Research on Artificial Intelligence Technology of Virtual Reality Teaching Method in Digital Media Art Creation

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Abstract

The popularity of virtual reality technology has gradually expanded from the computer field to all aspects of life and has also become a new approach to digital media art. In this paper, we analyze the characteristics of virtual reality technology and the three commonly used methods and explore and practice them in-depth. The experimental results provide a concrete reference and comparison basis for the teaching and research fields. In this paper, 160 students from the same school were selected for the teaching experiment. They were divided into four groups and taught courses on different artificial intelligence-based methods of creating virtual reality digital media art for one semester. They were artificial intelligence-based image recognition technology, artificial intelligence-based speech recognition technology, artificial intelligence-based natural language processing technology and traditional teaching methods. At the end of the instruction, we obtained subjective and objective test scores for four students using the same tests. All scores indicated that the effectiveness was much higher than traditional methods, regardless of which virtual reality technology was used. In addition, we found that students were far more sensitive and enlightened to visuals and images than to language.

Keywords: Digital media art, AI, Teaching method, Virtual reality

1 Introduction

Digital media art is an emerging industry. An original work of art is frequently valued higher than just a copy or digitized file. Extremely effective and simple to just get starting and operate with much more exploring and limitless innovative opportunities. Art is interpretative, expressing the designers typically believe and designed to connect with the sensations, sentiments, and intelligence of the observer. Good art never fails to amaze. When employed in advertising, appealing imagery can help to strengthen a visual identity and encourage customers to buy. These have adopted electronic art more accessible to artists as well as other creatives interested in exploring the medium's possibilities. Different creative skills or tools to achieve it. It uses computer-related software and design tools to design and create artworks, and it is also the primary training—technical talents with good scientific literacy and art literacy.

When we combine virtual reality technology with digital media art, at this time, virtual reality technology is a way of expression, a medium of art communication, and an interactive medium style. Digital media art is an art form for participants to complete this interactive experience through virtual reality technology. This combination shortens the distance between the experience and the work of art, and enables the experience to better understand the information that artists want to convey in work. In the art of digital media, the artworks we see are often related to dynamic images. For interaction, the sensing device captures data signals, such as the behavior, gestures, head movement and even eyeball rotation of the experiencer, and then responds quickly, so that the experiencer can really participate in the whole interaction process. Sensor systems focusing on various measuring methods, including such hydraulic, electromagnetic, optical, auditory, inertial, or hybrid sensors, can be used to collect data. Wearable sensor-based platform that uses several classification algorithms to distinguish autistic motions. Particular gestures are defined, monitored, and classified by the proposed system. They make linguistic information easier to understand, stress our viewpoint, control the flow of conversation, and keep the viewer's attention on the person.

Devin Link's simulation of physical reality first tried to make a flight model simulator, and succeeded in realizing people's flight desire. Morton Heyliger developed a motorcycle simulator, which realized the natural feeling of roaming Manhattan. It has the meaning of metaphor. In 1968, Ivan Suzelan successfully developed a head-mounted display that can display 3d computer images and track the movement of the user's head. It is called the Sword of Damocles. Although very large, the user has touched the handle. Interact.

In the 1980s, virtual reality technology was applied to the aviation field in the application field, and remarkable achievements were made in the United States. In the 1990s, major companies began to develop virtual reality technology, especially in hardware. At the same time, companies have launched virtual reality headsets, triggering a wave of VR commercialization. Since the 1990s, virtual reality technology has been developing continuously. The rendering effect of computer hardware has been continuously optimized, the display resolution has been continuously improved, and the human-computer interaction system has been continuously innovated and developed. Therefore, virtual reality devices are more flexible and experience is gradually increases. At the same time, virtual reality devices have penetrated into education, industry, culture, art and other fields.

Digital media art is different from traditional art, but also different from traditional computer algorithms. It is a combination of the two. Therefore, this paper uses three different virtual reality technologies to mobilize students' characteristics in different aspects, and makes exploratory

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experiments on this teaching methods and compares it with traditional teaching methods. Analyzing the results of our experiment from the scores and subjective scoring of students.

