performance of actual organs. In addition, 3D modeling has increased in immersion, which enables virtual experiments in computer systems to be displayed and used, and virtual experimental instruments and equipment to be operated in a variety of ways, which plays an integral role in learning and training, and will not

be restricted and affected by the overall site skills [21]. For a variety of human-computer interaction systems, it generates the overall digital environment according to the collector's behavior norms of hardware facilities, enhances the overall perception and operability, introduces a variety of knowledge tips and test environments, and rapidly improves the overall medical skills [22]. By using diversified information technology and reviewing the operating facilities repeatedly, its communication skills are continuously improved, and the overall learning points and learning efficiency are effectively and stably obtained. Training foreign countries to upgrade 3D virtual technology, strengthen the construction of digital information and enhance the effectiveness of virtual simulation laboratory facilities is a change in the technical direction of artificial technology (Figure 4) [23].



Figure 4: Virtual reality in clinical applications

3.2. Significance of 3D Digital Reconstruction and Application of AR_MR Technology in Medical Research

In the sense of 3D digital reconstruction and the application of AR_MR technology in medicine [24], according to the generation and transportation of image signals, the overall imaging equipment is controlled by human operation and interference, including the improvement of the overall environmental factors, which leads to the overall details tend to be blurred, forming a greater contrast, and the overall interference quality of the image cannot be guaranteed [25]. In the process of overall brightness improvement, it is necessary to develop the morphological changes and protection of space, so it is necessary to strengthen the processing and analysis of technology and technical methods (Figure 5), enhance the increase of image quality and the overall improvement of image accuracy. In terms of digital processing technology, it is necessary to have certain common development according to the development of image technology to realize the effective improvement of the whole functional module, which is more stable for the later image digital information technology processing. The image has been continuously improved to ensure that the interference of the overall information is eliminated, and the required information is improved and enhanced as a whole, so as to obtain a good visual effect of the image, which provides various basis and requirements for the doctor's diagnosis (Figure 6).



Figure 5: Schematic diagram of future orthopedic development of virtual reality technology

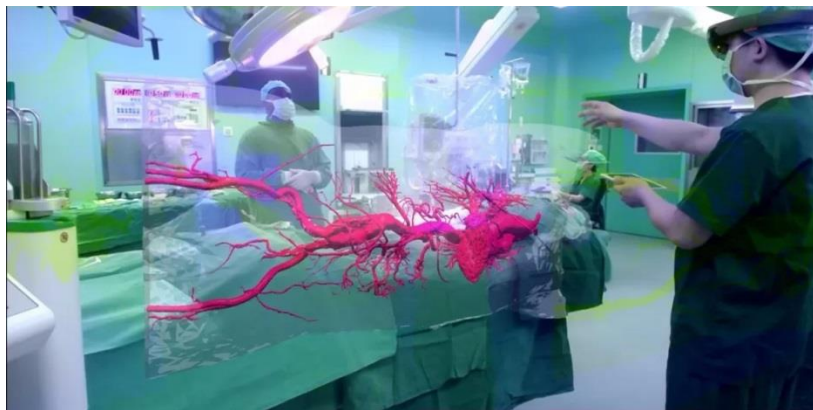


Figure 6: Schematic diagram of the development of vascular disease treatment based on virtual reality technology

4. The Application of 3D Digital Reconstruction and AR_MR Technology in Medicine and the Challenges it Faces

4.1. 3D Digital Reconstruction and the Application of AR_MR Technology in Medicine

In the overall clinical practice, the platform setting of virtual simulation has been changed to the evaluation of users' use level at home and abroad. In the clinical practice, Victoria and others have applied virtual simulation technology to students' overall teaching and traditional teaching methods, which has enabled students to continuously study and improve their practice methods, and finally shows that virtual simulation technology has a certain beneficial role in vascular training. In the virtual simulation system, there are continuous improvement measures and methods, such as the optimization of intravascular programs, which makes the overall team development advanced and enables the intravascular team to indulge in the dangerous development of simulated training sets. This method can be objectively evaluated in the development of necessary situations.

There are still some problems in the application of this kind of technology, and it needs to be tried and explored constantly, and updated by various technical means, so as to strengthen the interactive touch between the operator and the object in the virtual environment and enrich the interactive forms, so as to achieve a greater degree of simulation experience and improve the authenticity of the overall scene (Figure 7).



Figure 7: Schematic diagram of the future development of virtual reality technology for human treatment

4.2. Challenges for Development

At present, virtual reality equipment and 3D modeling technology generally have the characteristics of large volume and heavy weight, which makes their overall experience poor. Because people require images of virtual reality, building virtual simulation technology requires professional companies to develop 3D modeling technology, which reduces the resource and technology differences between regions and makes the gap no longer obvious, which is not conducive to improving the overall technological development advantages. For AR and ME, which have been used in clinic, As well as the development of three-dimensional simulation technology, there is insufficient evidence to prove whether the patient's condition can be improved after recovery, so that virtual simulation technology can improve the learning space and cannot avoid the complicated clinical situations and problems.

5. Conclusion

With the development of science and technology, the application of three-dimensional digital reconstruction and AR_MR technology in medicine has been gradually applied to clinical medical treatment. Doctors' overall technical improvement is helpful to enhance their recognition of the technical development mode and apply it to clinical treatment. To sum up, in the case of doctors using three-dimensional digital modeling in clinic, virtual simulation equipment generally has the characteristics of large volume and heavy weight. The production of related technicians has certain characteristics of complicated production and other situations, which makes the overall medical level of the country constantly improve. However, the virtual simulation platform can not realize a unified management system, which makes the overall quality unable to be guaranteed, lacks an adequate guarantee system, and lacks certain technical advantages in the medical mode of re-teaching, which can not provide students with a relatively safe learning space and skills. At present, the overall technical means are mainly limited to the traditional two-dimensional teaching form. With the development of modern digital technology,

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