Analysis of Talent Cultivation and Development under the Development of Immersion Data Mining Platform

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ABSTRACT: *With the rapid development of information technology and big data, the methods of talent cultivation are also gradually changing. To improve the quality and efficiency of talent cultivation, we propose an immersive talent cultivation experimental platform based on data mining algorithms. The platform first collects various data on students, including learning behavior, grades, personality traits, etc. Then, we used data mining algorithms to conduct in-depth analysis and mining these data. Specifically, we used clustering algorithms to classify students' learning behaviors, association rule mining algorithms to discover the relationship between students' grades and personality traits, and decision tree algorithms to predict students' academic performance. Through the application of these algorithms, we can better understand students' learning status and needs, and provide them with more personalized and accurate teaching services. At the same time, the platform also has immersive educational features, providing students with a more realistic and vivid learning experience through technologies such as virtual reality (VR) and augmented reality (AR). Students can conduct various experimental operations through the platform, deepening their understanding of knowledge points and enhancing their practical ability and innovative thinking.*

Keywords: Talent Cultivation, Immersion, Data Mining, Platform Development

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1. Introduction

The immersive platform has received much attention due to its simulation characteristics. However, at the same time, analog modelling results in a large amount of data. Therefore, how to get a better user experience with minimal data has become a problem that must be considered. However, data mining has been a hot technology in recent years. It helps them make decisions by extracting the information they want from the complicated big data and getting the relationship between the data [1]. Immersive learning has already appeared very early, through the characteristics of non-interference, time distorting, forgetting self, etc., to enable students to enter the learning state after a certain period and try to find that the method is indeed effective, and how to help students enter the state of immersion learning to minimize the five major principles that should be followed to hinder individual and collective immersion. However, immersion teaching is not combined with

related technologies [2]. The early immersive platform was modelled through a virtual reality environment, taking into account, at a deeper level, whether building construction was reasonable and at the same time reducing the amount of material waste that would put the user at the scene [3]. With the development of the times, the combination of emerging technologies and teaching to promote the cultivation of qualified personnel has become a social concern. At this time, the emergence of an immersive teaching system can stimulate students' interest in learning and encourage their independent study [4].

2. State of the Art

According to learners' requirements for the system, this paper builds an immersive learning system based on unity4.6 and 3D MAX. Section 2 introduces the process of cultivating innovative talents and the current education situation in our country. Section 3 introduces the technical methods required in this paper, and the core technologies needed for this paper are described. Section 4 presents some of the system functions, usage and related improvements. Finally, Section 5 describes the advantages and disadvantages of the system.

Cultivating innovative talents has always been a concern of all walks of life. When science and technology have not developed so well today, teachers often teach them and are prepared according to their aptitude. Teachers are overburdened. Education has rapidly developed after a period of development, with the combination of Internet technology. However, diversified teaching resources cause learners to not know where to start, and the educational resources are mixed. This is a significant impediment to beginners' learning [5]. At the same time, a large amount of data generated by the network has not been reused, so, combined with the emergence of data mining teaching, this teaching is more targeted, according to learners in the platform to generate massive amounts of real-time data mining, learning behavior guide and other aspects of building an immersive, personalized online learning environment [6]. However, a single learning method is still insufficient to lift students' interest in learning. Beginning to adopt the virtual reality system, researchers usually take the immersive teaching experience as the primary purpose, but they cannot provide information about the journey. They cannot satisfy the individualization of the user's demand. However, the existing immersive system does not meet the needs of studying; there is still much room for improvement in accuracy and speed [7].

