

## Complementary Study Between VRML and 3D MAX Modeling

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### Abstract

In recent years, with the development of increasingly sophisticated emerging technologies, three-dimensional modeling and virtual reality have become gradually mature and emerging technologies, Interact-based virtual reality technology has also increasingly become a new field of computer graphics. There are many classes of three-dimensional modeling software and different software features are also distinctive. To make model quickly and implement an interactive virtual environment network, we can use 3DSMAX`S visual three-dimensional modeling capabilities and VRML three-dimensional virtual reality network programming language which Can construct virtual scene and to achieve the user interaction with the virtual scene. This article describes the VRML language 3DSMAX and related technical characteristics, and through examples using VRML language 3DSMAX and quick way of virtual interaction. Based on the complementary research of VRML and 3D MAX model, we resolved quickly model and browsing Web virtual scene.

### Keywords

Virtual reality modeling language; 3ds Max; VRML; three-dimensional model; complementary.

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### 1. Introduction

Virtual reality is the product , which is the combination of a certain level of computer technology and noeticscience. its appearance opened up a new way for human to understand the world. Currently, the VRML environment established in the country was mainly through Notepad to manually edit. This is a very original way and low efficiency. So that the universal access of the VRML encountered great difficulties. In practical applications, people need a more conveniently and quickly method to create the product of virtual reality. The operator is able to construct HTML documents without master the grammar rules of VRML computer language. The operator only need to drag and click tools similar to the Frontpage .However, in the case of the computer and Internet penetration of our country is not wide. There is still no our own copyright tools to construct VRML file. This is a great obstacle for the development of our country's next-generation Internet. Accordingly, how to use non-VRML professional modeling software to quickly generate VRML model has become particularly important . In recent years, domestic and foreign scholars have carried out extensive and in-depth study of virtual modeling techniques. They made a variety of research methods, and the implementation of the various programs created certain application and feasibility.In this paper, by take virtual modeling software for modeling to research on the complementarities between VRML and 3ds Max modeling.Combined with their advantages and disadvantages to strive to achieve rapid prototyping and Web browser of three-dimensional virtual scene.

## 2. The Implementation Process of VRML Language Building Three-Dimensional Model.

### 2.1 Editing Environment for VRML

Although the visual design tools of VRML can be used auxiliary generate VRML file and create virtual reality scenes, it can not be achieved when there are many requirements for VRML. For instance, Internet Home Space Builder, which designed for the construction industry products. Its main disadvantages include the animation of the object, behavior is not supported and event operation. As the Company Platuim has leading-edge products, the Vcreator is particularly high requirements on computer's performance. The Vcreator can not be used in an ordinary PC and used in the graphics workstation to be able to play good results. VRML Pad is an excellent editing tool, which is based on the character-mode. It is typically more suitable for the use of three-dimensional scene. Because VRML Pad edit describe the internal data structures of the three-dimensional scene and the scene designer can directly operate on the data structure. But for users who do not understand the VRML file format, this tool is very profound. Render Soft is a completely three-dimensional visual editing environment. The user can directly use the mouse on the three-dimensional object such as drag-and-drop operation, but can not show the internal data structure. Contrary to VRML Pad, it is not suitable for advanced users. In addition, the function of VRML editor is not perfect and not conform to the people's thinking. It does not combined the tree view with 3D scene view, which are reflect the internal data of the VRML file. Moreover the Visual editor of routing statement does not implement. It can only write by hand to complete.

### 2.2 Edit VRML File

When we design the VRML virtual scene, the easiest way is to directly use a text editor to edit the descriptive text. It is similar to the program design. This method is simple and convenient, but not very intuitive. It has higher requirements for spatial imagination of the designer and low efficiency. Nowadays there are many visualization VRML Design Tools, such as CosmoWorld and HomeSpace, etc. These tools will make standard nodes of VRML become the visible components. When the user in the design, just use these components to group its own virtual scene. Moreover, at design time you can see the design effect. After the design is completed, the Visual virtual scene will automatically generated standard description text of VRML by the system. In this way, after these texts are sent to the user's browser, the user's screen will reproduce the virtual scene.

### 2.3 Run the VRML File

- (1) in the browser to call the VRML file
- (2) Click VRML file in the file manager

```
#VRML V2.0 utf8
```

```
Group
```

```
{
```

```
children
```

```
[
```

```
Shape
```

```
{
```

```
geometry Box {}
```

```
} ] }
```

### 3. The Implementation of the Three-Dimensional Model

#### 3.1 Data Collection of a Real Model

Virtual reality model gives the architecture of the virtual reality. Only on the basis of input the correct data, virtual reality can mobilize the internal logical relations and mathematical relationships. Accordingly to the computing and statistics, then give an accurate results output by virtual reality. If lack of proper input data, the virtual reality system will play the role of misleading decision-making, resulting in serious consequences.

