

Research on Endangered Plant Protection in Changbai Mountain Based on AR Interactive Narration

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Abstract: *Changbai Mountain is a very important treasure house of plant resources in China, in which a large number of ancient plants are preserved. These plants not only have very high economic value and ornamental value, but also have very important biological research value, which has a strong reference for the study of the evolution history of the local natural environment. However, in recent years, with the continuous improvement of the local tourism economic development level and the sharp change of the global climate, a large number of endangered plants in Changbai Mountain are facing the threat of extinction. Based on this reality, how to use modern means to effectively protect them has become an important topic that every relevant researcher must consider. This paper will discuss this topic, try to combine the current popular AR narrative technology with the protection of endangered plants in Changbai Mountain, improve the efficiency and quality of relevant research work, so as to achieve effective protection of endangered plant communities in Changbai Mountain area.*

Keywords: *AR Interactive Narrative; Changbai Mountain; Endangered Plants; Protection Research*

1. Introduction

In recent years, with the rapid development of information technology, the virtual reality technology industry represented by AR narrative has begun to emerge. Once this emerging technology model came out, it had a subversive impact in all walks of life. This narrative mode allows users to break the boundaries of time and space and realize the depth perception of something or an event by building a virtual space highly similar to the real world in the digital space, and setting up 3D models and physical engines. Its narrative efficiency is unmatched by traditional words, pictures or videos. However, the research on the protection of endangered plants in Changbai Mountain area has been restricted by natural conditions for a long time, so it is impossible to realize real-time monitoring and research on relevant plant populations, and can only conduct research through frequent field surveys, which greatly limits the efficiency of research. However, the maturity of AR narrative technology provides more diversified choices for relevant researchers, opening up a new form of research on the conservation of endangered plants in Changbai Mountain.

2. Introduction to AR Interactive Narrative Structure

The so-called AR interactive narrative mode is a new narrative mode that has emerged with the continuous development of computer hardware equipment and software programs in recent years. It is one of the main directions of current computer development, and has also been widely used in games, tourism, archaeological research and other industries, and has shown excellent application results. Its basic principle is to build a digital space highly similar to the real world in the virtual space by means of 3D modeling or 3D scanning.[1] All objects in the real world can show physical characteristics almost identical to the real world in this virtual space through modeling and mapping, which is very suitable for the study of plant communities. At present, the construction of AR interactive narrative system mainly has three steps: first, three-dimensional registration, which is the most basic and important step, and the key to the follow-up AR interactive narrative. In short, it is to copy the objects in the real world to the virtual space through 3D modeling or 3D scanning, and simulate the environment similar to the real world through the physical engine, such as rain, snow or sunny days, and then track and register the objects, so that they can change accordingly with the user's operation and perspective changes.[2] The second is the integration of the virtual and the real, that is, a media that can be connected with the virtual space is set in the real world. This media can be a

two-dimensional code or a shared digital platform. Researchers can enter the pre designed virtual space by scanning the two-dimensional code or logging in to the platform. Finally, there is a real-time interactive system. The virtual space is not immutable. Users can achieve real-time interaction with some objects through specific operations, thus ensuring the high similarity between the virtual space and the real world.

3. The Role of AR Interactive Narration in the Research on the Conservation of Endangered Plants in Changbai Mountain

3.1 Combination of virtual and real to improve the cognitive efficiency of researchers

In the field of plant research, one of the main problems that researchers have been facing is that it is difficult for researchers to directly contact some endangered plants.[3] These endangered plants often live in places where the natural environment is relatively poor. Researchers must carry out very complicated preparation and investigation work every time they study, especially for the study of endangered plants in Changbai Mountain area. As a mountain range covering a wide area. The distribution space of plant communities is very scattered, and the geographical environment is bad. These factors greatly hinder the research efficiency of researchers. However, the maturity of AR interactive narrative has provided a new idea for solving this problem. The current 3D technology has been able to achieve the perfect replication of high-precision models. Many endangered plants in Changbai Mountain can be presented in the digital space through 3D modeling or 3D scanning, which greatly facilitates researchers' learning and research.

3.2 Real time interaction, giving full play to the subjective initiative of researchers

A big difference between AR interactive narrative and simple three-dimensional space is that under the AR interactive narrative mode, users can achieve the impact and change of the virtual space through specific operations, which greatly improves the flexibility and interest of researchers' work and enables them to make corresponding innovations through their own subjective initiative. For example, in the process of studying the endangered plant population of Korean arborvitae, researchers can conduct simulation operations in the virtual space through AR interactive narration, and build a space model that is most suitable for the breeding of Korean arborvitae in the wild according to its growth habits and distribution, and then carry out the subsequent protection work of Korean arborvitae according to this model, It greatly improves the flexibility and efficiency of researchers.

3.3 3D registration to improve the efficiency of observation and recording of endangered plants

In the research on the protection of endangered plants in Changbai Mountain, a very important step is to timely record and register the growth of these endangered plants, so as to carry out effective protection work. However, in Changbai Mountain area, due to the harsh climate environment, especially after winter, the strong Siberian cold current makes the local natural environment extremely extreme, which is not suitable for plant research in many cases. But through AR narrative technology, we can record various plant communities in Changbai Mountain. For example, when studying Rhododendron plants in Changbai Mountain area, we can investigate when the climate is appropriate, and then conduct 3D simulation of the plant conditions in some key protected areas to build a 3D space that can be observed. After the extreme weather has passed, we can conduct field investigation in this area to collect data of these key protected areas, Then upload it to the virtual space to update and compare the growth and distribution of plants last year with that of this year. While keeping abreast of the latest data, we can also speculate the reasons for the growth and change of these endangered plants through the changes in these data, so as to carry out more efficient plant protection.

