

Design and production of virtual park roaming system based on panoramic image

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Abstract

With the rapid development of science and technology, new technologies are constantly appearing in people's eyes. Among them, virtual reality technology has created a virtual three-dimensional space for people with its interactive, immersive and imaginative 3D characteristics, which has many applications in medical treatment, education, military affairs, tourism and other aspects. The design and production of virtual park roaming system utilizes virtual reality panoramic technology, builds virtual scenes based on panoramic images, connects the panoramic images formed by stitching the real pictures through the fixed point shooting, and constructs multiple virtual park scenes to form a virtual ecological park. Visitors can make space roaming according to their own habits and preferences. This paper mainly analyzes the design and production of the virtual park tour system. Taking Nanhu Park as the reference object of the virtual tour system, it constructs the design framework of the virtual park tour system, and expounds the production steps of the panorama and the preview and release process of the panorama system.

Keywords

Virtual reality ; panoramic image ; virtual park roaming system.

1. Introduction

Tangshan Nanhu City Central Wetland Ecological Park belongs to the national AAAA level scenic spot. It makes full use of the coal mining subsidence area to realize the historic change of "turning waste into treasure" from "deep black" to "blue". With vast water area, dense forest and beautiful environment, the park is a large-scale urban central wetland ecological park that integrates natural ecology, historical culture and modern culture. With the increase of people's attention to the wetland environment and the development of new technologies, the digital presentation form has become an important way to publicize the wetland landscape. This paper takes Nanhu City Central Wetland Ecological Park as an example to explore the design and production of virtual park tour system based on panoramic images.

2. Overview of panoramic roaming system

Panoramic view panoramic roaming system can also be referred to as a virtual system, is a kind of virtual reality technology based on panorama, it USES one or more photos joining together into a panoramic image, through friendly interactive interface will be simulated two-dimensional floor plan into real three dimensional space is presented to the viewer, at the same time provide scene control functions such as zoom, map navigation, scene jump, In order to achieve the effect of simulating and reproducing the real environment of the scene [1]. Panoramic roaming system based on image rendering technology has many advantages. It has the advantages of easy modeling, strong sense of reality, fast rendering speed, significantly reduced cost, and is suitable for virtual browsing of complex scenes. It does not require a lot of

calculation to render every part of the scene. However, its disadvantage is that the data integrity and accuracy are not as good as geometric model methods [2].

3. Design of virtual park roaming system

3.1. Function design of virtual park roaming system

The functional design of Panoramic Park System is based on the principle of convenient visitors, which mainly includes the following functions:

(1) Text navigation. Interface template to choose a direct scene thumbnail will make the whole interface appear complicated. Select the text navigation template and click the text representing different scenes to display the thumbnails of the corresponding scenes. The thumbnails of other scenes are hidden.

(2) Limited perspective. Set the initial perspective and select the best viewing position of the panorama. When the visitor opens the scene, the content of this position will be displayed by default. Set the viewing Angle range, which is divided into "nearest" and "farthest" viewing angles. The "nearest" refers to the nearest distance to which the scene image can be enlarged, while the "farthest" refers to the farthest distance to which the scene image can be reduced. Set the vertical/horizontal viewing Angle to $-180^{\circ} - +180^{\circ}$ (360°). Define the viewing Angle by modifying the FOV value, viewing Angle range, and vertical viewing Angle range.

(3) Angle mode switch. Panoramic Park system has normal viewing Angle mode, fish-eye viewing Angle mode, asteroid viewing Angle mode, crystal ball viewing Angle mode, visitors can choose according to personal preference.

(4) Automatic cruise. Set the scene automatic cruise time, rotate one circle can automatically jump to the next scene.

(6) A variety of virtual roaming control modes. In the computer terminal, the mouse can be used as a control tool to directly click the operation view for roaming. In the mobile terminal, visitors can change the direction of the Angle of view and adjust the distance of the view through the touch screen. "Gyroscope" and "VR" operation buttons are also set on the interface. Gyroscope can completely monitor the displacement of visitors' hands to achieve virtual roaming effect, and VR devices can be connected for more real access.

(7) Various types of hot spots. Panorama switch type hot spot is used for switching between different scenes, each hot spot can set the corresponding scene name. Hyperlinks are used to link to other web pages and can be opened in a new window without affecting the current page. Text hot spot, graphic hot spot, video hot spot, audio hot spot from a variety of perspectives in the system of each scene.

(8) Introduction of the work and QR code. Click the interface information button to display the introduction of the work and the two-dimensional code of the work. Visitors can enter the system by scanning the two-dimensional code on the mobile terminal.

(9) Scrolling subtitles, popularity and creator display. The system can display the scrolling subtitles, such as welcome words or text introduction, the number of times viewed and the creator for visitors.