2 Related Work

In the past, people could only perceive art by looking at objects with their eyes. However, with the continuous advancement of technology, people may perceive the characteristics of art that they could not perceive before through virtual reality technology. It even achieves a sense of realism that is false to reality. New windows are opened for humans to observe the world through different artificial intelligence technologies, making the human experience raised to a new level.

Digital media art creation and artificial intelligence technology are complementary, promoting each other and thus broadening their respective fields. Art creation based on virtual reality technology is based on digital media, so digital media largely determines virtual reality art's organization and aesthetic characteristics. Digital media art is still a kind of art, but it is very different from traditional art, and people need to change their appreciation perspective. Several digital media art artists are accustomed to completing their work using a computer data processing technology. The artificial intelligence implementation of virtual reality technology has become more proficient as a result of these processes, resulting in better outcomes. Then it discusses the technical benefits of artificial intelligence technology for creating digital media art while employing the interactive virtual education technique [13]. Further a new visual saliency guided complex image retrieval method is proposed to improve the efficiency of retrieval information. And this approach would helpful to label the image pattern in a clear manner and provides the baselines in multifaceted scenarios [19]. Then literature [20] presents a survey to address the optimum ratio determination need of image compression in particular fingerprint to authorize the system's identification with improved accuracy. Moreover, by quaternion algebra the encryption scheme is presented for four image which is processed in a vector manner holistically and improve the correlation weakness and security [21].

In film and television advertising, virtual technology has been implemented for a long time, and VR technology has been implemented earlier, especially in developed countries such as the United States. It is shown in the form of a computer, and everything that people can see is shown in the form of virtual. Virtual technology is almost the level of international roaming technology in the United States [1-2]. Because it is the first country to get involved in virtual technology, there are many researchers, so there are a lot of successful products in the application of virtual reality technology. Study the remote control technology of virtual roaming in Japan, study the expression of human dynamic form, and establish a robust database of related data. University of Tokyo, Kyoto University and other universities are doing related research, such as the development of virtual technology, which is also their research direction. European countries, such as Britain, Germany, Sweden, the Netherlands and Spain, have also carrying out a series of theoretical research and the development of physical systems with the support of funds and technology from the European Community. They also hope to gain a place in today's prevalent VR industry. (Refer to Figure 1 and Figure 2)

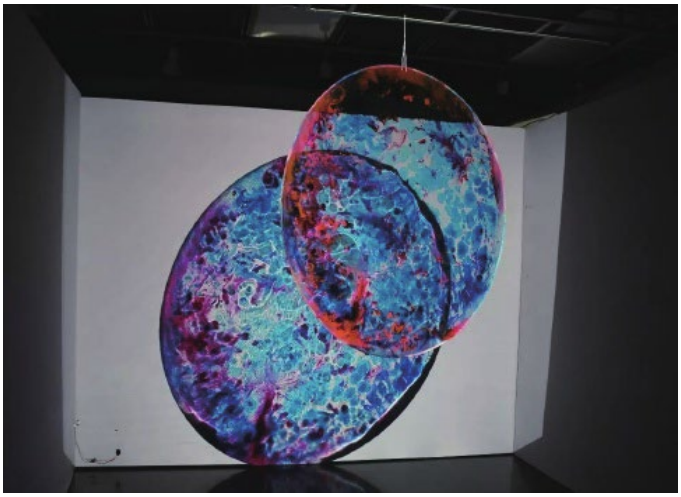

Figure 1. Combination of virtual and modern art

Figure 2. Application of virtual reality technology

In recent years, many universities have started the research work of virtual reality, and scholars' research direction is the aesthetic characteristics and artistic theories of virtual reality. The main research direction of Professor Li Yanzu of Tsinghua University is how to integrate science and art perfectly into virtual reality technology. Any work created by using virtual reality technology should be both "scientific" and "artistic" work. Professor Li Yanzu pointed out that science and art are inseparable. The application of virtual reality technology needs to be conducted under the guidance of existing scientific experience. On the basis of ensuring that the finished product can achieve the intended functions, it must also have artistic attainments.

