

A Study of 3D Stereoscopic Map-Tool Using Ogre3D Game Engine

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Abstract. In this paper, we implement 3D stereoscopic map-tool using Ogre3D game engine. It is implemented for pre-testing of immersion and fatigue you can feel in 3D stereoscopic images. In the implemented program, the properties of 3D images can be changed in a simple way and it can be tested for the immersion and the fatigue directly. The currently implemented program is a prototype of 3D Stereoscopic Map-Tool. In the various situations, we will test this program for fatigue and immersion. Based on simulation results, the additional features will be updated.

Keyword: 3D Stereoscopic Map-Tool, Ogre3D Game Engine, Fatigue and Immersion

1. Introduction

3D stereoscopic image technology is a method that people feel like being in place that images are created using the human binocular parallax. Recently, after the success of "Avatar" movie, the many researches for 3D stereoscopic images are being performed [1-3].

In Korea, there are many researches for software and hardware of 3D stereoscopic images. These researches are focused on signal processing techniques and 3D stereoscopic display. But there is no accurate data for the fatigue and the immersion occurred from 3D stereoscopic images.

The application of the 3D stereoscopic gaming technology long since been developed, but the promotion and development is much slower because the real-time processing of all the output is required in 3D stereoscopic game unlike other media[2]. Thus high-performance hardware is required for 3D stereoscopic game and its distribution does not spread. The number of users is less and the number of games related 3D stereoscopic images is also less. In recent years, there are many improvements in hardware performance and these issues have been resolved considerably. In order to more activate 3D stereoscopic game, it is required the pre-analysis environment for fatigue and the immersion that user can feel when play the game a long time.

In this paper, we implement 3D stereoscopic map-tool using Ogre3D game engine. It is implemented for pre-testing of immersion and fatigue you can feel in 3D stereoscopic images. In the implemented program, the properties of 3D images can be changed in a simple way and it can be tested for the immersion and the fatigue directly. The currently implemented program is a prototype of 3D Stereoscopic Map-Tool. In the various situations, we will test this program for fatigue and immersion. Based on simulation results, the additional features will be updated.

2. Ogre3D Game Engine [4-6]

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Ogre3D is one of the largest open-source game engines based on Such as Direct3D or OpenGL graphics engine. This game engine is simple, easy to use user interface designed to minimise the effort required to render 3D scenes, and to be independent of 3D implementation i.e. Direct3D/OpenGL. The engine consists of three main parts: a summary of features as follows:

Scene Management: This is about the contents of your scene, how it's structured, how it's viewed from cameras, etc. Objects in this area are responsible for giving you a natural declarative interface to the world you're building; i.e. you don't tell OGRE "set these render states and then render 3 polygons", you tell it "I want an object here, here and here, with these materials on them, rendered from this view", and let it get on with it.

Resource Management: All rendering needs resources, whether it's geometry, textures, fonts, whatever. It's important to manage the loading, re-use and unloading of these things carefully, so that's what classes in this area do.

Rendering: Finally, there's getting the visuals on the screen - this is about the lower-level end of the rendering pipeline, the specific rendering system API objects like buffers, render states and the like and pushing it all down the pipeline. Classes in the Scene Management subsystem use this to get their higher-level scene information onto the screen.

3. Implementation Of Map-Tool Using Ogre3D Game Engine

In this paper, we produced the 3D stereoscopic map-tool using Ogre3D game engine. First, the user interface (UI) program is implemented by the most widely used Visual C++(MFC) in window programming. Next, the features in map-tool are made by using the functions provided by Ogre3D. Fig. 1 is the initial screen of the implemented map-tool.



Fig. 1 The initial screen of map-tool

Terrain generation dialog box shown in Fig. 2, each of the input parameters are described as follows: Name: file name of Terrain height map, MaxPixelError: the precision of the generated terrain (LOD: Level of Distance) indicates, Composite Distance: the distance from the camera to the point representation of the terrain, Size: height map size, World Size: a virtual space that is created in the world coordinates of the terrain, Input Scale: scale up the size of the height map image to, Min Batch Size, Max Batch Size: LOD minimum / maximum matrix size setting, Layer Count: the number of texture map be composite to height map. The texture of the bottom of the dialog box shown in Fig. 2 combined texture map settings tab set the value to be entered into each layer of the map. Here you can set up to eight texture maps; turn down the texture in the high layers of the layer above is to be represented. In Fig. 3 sets the lighting value used when generating the terrain. Direction, Diffuse, Specular set the values of the direction, the light radiating, and reflection.