3.2. Framework design of virtual park system

The basic frame design of Nanhu Virtual Park system is based on the way of making typical scenic spots in Nanhu Park into panoramic roaming scenes and satisfying the human-computer interaction function of the system. The basic frame of the system is shown in Figure 1.

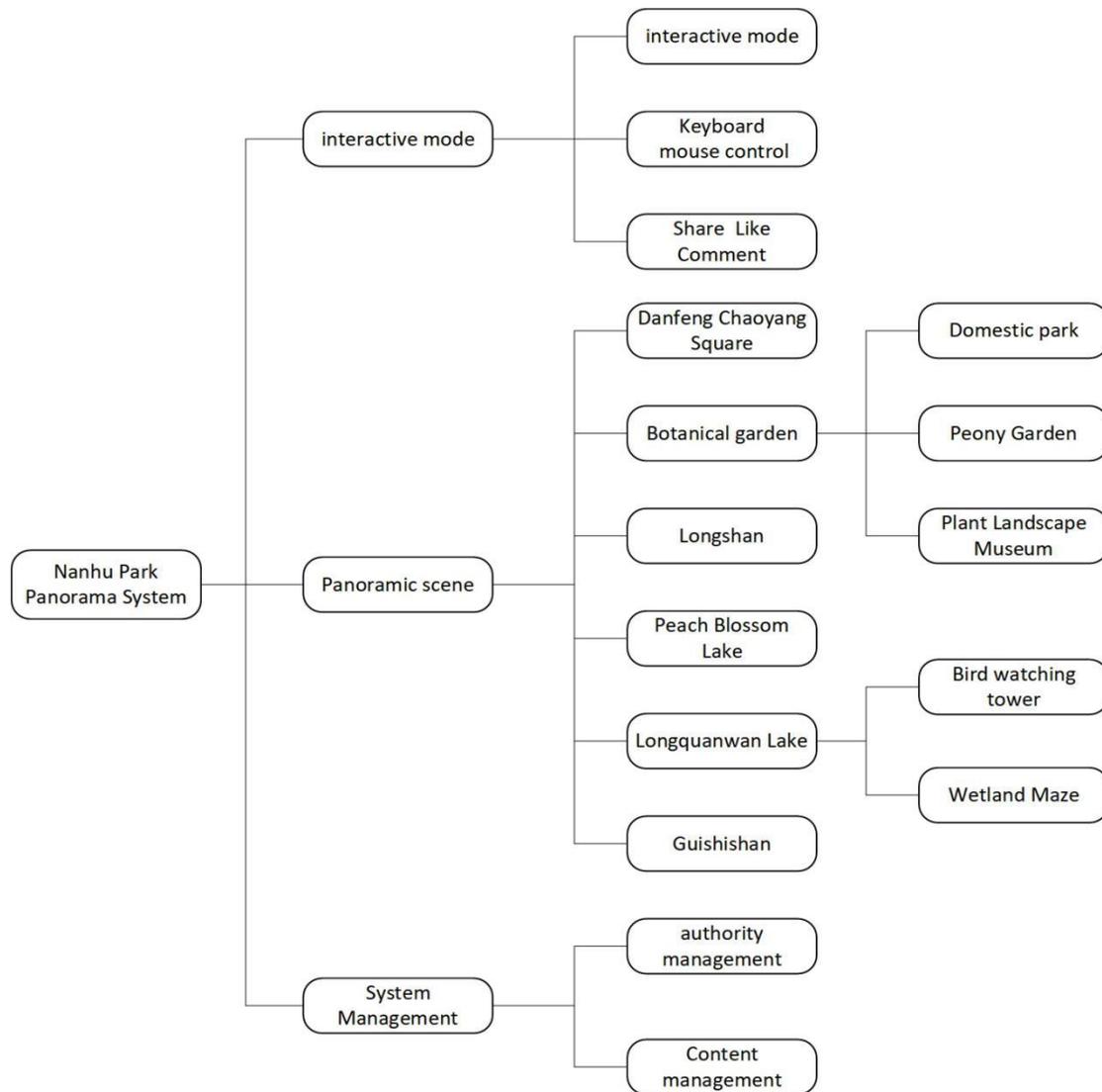


Figure 1 :The basic framework of the panoramic park system

4. Production of virtual park roaming system

Virtual park roaming system can enable visitors to switch in the virtual space constructed by panoramic images to achieve the purpose of roaming in different scenes. The production of panoramic park system requires the combination of related hardware and software. The production process includes the production of panoramic map of the roaming system of Nanhu Virtual Park, the production of the main interface and the realization of interactive functions.

4.1. Making the panorama of the virtual park roaming system

Making panoramic image of virtual Park roaming system includes three steps: image acquisition, panoramic image mosaic and post-processing. References.