3 Artificial Intelligence Technology of Virtual Reality Teaching Method in Digital Media Art Creation

The rapid development of virtual reality technology has promoted the development of technology fields and accelerates the form and speed of digital information dissemination in new media. A digital data dissemination system automatically delivers information through one or even more providers, along with bulk sent messages, invoices,

and other data, to a number of distant terminals in houses or companies. At each distant station, the model integrates independently programmable recipient. A pre-existing communications system, including such CATV or a switching transport network, provides the transmitted signal. There is room for development in people's lives and in various academic fields. For example, it combines education and virtual technology into a new teaching method. Communication between teachers and students is no longer a simple language and writing on the blackboard. Virtual technology can replace text in textbooks and convert it into visual effects, making it easier for students to accept and understand. The combination of medicine and virtual technology has enhanced doctor 'ability of clinical operation. Virtual reality is a novel way to motivate numerous health disciplines. Instructors and students of many health research can use these techniques to identify their levels of expertise for medical therapy prior performing on a patient. Virtual reality (VR) usage in medicine is only getting started. VR surgical simulations, teleconferencing operations, sophisticated medical data visualization, and rehabilitation are just a few of the possibilities [14]. These applications, which are administered via a computing device, are the manifestation of virtual reality as an intrinsic element of the medical paradigm change. By showing the basic structure of human organs, the doctor can better understand the human structure and reduce the deviation of surgery. The combination of architecture and virtual technology can show various forms, which can not only express regional style, but also include human culture. At the same time, the architectural style shows a kind of history, including stories and feelings. This is particularly true in the digital campus. The roaming space built according to the school's characteristics can allow first-year students to understand the school better, and graduate students can linger on the time of school study.

3.1 Concept and characteristics of virtual reality

Virtual reality technology can create a virtual environment where participants can communicate and interact with devices. This is a computer simulation system. It uses a computer to generate a simulated virtual environments. This simulation environment is a dynamic three-dimensional view, which can interact with the device according to the physical behavior of users. It can build a simulated virtual reality, so that users can experience it [3-4]. To provide an interactive experience, the VR device is connected with sensor and responding technologies for vision, sound, feel, and kinesthetic learning enabling human contact in the virtual world. On a sensory level, the users are immersed in a virtual area that is cut off from actual world. Interactions can indeed be achieved in a variety of ways. The most popular is the employment of a scope controlled by the human phone [15]. High overhead Provided to the user should not be placed in the recipient's visual field since they can obstruct his or her sight. The atmosphere is completely immersed in a virtual environment again. The simulation effects of virtual reality technology mainly include simulated environment, simulated perception, and simulated natural skills. The simulated environment refers to the simulation and replication of the natural environment. The simulated perception refers to the simulation of the traditional visual perception, including hearing, touch, taste, smell and strength; Imitating natural skills means that the system can collect the data signals of the user's head, eyes, posture and other body movements, respond according to the preset settings, and then feed back the information to the user. The ideal virtual reality technology can imitate the perception of all human beings, realize a high degree of simulation, and make user completely immerse themselves in the built virtual environment.

The virtual reality space built by virtual reality technology also enriches the audience's experience of watching artworks. Artists who use virtual reality technology can give full play to their imagination, making it possible to build scenes that were impossible in the past and making it impossible to build in the past. The possible experience is realized, enabling digital media artists to transform the constructed art space from "out of reach" to "reachable". Audiences can interact with the artwork through the immersive experience. Robertson further exchanges and interacts to get closer to work and understand it in depth.