3. Methodology

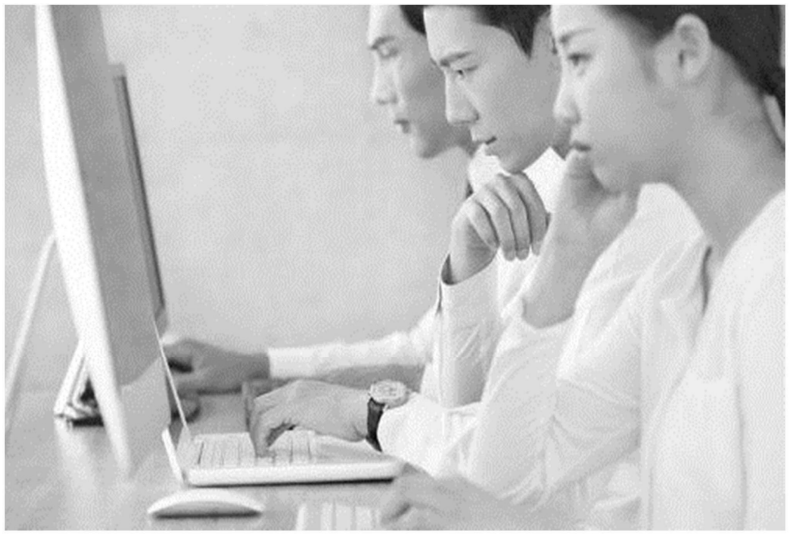

Figure 1. Modern immersive teaching

With the development of science and technology, adopting new technology to enable learners to improve their abilities is becoming increasingly common. Teachers are dictating to knowledge sharing on the Internet. Learning technologies have spanned several platforms. In recent years, the emerging virtual reality technology has also been researched by researchers in teaching experiments, as shown in Figure 1, immersive learning is one of the methods. Through immersive learning combined with virtual reality technology, the real environment can be simulated, which enables the learner to have more

direct and clear contact with the actual scene. With the help of the virtual learning environment, learners enhance their skills through highly engaging interactions and exercises. The immersive system serves the virtual campus and virtual city. It obtains the relevant information through the simulation of the actual scene and avoids the problem of severe errors and waste of financial and material resources in actual moulding. Initially, immersive platforms combine [8].

3.1. Data Mining in the Construction of Innovative Talent Training System

This paper decided to combine data mining and immersive systems to build, in the system planning and data processing, data mining to take the artificial neural network learning, the first step of the data processing to sort out.

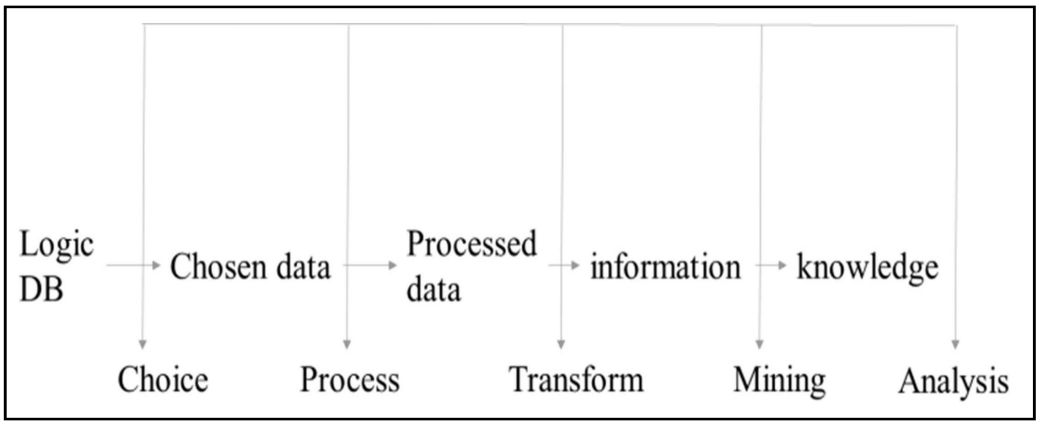

Figure 2. Data mining process

Figure 2 shows that through the logic of the database processing, mining potential information. Two similar algorithms are involved in artificial network learning: the law of perceptron training and the law of gradient descent. The distinction between these two laws is mainly based on whether the training example is linearly separable or convergent [9]. Both algorithms ensure convergence to acceptable assumptions, with slightly different assumptions under different conditions. In this paper, we use the sensor training rule. The sensor inputs a real-valued vector, computes a linear combination of these inputs, and then outputs '1' if the result is greater than a certain threshold or '-1' otherwise. More precisely, if the inputs are x1 through xn, then the perceptron calculated output is:

$$o(x_1, x_2, \ldots, x_n) = \begin{cases} 1, w_0 + w_1 x_1 + w_2 x_2 + \ldots + w_n x_n > 0 \\ -1, otherwise \end{cases} \tag{1}$$

Each W_i in Equation (1) is a real constant, or weight, that determines the contribution of input X_i to the perceptron output. Note that the constant ($-W_0$) is a threshold set so that the sensor outputs 1, and the weighted sum of the inputs must exceed the threshold.