4.1.1 Image acquisition

At present, panoramic images can be obtained by means of panoramic camera, aerial panorama, single electric digital camera + fish-eye lens, ordinary camera + panoramic head and so on. This project uses the F4 panoramic camera to obtain panoramic images. Although the F4 is a commercial-grade panoramic camera, the shooting process is very simple and has the feature of one-click imaging. Shooting should pay attention to the following matters : (1) choose to shoot in a sunny day, preferably in the morning, to prevent the sun is too strong and overexposure. (2) Driving cars, walking tourists and shaking plants should be avoided in the overlapping

places between the images, otherwise, the change of object position will cause trouble to the later Mosaic. (3) Tripod Try to choose a monopod, so as to prevent the tripod from being shot into the panorama. If there is no monopod, you can choose a common tripod, but pay attention to the opening and closing Angle of the foot tube should be as small as possible, so as to facilitate post-processing.

4.1.2 Panoramic image Mosaic

Panoramic image Mosaic. It is a technology that seamlessly spliced multiple related images with overlapping areas, so as to obtain a wide-angle panoramic image [3]. Common panoramic image Mosaic software includes Pano2VR, Microsoft ICE, PTGUI and so on. The panoramic image Mosaic software selected in this project is Detustitch, which is a professional and powerful panoramic Mosaic software developed by Detu F4 camera. Able to identify the F4 cameras four TF card, a key export panoramic images, at the same time provide camera splicing and file joining together two modes, it allows users to complete the image stitching, compared the software and the software, easy operation, the key of the puzzle is also very fast, can rapidly improve the efficiency of image stitching.

Using Detustitch to generate a panorama mainly includes three main steps(Take Danfeng Chaoyang Square as an example):

Open the software, click "File Mode", and drag the pictures corresponding to the four ABCD lenses to the relevant position.

After the image is dragged, click the output button, the computer will automatically calculate and synthesize the panoramic image.

Preview the panorama, the synthesized panorama is shown in Figure 2.

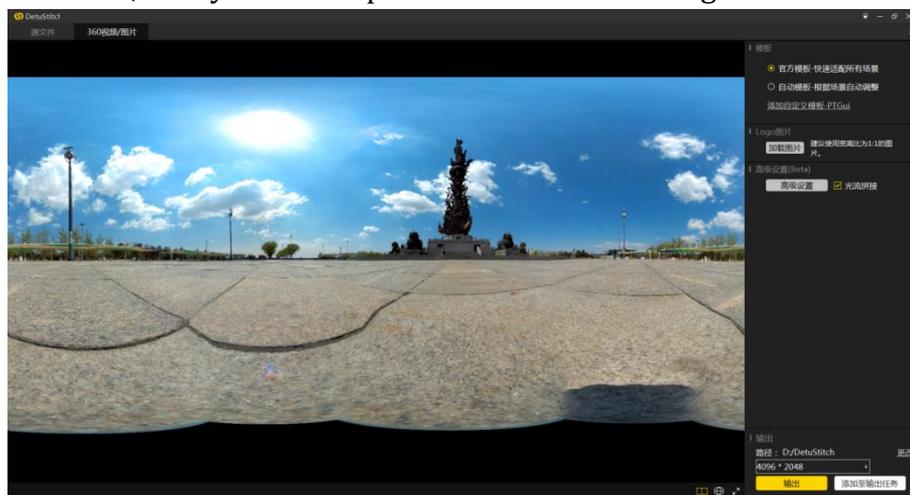


Figure 2 Preview of the panorama

4.1.3 Panoramic image post-processing

Since the ordinary tripod is used to support the camera, there is a tripod handle and its shadow on the ground. Need to use Photoshop post-processing, take the panoramic view of Danfeng Chaoyang Square as an example to make up the land. Use the panorama distortion filter plug-in Flexify in Photoshop to convert the panorama into a normal flat photo for repair.

The main steps of using Flexify to repair the ground are as follows:

Import the picture to be processed, copy a layer.

Select the copied layer and open the filter plug-in Flexify. Select "equirectangular" in the input item, that is, the input original image is a spherical panorama with the aspect ratio of 1:2, and select "zenith&nadir" in the output item to convert the spherical panorama into a hexahedron, and display the sky and the ground separately. As shown in Figure 3.