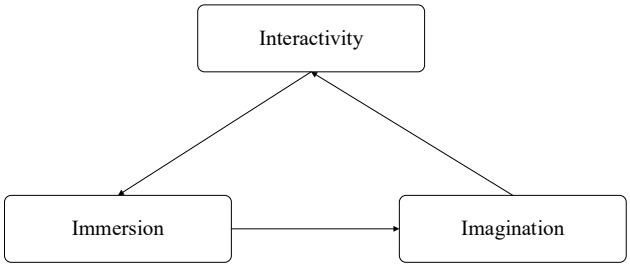

Figure 3. Characteristics of virtual reality technology

Virtual reality has three characteristics as shown in the Figure 3. And imagination creates the triangle of virtual reality technology. The three basic features of virtual reality technology are different from other technologies. VR headsets achieve this by filling the recipient's entire field of view, whereas earphones provide the same effect with audio, completely enveloping the user in another environment. When it comes to virtual reality, interaction refers to a specific connection that have been built between its virtual representation and its consumers. It denotes the potential of the client participating in the computer-mediated data exchange procedure. At times, the virtual world may seem more vibrant and realistic than what that almost all individuals can explain using their imaginations and recollection [16]. Virtual reality technology has been widely used in other fields, and the three features of virtual reality technology are evolving. other features that have resulted. For example, with the features of mobility and autonomy, mobility is often associated with interactivity. Qiu Jing mentioned in the book "VR Virtual Reality. Technology Revolution + Business Applications + Classic Cases," the book mentions that mobility refers to users operating virtual systems in the virtual environment with actual actions or methods in the objective world and getting feedback from the scenes and environment. The physical properties of all things in the real world can be realistically demonstrated in the virtual space. However, action and autonomy cannot be separated from the user and the things in the scenario. Neither single nor mutual motivation can be separated from mutual interaction. These two features are also interactive features extracted from sex.

3.2 VR equipment and scene

Virtual reality technology is developed from a variety of technologies, and its implementation requires VR equipment and corresponding virtual scenes. (Refer to Figure 4)

Figure 4. VR equipment

HTC Vive is an advanced VR device. The specific imaging principle is as follows. Two locators form a rectangular region. costly. The HTC Vive is an interactive virtual headgear with controls that provides a truly immersive experience. The HTC Vive monitors and records every movement from around space utilizing multiple channels for each quadrant. The controls are cordless, and the headsets is connected to the internet via a lengthy cord. It's also necessary to have a machine with the computing electricity to drive augmented world, that can be quite costly. After the helmet is positioned, we can move in this rectangular area with the helmet, and then we can see the Unity 3D engine. Unity3D is a user-friendly open source and a strong cross-platform 3D runtime. Unity will appeal to everyone who wishes to simply create 3D applications and games for smartphones, pc, the internet, and controllers. It is simple enough according to beginners and sophisticated enough even for experts. Formation of virtual scene. Export the 3d model formed by the above-mentioned 3d reconstruction as an obj file and import it into Unity 3D to see the 3d image in VR. The scene seen in the VR (Refer to Figure 5) glasses are consistent with the Unity 3D window.

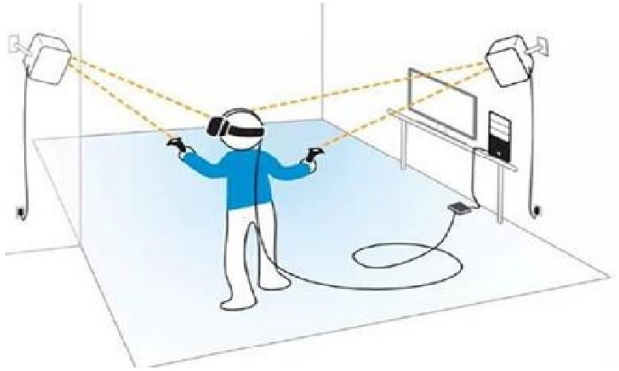

Figure 5. VR scene

3.3 Digital media art creation based on image recognition technology

In human image recognition systems, the recognition of complex images is often achieved through different levels of information processing. A familiar image is recognized as a unit without paying attention to its details because its main features are mastered. Such a whole unit consisting of isolated units of material is called a block, and each block is perceived simultaneously. In recognition of written materials, one can recognize not only the units such as strokes or radicals of a Chinese character as a block but also the words or phrases that frequently appear together as a block unit.