To simplify the representation, suppose there is an additional constant input x_0 = 1, Then, we can write the above inequality $\sum_{i=0}^{n} w_i x_i > Q$, or as a vector written as $\vec{w} \cdot \vec{x} > 0$. For the sake of brevity, we sometimes write the sensor function as:

$$o(\vec{x}) = \mathrm{sgn}(\vec{w} \cdot \vec{x}) \tag{2}$$

In Equation (3),

$$\mathrm{sgn}(y) = \begin{cases} 1, y > 0 \\ -1, otherwise \end{cases} \tag{3}$$

Learning a sensor means the value of the options W_0,.., W_1. Therefore, the hypothetical candidate space H to be considered by the perceptron learning is a set of all possible real-valued weight vectors.

$$H = \left\{ \vec{w} \middle| \vec{w} \in \xi^{n+1} \right\} \tag{4}$$

To explain equation (5) better, the implication is that one way to get an acceptable weight vector is to start with random weights and then iteratively apply the perceptron to each training sample as long as it misclassifies the sample and modifies the perceptron's weight. Repeat this process until the perceptron correctly classifies all training examples. Each step according to the perception of training rules to modify the weight, that is, according to the following rules to modify the input x_i and the corresponding weight w_i :

$$W_i < - W_i + D_{wi} \tag{5}$$

In Equation (6),

$$D_{Wi} = h\ (t\text{-}o)\ x_i \tag{6}$$

Where t is the target output of the current training example, o is the output of the perceptron, and h is a positive constant called the learning rate. The effect of the learning rate is to ease the degree of adjustment at each step. It is usually set to a small value (for example, 0.1) and sometimes attenuates as the number of right adjustments increases.

To get an intuitive feeling, consider some special cases. It is assumed that the perceptron has correctly classified the training samples. At this time, (t-o) is 0, which makes D_{Wi} equal to 0, so no weight is modified. If, on the other hand, the output of the sensor is -1 when the target output is +1, the output must be modified so that the sensor outputs a +1 instead of -1. If $x_i > 0$ in this case, an increase w_i will let perceptron be closer to the correct classification of this example. In this case, training law will increase w_i , because (t-o), h and x_i are both positive. For example, if $x_i = 0.8$, $h = 0.1$, $t = 1$, and $o = -1$ then the weight update is $D_{wi} = h\ (t\text{-}o)\ x_i = 0.1\ (1 - (-1))\ 0.8 = 0.16$. On the other hand, if $t = -1$ and $o = 1$, the weights associated with positive x_i are reduced rather than increased.

3.2. Immersive Experimental Platform Scene Modeling

Modeling is a very important part of immersive system construction. The experience effect of an immersive talent training system is closely related to scene modeling. In this article, all scenarios are implemented using 3D MAX modeling software. During the scenario, each scene is constructed according to the ratio of 1: 5000 and then saved in *fbs* format. Finally, the generated *fbs* file is imported into unity 3D to perform scene set-up in the modeling process to consider the issue of the model realistic but also consider the system speed. Therefore, a combination of fine modeling and simple modeling is adopted to construct a virtual real working landscape. In the process of building the model, it is necessary to reduce the number of faces and the number of segments of the model without affecting the model's realism. The number of invisible faces at the intersection of the model must be deleted. The maximum number of faces in a single model does not exceed 1: 1000. Otherwise, system operation, through optimising the model in the scene, is to achieve the ultimate effect.

3.3. Immersive Experimental Platform Interactive Interface

Immersive virtual system in the interface design is concise, intuitive, and user-friendly as the main purpose. Mainly consider the color interface, font matching, and page layout and other factors. To facilitate the experience of those who can experience different scenes, this article by the interface design principles to leave a large screen area for the experience to increase the sense of openness of the school scene, so the left button draws the function of interaction with the system button, the large area on the right is used to display the browsing screen and the interaction effect during the scene roaming [10].