Fig.2 Terrain generation using the pre-defined height map

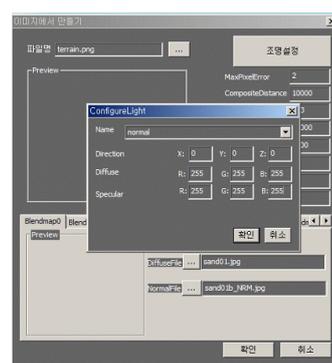
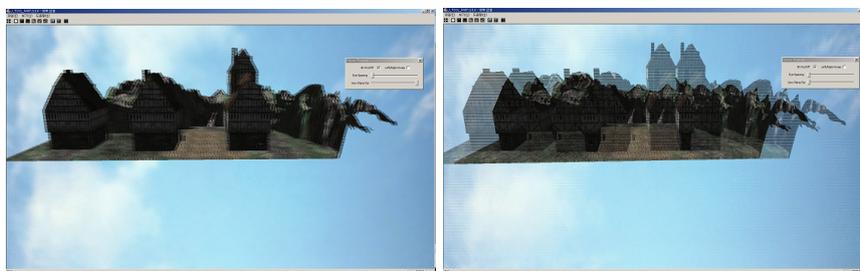


Fig.3 Lighting settings for terrain generation

The implemented program can be used in the horizontal interlaced 3D monitors. 3D stereoscopic image consists of images obtained from two cameras in 3D space, and then it's displayed in 3D monitor. To test the fatigue and the immersion, we must change the 3D stereoscopic property in various cases. As shown in Fig. 4, the properties of 3D stereoscopic images can be set. In Fig. 4, eye spacing sets the distance between eyes. Here, it's the distance between the two cameras. We can adjust it the minimum 0cm up to 8cm. In view plane far slider bar, we can set the focal length from camera to scene. In Fig. 5, there are 3D stereoscopic images in the various states. Fig. 5(a) shows the result of focal length adjustment and Fig. 5(b) shows the result of simultaneous adjustment of the bilateral distance and the focal length. In this paper, we implement 3D stereoscopic map-tool using Ogre3D game engine. This tool can be used to test the immersion and the fatigue user can feel in 3D images before full-scale production and to develop the contents effectively.



Fig.4 Setting properties of 3D stereoscopic images



(a) (b)
Fig.5 3D stereoscopic property changes: (a) focal length adjustment, (b) simultaneous adjustment of the bilateral distance and the focal length

4. Summaries

In this paper, we implement 3D stereoscopic map-tool using Ogre3D game engine. In the map-tool, first, the user interface (UI) program is implemented by the most widely used Visual C++(MFC) in window programming. Next, the features in map-tool are made by using the functions provided by Ogre3D. It is implemented for pre-testing of the immersion and the fatigue user can feel in 3D stereoscopic images before full-scale production and to develop the contents effectively. In the implemented program, the properties of 3D images can be changed in a simple way and it can be tested for the immersion and the fatigue directly. The currently implemented program is a prototype of 3D Stereoscopic Map-Tool. In the various situations, we will test this program for the fatigue and the immersion. Based on the future simulation results, the additional features will be updated.

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6. References

- [1] J.S. Lee, S.D. Park, S.H. Han and C.Y. Kim, "Implementation of 3-Dimension Stereoscope Using 3D Graphics," Conference of Korea Multimedia Society, VOL: 13, NO: 2, 2010. 11, PP: 184-187.
- [2] C.W. Choi, " HUD Factor Classification of Online FPS Game for 3D Stereoscopic Application," Dept. of Media Broadcasting, Graduate School of Information Sciences, Soongsil Unversity, 2011.6.
- [3] E.J. Chae, C.Y. Choi, K.D. Choi and K.H. Kim, "Developing a Sensory Ride Film 'Dragon Dungeon Racing'," Journal of Korea Contents Society, VOL: 11, NO: 2, 2011, PP: 178-185.

- [4] G. Junker, Pro OGRE 3D Programming (Expert's Voice in Open Source), Springer-Verlag New York 2006.
- [5] F. Kerger, OGRE 3D 1.7 Beginner's Guide, Packt Publishing 2010.
- [6] <http://www.ogre3d.org>
- [7] S. Choi, "Technical Status and Prospect of 3D Stereoscopic Images," Journal of Korea Information Processing Society , VOL: 17, NO: 4, 2010, PP: 4-11.