4. The main model of the combination of AR interactive narrative and research on the conservation of endangered plants in Changbai Mountain

4.1 Build a digital space system to improve the observation efficiency of researchers

One of the most important functions of AR interactive narrative is the construction of virtual space, which provides a three-dimensional information space for observers, so as to improve research accuracy and efficiency. Changbai Mountain is a mountain range with a very complex geographical

environment. Its terrain is complex and changeable, and its geomorphic combination is quite different. It mainly includes high mountains, plateaus, valleys, platforms, river valleys, marshes and other areas. These endangered plants are also scattered in these areas, which leads to great difficulty if we need to study them through field visits every time. However, the maturity of 3D technology provides great convenience for solving this problem. The latest open source virtual reality technology is represented by the illusory engine. This software can build a very realistic natural scene through not too complicated operations, and it also has a very rich physical engine, which can simulate the weather changes in the real world in this virtual space by adding natural physical systems. First of all, the distribution of endangered plants in Changbai Mountain can be divided into several large regions, which can be divided into coniferous forests, mixed coniferous and broad-leaved forests, *Betula yucata* forests or alpine tundra according to different plant group theories. Then, through 3D modeling or 3D scanning, the representative parts of these regions can be digitally processed to build a virtual distribution space of endangered plants in Changbai Mountain, Then add 3D models of some endangered plants, and upload the entire virtual space to a special learning platform, so that researchers can directly observe the specific morphology and growth distribution of these endangered plants through this online form. The learning and research effects achieved in this way are hard to compare with words, pictures and videos.

4.2 Establish plant growth model and collect plant growth information

In the process of research on the endangered plants in Changbai Mountain, a very important step is to realize the research on the growth and development of these endangered plants, analyze their appearance characteristics in different growth stages and specific performance in different environments, and on this basis, more efficient research and protection can be carried out. For example, in the process of studying the Korean Yabai, it is necessary to record the characteristics of the Korean Yabai in different growth stages and the change data in different growth environments. In traditional research, the construction of growth model requires field investigation, observing its growth rings by drilling wood cores, and then constructing the model by text or pictures. This research method is too complicated, and it is difficult for some entry-level research learners to intuitively understand the specific growth of Korean Yabai through text narration. At this time, we can use virtual reality technology to build plant growth models to facilitate researchers' learning and research. For example, a complete set of growth models from germination to withering can be constructed according to different growth cycles of the Korean Yabai, and the most representative Korean Yabai plants can be selected as the model reference, and the growth of the Korean Yabai under different growth environments can also be three-dimensional constructed as the data for research work. This three-dimensional display is very close to the real world, and provides researchers with more convenience than words and pictures.

4.3 Establish dynamic distribution curve to facilitate the study of plant community changes

At present, due to the impact of human activities, the growth range of endangered plants in Changbai Mountain has been greatly reduced, and even many plant communities symbiotic with local small animals are facing the threat of extinction due to the disappearance of these small animals. Based on this reality, it is necessary to study the distribution of these endangered plants and the internal causes of this distribution, so as to conduct more effective conservation research. Through virtual reality technology, a dynamic plant distribution map can be established, and the distribution of various endangered plants can be digitally processed and displayed in a three-dimensional model. Researchers can study the three-dimensional model, analyze the internal and external causes of this plant distribution, and analyze which human activities led to the shrinking of these plant growth areas, Moreover, the 3D model can be updated timely according to the annual inspection, which ensures the timeliness of research results, and allows AR interactive narrative technology to truly serve the reality of Changbai Mountain endangered plant protection.

4.4 Establish a three-dimensional plant population database to facilitate plant research and protection

In the traditional research on the protection of endangered plants in Changbai Mountain, a very important step is to establish a perfect plant population database. All kinds of endangered plant species in the Changbai Mountain area should be included, especially some plant species that need to be protected, their annual changes in number, plant age, distribution area, etc. should be investigated and studied in detail, So as to formulate effective protection strategies. In the traditional research process,

the establishment of this database is mainly through the way of numbers and words. If researchers want to obtain the data information of the corresponding plant population, they must achieve it through a very complex information acquisition process, which has greatly limited the research efficiency. However, AR interactive narrative can solve this problem smoothly, and greatly facilitate researchers' learning and research efficiency through certain technical means. For example, in the process of studying the plants on the north slope of Changbai Mountain, we can simulate the distribution of the main plant communities on the north slope and their specific living environment through 3D simulation technology. These realistic 3D models are just convenient for researchers to observe. The most important thing is that researchers can click on a plant model to obtain specific data information about this plant, such as the number of wild plants, Regional distribution and population change trend in recent years. This research and learning method has great convenience and interest. For researchers, these plant data are no longer just cold numbers, but plant models that can be truly displayed in front of their eyes, so as to achieve the protection and research of endangered plants in Changbai Mountain.

5. Conclusion

As a new research method, AR interactive narrative provides a new learning method for the learners and researchers of endangered plants in Changbai Mountain with its unique virtual reality technology. Through this technology, more efficient observation and research of endangered plants in Changbai Mountain area can be realized, and these information can be transmitted to more people in a more visual and interesting way, so that more people can realize the understanding and protection of endangered plants in Changbai Mountain. It will provide more powerful support for the conservation of endangered plants in Changbai Mountain.

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