4. Result Analysis and Discussion

The rapid adjustment of China's economic structure and the increasing globalization of the market economy have cultivated innovative talents. The cultivation of talents needs to shift from a "one-discipline" academic training mode to a "wide-

caliber" applied and multi-disciplinary training mode; curriculum design and personnel training must be fundamentally converted from the traditional language-based language teaching model based on the relevance of the system of immersion teaching [11].

An immersive experimental platform for cultivating innovative talents will produce a large amount of data, and the correlation analysis and intelligent extraction of massive data are the keys to personnel training. By constructing and using the system's immersive interactive analysis environment, the complex, large-scale talent data and data mining results are presented to users visually and intuitively, allowing users to visually understand the information contained in the data and interact with them to achieve human intelligence and the organic combination of machine intelligence is an effective way to solve the problem of personnel training [12].

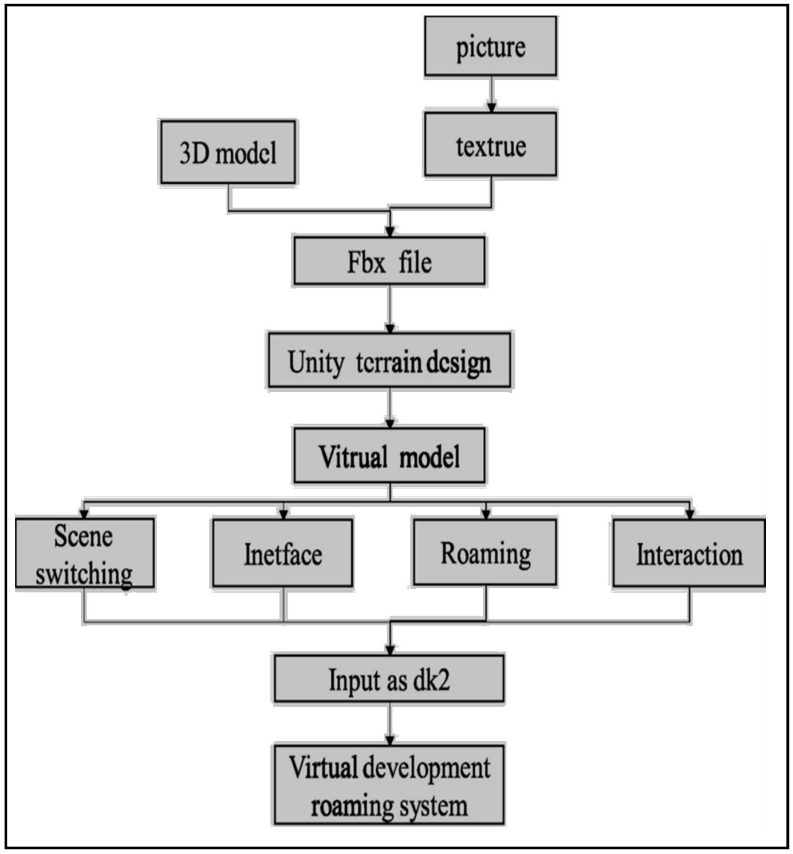

Figure 3. Immersive system setup process

In this paper, the fine scenes and simple scenes are divided by data mining. To improve the user experience, collision detection has been added. During the roaming process, the observer's point of view will keep changing with the movement of the input devices. The trees, buildings, street lamps and other buildings need to do collision processing; otherwise, they easily lead to the point of view through the buildings, easily lead to false feeling. The system uses the collision triggering function when designing the collision detection function; that is, it specifies a trigger that is in an activated state and includes the object that actually detects the collision into the trigger so that the collision detection between the role and the object becomes a role collision detection with the trigger solves the abrupt and unreal feeling during the collision and improves the system performance and the real degree [13]. The adjustment of the viewpoint will bring a very different visual feeling to the user. The false feeling may cause some users to feel dizzy when using it, which makes the experience feel bad. And, at the same time, the collision detection between the character and the trigger can be used to be more sensitive and improve the system's reaction speed enhance user experience [14].

To make the experimenter fully experience the actual training scene, this article makes a corresponding improvement in the

virtual roaming, using a combination of automatic roaming and autonomous roaming; when the experimenter is unfamiliar with the related work scene auto-roaming, those who want to make their progress on the story of the progress of the rover can be autonomous, can get a better view of the width, high flexibility, through the WASD keys around the move, the mouse or headset can convert roaming perspective.