(1) Graphic design

In the application process of intelligent image recognition, it is generally necessary to consider multiple aspects such as structural composition, colour ratio, and shooting background. At present, the more common 3d video technology make full use of intelligent image recognition technology. Through a series of processing on the image, it is as close to real-life as possible to meet the artistic effect of the image. In addition, the adjustment and processing of image color scale can directly stimulate the audience's sensory experience and understand the emotion, image and meaning of the image. Through the continuous arrangement and combination of the three primary colours, along with the changes in brightness, the text information is expressed through colourful images and videos, making it easier for people to understand the information and emotions to be expressed.

(2) Animation.

Animation is a kind of moving picture. Animation makes the still image be drawn in a moving way, forming a complete, moving and logical image. According to the characteristics of human vision, the pause time of each frame is 25 frames in animation. Animation is artistic, and some animations have special educational significance, which can help children to shape their own values better in the process of growth. Some animations are rich in visual effects. Pixar animation, for example, has high artistic value and expressive force. While the plot itself is attractive, the pictures presented is also very eye-catching, which can fully meet the spiritual needs of people. (Example shown in Figure 6)

Figure 6. Pixar animation

3.4 Digital media art creation based on speech recognition technology

Speech recognition technology is to make smart devices understand human voices. It is a multidisciplinary science involving digital signal processing [5], artificial intelligence, linguistics, mathematical statistics, acoustics, emotions, and psychology. Individuals may simply control equipment and communicate information by conversing only with assistance of speech recognition technologies. Speech recognition speeds up transaction management since the software generates words as rapidly as they are said, which would be usually much faster than typing [17]. This technology can provide multiple applications such as automatic customer service, automatic voice translation, command control, voice verification codes, etc.

In the practice of digital media art, computer intelligent speech recognition has a high utilization rate [6]. The most commonly used function is the voice interaction, which is an efficient way of interaction, and a comprehensive technology for people to interact with computers through natural voice or machine synthesized voice.

Tone synthesis completes the transformation from text information to sound information. Synthesis is the method of producing sounds with synthesizers. This is accomplished by generating radio waves from computer impulses, which are then converted to acoustic pressure employing instrumentation and speakers. Many digital media works of art practice sound interaction, such as sound shell induction interactive device. The mysterious black acrylic as the base plate and the classic tungsten lamp as the luminous body can be assembled into a variety of English letters and numbers. Depending on the size of the sound shell, the light will have different light modes and sound modes. As the change of sound, the whole letter can be lit in sequence or streamlined like a snake.

3.5 Digital media art creation based on natural language processing technology

NLP (Natural Language Processing) is an artificially intelligent subfield (AI). It aids machines in processing and comprehending natural speech so how they can execute repetitive jobs autonomously. Machines can now interpret more language-based information that people could, without being fatigued and in a uniform and seamless way. Given the massive volume of unorganized information collected every day, including health records to social networks, automating will be essential for effectively analyzing text and audio data [18]. Natural language processing is an indispensable technology in digital technology and computer science, and it is also an important bridge for communication between people and computers. The language that people output [7]; After receiving it, the computer processes it, then converts it into computer language for manual operations.

Figure 7. Deep dream

The works of digital media art practice often depend on computers in the author's creation or the audience's watching. Therefore, natural language processing (NLP) has become an indispensable way for creation or presentation.

The Deep Dream (Refer to Figure 7) published by Google aims at computer natural language processing and algorithm planning, exploring the intelligent language technology in digital technology, enabling machines to learn how to generate art and music [8-9], and perhaps create charming and elegant content on their own. The following Figure 8 shows the neural network model, which can improve the performance by building a dense block structure without increasing the computation, thus approaching the best sparse structure.