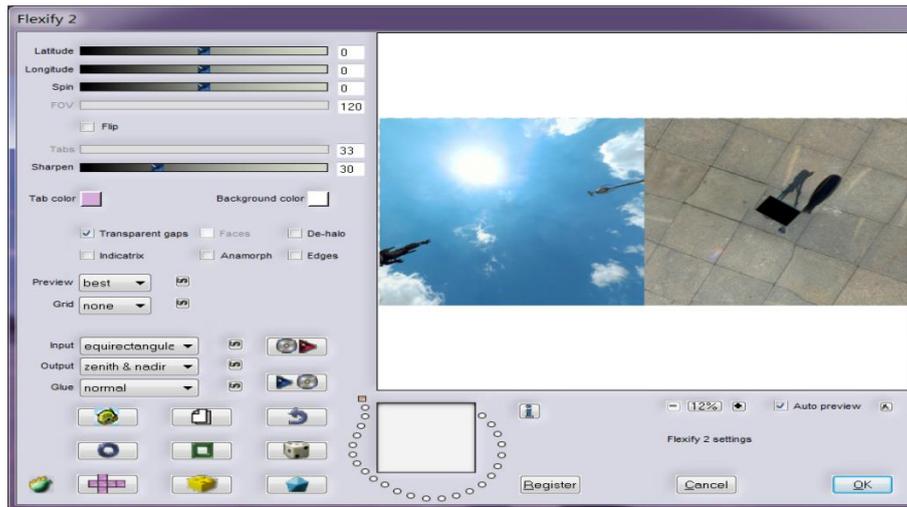


Figure 3 The sky and the ground are displayed separately

Use the lasso tool to select the "tripod" area, use "Smart Fill" to eliminate the "tripod" area, and then use the imitation stamp tool for detailed processing.

Select the filter plug-in Flexify. Select "zenith&nadir" in the input item and (4)Select the filter plug-in Flexify. Select "zenith&nadir" in the input item and "equirectangular" in the output item to restore the repaired image. Save the restored panorama as JPEG format and select the best quality. The new panorama is shown in Figure 4.



Figure 4 Panorama after ground restoration

4.2. Making the main interface of the panoramic park system

When constructing the virtual park roaming scene, choose the 720Cloud platform, upload all the spherical panoramic pictures produced in the previous stage to the platform, and then select the "park", "roaming" and "lake" labels for the work, and click "publish" After the automatic processing of the platform, the establishment of the Nanhu Panorama Park scene can be completed.

In the established scene interface, the main interface production is completed through a series of settings and editing. First click "Global Settings" to set it. In order to allow users to operate and watch more freely, turn off the automatic scene rotation effect, the automatic scene switching of the computer version and the automatic switching of the mobile phone scene. At the same time, in order to allow mobile phone users to have a better experience, the mobile phone gyroscope is turned on by default. Background music is selected by default on computers and mobile phones, and several pieces of music are uploaded to the database as background music for different scenes. Then adjust the initial viewing angle of the interface, and add a brief introduction to Tangshan Nanhu Park and the panoramic system to complete the production of the main interface.

4.3. Realization of human-computer interaction function of the system

In order to enhance the user's experience, some roaming hotspots need to be added to each scene to switch between scenes. To ensure that the hot spot is added for the user's convenience and service, the specific steps are as follows:(1)Select the option of "Hotspot" in the system setting interface, click "Add Hotspot Button", and select the appropriate system icon in the pop-up window on the right.(2)Select the hot spot type as the panoramic switching type, as shown in Figure.(3)Add a title to the hot spot, select the target scene to be switched, and finally click the Finish button, as shown in Figure 5.

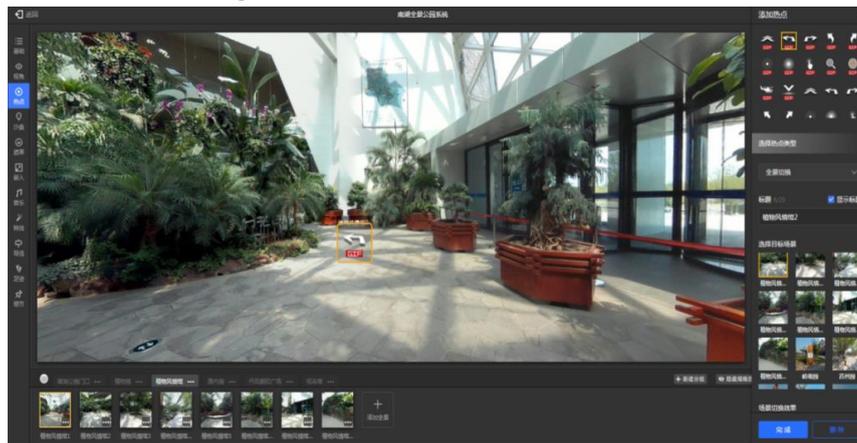


Figure 5 hotspot settings

5. Preview and release of Panoramic Park System

Panoramic park system through a series of production process, you can first preview it to check whether its function is perfect, such as: whether the hot spot function created is successful, whether the hot spot position is appropriate, whether the background music is playing normally, whether the scene introduction is displayed, etc. Improve the system through multiple previews so that users can have a good experience when the system is released. After the preview, all the functions of the system can run normally, and all the Settings do not have problems, you can release the work. After the point "publish" button, panoramic park system is established on the platform users can enter the system through https://720yun.com/t/8b4jrzmuy4?scene_id=27099797.

References

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