Figure 4. Oculus dk2 dual view

The critical point of this system lies in the way the system is presented. With Oculus DK2, a virtual reality device listed in July 2014, as shown in Figure 4, there are two eyepieces, each with an eyepiece resolution of 640 × 800; the user in use, the two eyepieces superimposed produce three-dimensional virtual immersion; the overall resolution can reach 1280 × 800, making the user roaming sense of immersion greatly enhance the campus. Since Unity-free integration for Oculus provides the same Oculus features as Unity Pro users, it is possible to develop an immersive virtual touring system that uses Unity 4.6 and Oculus integration on the Rift. Wear a virtual reality helmet for real-scene test results, as shown.

As scenario simulation requires large data and computational computations, this article combines data mining with the above. From the above, we can see that the system's user experience before and after data mining is investigated through artificial neural networks.

Contrast	Not using neural network	Use neural networks
Reaction speed	2.3s	0.78s
Fine detail quality	Rough	More delicate
The number of scenes	5	10

Table 1. Comparison of Systems Before and After Using Data Mining

As can be seen from Table 1, the immersive system using a neural network has been greatly improved in all aspects. As for the response speed, the analysis of data can greatly introduce unnecessary data redundancy and reduce the computational burden of the computer, freeing up more memory space for the establishment of other scenarios through the combination of data mining, measuring what the user is sensitive to what the actual object, but also better for the division of simple data and fine

data, rather than through the establishment subjective intuition to judge, enhance the system's general usability, apply to more users. With the addition of scenes, users can also make more scene choices. Only as many contact scenes as possible can stimulate the minds of trained users to complete the innovation work [15] better.

As mentioned above, the development and operation of the immersive system are all implemented on the Windows operating system. The hardware environment is CPU Intel (R) Core *i*5-3230M, clocked at 2.6GHz, memory 4GB, graphics AMD Radeon HD7500M, software environment Unity 3D4.6 and 3Ds Max2014, the operating results are shown. The system can be released to PC, Web and other platforms and run smoothly for better operating results. This proves the system has good portability and can run under various hardware and software platforms.

The domestic colleges and universities' curricula emphasise theoretical knowledge training, despising the absorption of knowledge and theory and system construction, the lack of knowledge and ability to speculative ability system training, resulting in a fundamental flaw. Therefore, training innovative talents in data mining needs attention and refinement. It is necessary to grasp and deepen the study of the core curriculum of related majors, the relevance of the subject matter and the topic of knowledge, and establish a complete immersion based on the professional knowledge framework teaching system. Therefore, in addition to establishing related scenarios, the system allows each industry user to connect to professional learning sites and use data mining user learning efficiency to judge and remind in the system.

Experiments show that the system can overcome the disadvantage of lack of immersion in virtual roaming. Users can experience the virtual environment close to the real campus and can interact with the virtual environment. The system is simple and easy to implement, and other characteristics have broad application prospects.

5. Conclusion

Based on 3DS Max modelling technology and Unity3D virtual reality technology, this paper collects, organizes and builds a complete three-dimensional simulation model of the scene information encountered in the designated industries and develops an immersive 3D virtual talent training experiment platform based on the Occulus *dk2* virtual reality helmet. The results of the running show that the talent cultivation system established in this way has broken through the traditional two-dimensional digital scene display and can present various situations in an intuitive, vivid and realistic manner. The user has a strong sense of immersion after wearing a helmet. It can intuitively and comprehensively browse the entire experimental system and conduct a series of operations such as roaming, transmitting, automatic browsing, and human-computer interaction, feeling immersive. In this experimental platform, we found the following points: In order to better the sense of immersion and determine the orientation of the analogue data, there are corresponding instructions that imply the user. In addition, excessive data redundancy will lead to the system being unable to run or crash, so the data must be well summarized. Data mining technology should be more targeted; it does not need to analyze each type of data, only needs to analyze the problems that may be encountered in the occupation, and can reduce the amount of computation. The construction of this experimental platform can provide a reference for other virtual platforms, but there are many deficiencies in the setup process. How to improve the speed of the practical system and enhance the sense of user experience is the most important. I hope that in the future, this point can be taken into account.

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