Image categorization, object recognition, and antagonistic training are just a few of the computer vision applications that the GoogLeNet architecture can aid with. The key operations in GoogLeNet include convolution, pooling, softmax and the combination of other loss functions. A fully connected layer is substantially less specialized and effective than just a convolution layer. Each neuron in a fully-connected layers is linked to each and every neuron in the preceding stage, so each link will have its own value. In GoogLeNet, for example, there's many two max-pooling levels between certain activation functions. These max-pooling layer' job is to downward sampled the input as it travels through system. The softmax function reduces a vectors of K true value to a matrix of K true value that add up to 1. The softmax turns the input data, which might be positive, negative, null, or higher than just one, into values between 0 and 1, allowing these to be understood as possibilities. When we talk about the concept of continuous convolution and extend it to discrete sequences, we can perform convolution operations on matrix data such as images and extract some abstract features. The following convolution operations are referred to as discrete convolution operations. Its form is as shown in equation 1.

$$\big(f, g(x)\big) = \sum_{\tau=-n}^{n} f(\tau) g(x-\tau) \tag{1}$$

Where (τ) and $g(x-\tau)$ are discrete sequences. In the convolutional neural network, to improve the subsequent classification ability of the network, the convolution calculation generally also adds a bias parameter. Therefore, the above discrete form of convolution is like Equation 1, where $b(x)$ is the bias of convolution operation.

$$F(x) = \big(f, g(x)\big) + b(x) \tag{2}$$

If the convolutional neural network has only linear convolution operations, it is difficult for the network to have strong nonlinear classification capabilities. Therefore, it is necessary to add a nonlinear mapping link to increase the network's nonlinear classification ability. This nonlinear link is also called Is the activation function [10-12]. Commonly used activation functions are $Sigmoid$, $Relu$, $Softmax$, etc. A sigmoid function is a finite, variational, emphasizes the role which has a non-negative gradient for each position and precisely one transition point and is specified for all real input data. The rectified linear activation function, or ReLU for short, is a piece - wise vector quantity which, if the inputs is positive, outputs the input directly; else, it outputs zero. The vanishing gradient problem can be solved with the linear activation input signal, enabling systems to train faster and perform much better

$$S_i = \frac{e^{V_i}}{\sum_j e^{V_j}} \tag{3}$$

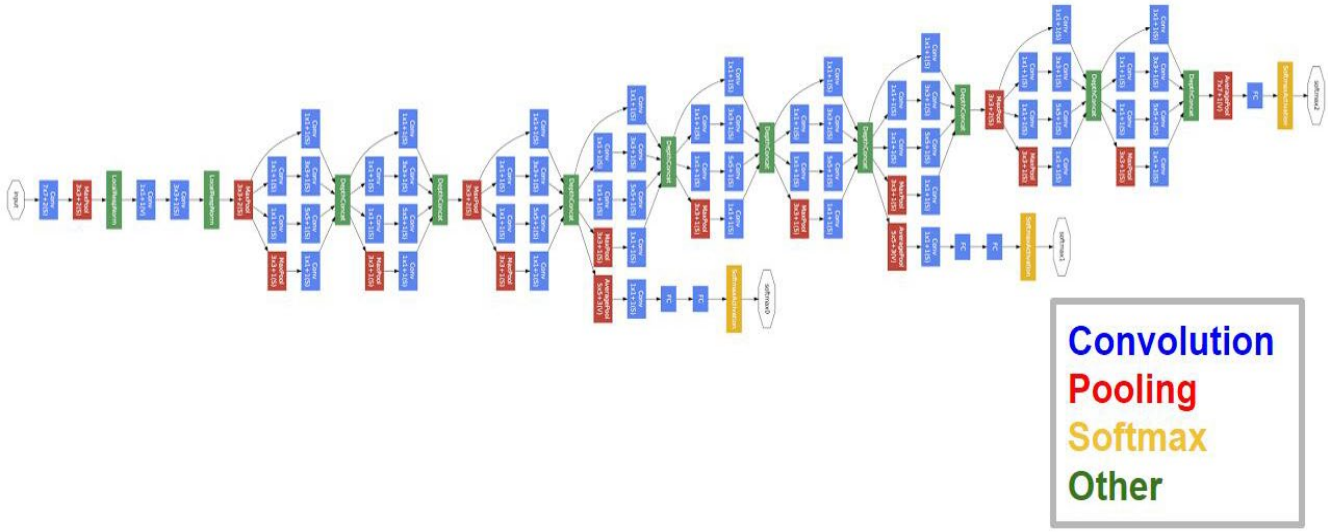

Figure 8. GoogLeNet

4 Digital media art creation experiment and analysis

4.1 Digital media art creation teaching experiment

In the aspect of education, it mainly lies in the systematic learning of knowledge, which is student-centered. By creating a virtual teaching system, passive learning can be achieved. The student is capable of absorbing the presented information according to their own conditions in distance learning. Seminars or online assessments may be used to deliver the knowledge. In any event, it is the graduate's responsibility to pay attentively, ask any questions, and do very well on examinations. Realize the environment that everyone likes to learn, thus promoting the formation of new knowledge. For example, situational learning, experiential learning, collaborative learning, problem-oriented learning, inquiry-based learning, etc., all of which have the same characteristics as the virtual learning environment, can be widely used in the teaching of virtual reality. Situated learning is a theory that describes how people develop professional abilities and incorporates apprenticeships study into just how valid periphery involvement develops to participation in a community of inquiry. Experiential learning refers to the process of understanding by just doing, and it is further precisely defined as gaining by observation while doing. Collaborative learning improves higher-order thinking, verbal presentation, personality, and leadership ability by exposing students to a variety of viewpoints. Problem-Based Learning is a teaching style wherein students are taught concepts and methods through use of complicated real-world issues rather than the straight interpretation of information and ideas. Inquiry-based learning is an educational training algorithm that begins with the presentation of queries, challenges, or experiences. Virtual reality technology has just started in the field of education, and has not yet entered ordinary classrooms in large scale. The two characteristics of virtual reality, "immersion" and "interaction", can simulate different learning environments truly. (Refer to Figure 9)

This article uses three different virtual reality technologies to conduct teaching experiments and compare them with the control group. However, in practical applications, these different technologies are not mutually exclusive but can be combined in the same virtual learning environment.

4.2 Experimental Results and Analysis

A total of 160 students were selected from the same school for teaching experiment. The students are divided into four groups with 40 students in each group. The four groups will teach four different courses of virtual reality digital media artistic creation based on artificial intelligence, which will last for one semester. They are digital media artistic creation based on artificial intelligence image recognition technology, speech recognition technology, natural language processing technology and traditional teaching methods. After one semester's teaching, we passed the same test, and obtained the subjective scores of four groups of students and four groups of students for different experiments, as shown in the following Table 1 and Table 2.

The results show that no matter what kind of artificial intelligence virtual reality technology is used for teaching, students' grades will be improved. The students in the artificial intelligence-based natural language processing technology and image recognition technology group are evident in the supervisor's scoring and performance. Better than my classmates in the speech recognition technology group. It can be seen that students are much more sensitive to vision, images and enlightenment than to speech. This will help us to increase and improve the use of virtual reality technology in the follow-up teaching.

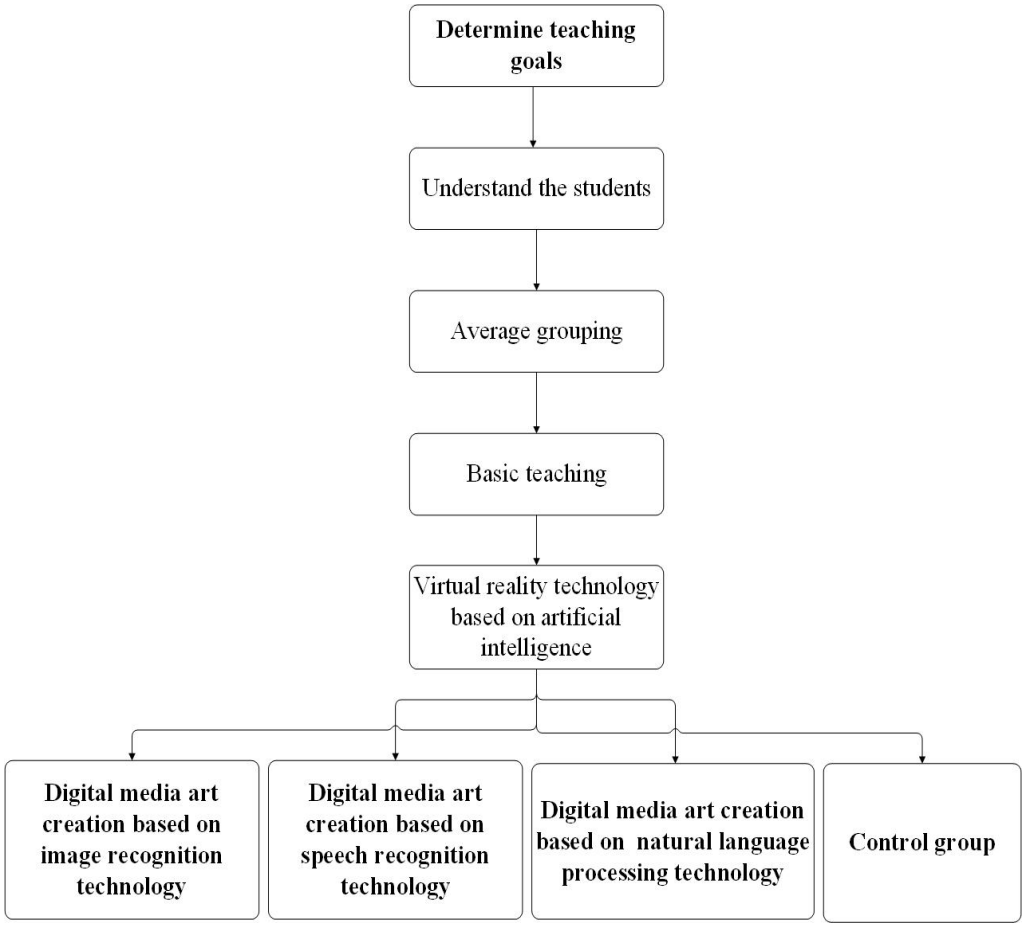

Figure 9. Teaching experiment flowchart

Table 1. Student record card

Group	Average core	Highest score	Lowest score
1	82	92	71
2	85	97	79
3	86	96	80
4	75	91	66

Table 2. Students' evaluation of experimental courses

	Group 1	Group 2	Group 3	Group 4
Innovation	41%	81%	84%	10%
Novelty	86%	99%	92%	11%
Pleasure	90%	91%	96%	31%
Exploration	92%	97%	98%	9%
Immersion	90%	97%	98%	4%
Ease of operation	77%	80%	73%	78%
Improve your grades	60%	87%	85%	50%
Continue to learn	87%	99%	97%	67%

5 Conclusion

Science and technology, traditional arts are gradually developing and growing under the trend of the times. In art, new media art is a new art form that conforms to the pace of development of the times, but it is different from traditional art. Under the influence of new media, the original single painting art has many different forms, from static expression to dynamic art display, from the passive appreciation of aesthetics to acceptance of artistic beauty by the subject. In the background of new media, the teaching of virtual interactive art came into being.

The application of virtual reality to digital media art teaching has achieved good results in education and professional training, such as physical science research, medical and health fields, teaching in specific institutions, aviation flights training and so on. In addition, there are many types of research just for the purpose of designing and developing the platform related to virtual reality technology and middle school disciplines. The digital media major put forward virtual reality teaching method for the first time, but some practical applications still exist. There are many shortcomings and places worth improving. Through continuous exploration, virtual reality technology based on artificial intelligence can be widely used.

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