The most effective and credible way to acquire basic data is through the remote sensing technology. These accurate, multi-state data can be used for large-scale virtual reality system. The model data used in this paper are obtained by the measured through measuring instruments. Eventually CAD drawing software to produce the model structure diagram and with reference to the structure to build three-dimensional model.

#### 3.2 Using 3ds Max to Create a Three-Dimensional Model.

After the data collection of a realistic model, the mind of the creator was already formed a clear image of three-dimensional objects. The basic steps of the operation process are as follows:

3.2.1 The default length unit of 3ds Max is "feet". In order to facilitate the control of large scale virtual reality scenes when in the dynamic interaction design, Users had better choose the more familiar Metric Centimeters cm as a unit of length and to provision a ratio between virtual real models and virtual reality environment model

3.2.2 Modeling By Use of the Basic Graphics of 3ds Max

Use of two-dimensional spline curves, and add an extruding Extrude modifier to make the two-dimensional form more thicker. This is a common method to design three-dimensional model in 3ds Max. However, using this method to achieve a relatively smooth effect will increase the number of triangular facets. Thereby it will slow the speed of the VRML to call the model. In accordance with plane location map and digital photograph of the construction of buildings to use basic graphical tools modeling carefully in 3ds Max. Furthermore, create the model of a small amount of data through the use of Boolean operators.

### 4. The Respective Advantages of VRML and 3ds Max for Complementary Modeling.

#### 4.1 The Respective Advantages of 3ds Max for Complementary Modeling.

3ds Max is professional 3D animation software, it can make virtual reality scenes have perfect realistic and delicate, and it has lots of material library and designers. After making the original file of Static virtual scene, VRML plug-in needs to be installed in 3ds Max to animation and hyperlink settings. Finally export VRML97 format file. But the generated VRML97 format file is big. It has apparently delayed when transmitted over the Internet and reproduce if the scene is complex. It can not do real-time browse.

It can be clearly seen by comparing the architectural model establish by 3ds Max and the architectural model using the VRML plain text writing, that the former has clear structure and realistic shape. But the latter's single and performance is weak. As figure 1, 2 show. So, that is why VRML model instead of using Visualization VRML editing software or use powerful modeling software modeling is widely used.



Figure1 main building model created with 3ds Max

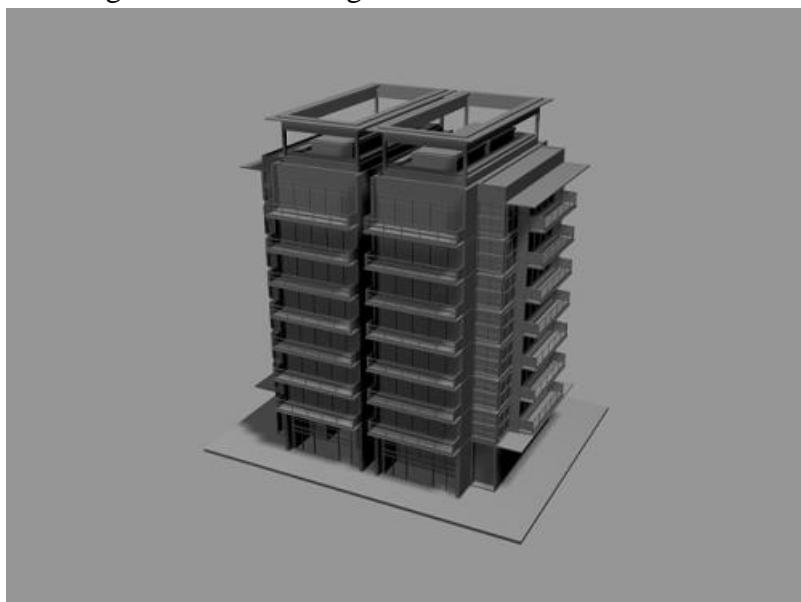


Figure2 main building models using VRML plain text editor

Now, A lot of three-dimensional CAD software to support the function of the output of a particular scene in VRML format. Common CAD software includes UG, PRO / E, 3ds Max, etc. they all have the interface to export VRML. Among, 3D animation software 3ds Max can create complex three-dimensional model of the object quickly and efficient. To compensate for the lack of VRML when it building complex models.

#### 4.2 The Advantage of VRML for Virtual Reality.

VRML (Virtual Reality Modeling Language) is graphics description language of three-dimensional modeling and rendering. It generated in order to quickly achieve three-dimensional animation and user interaction based on three-dimensional object on the page. It is same as HTML (Hyper Text Markup Language), is a kind of text description language. VRML is network-oriented; it is born to the network, and development with it. The trick of the VRML is that it avoids a large-capacity transmission in the internet from one frame of video image, and the transmission of only a smaller capacity VRML file. That is, only transmission the model which describes the scene, and let the generation of animation frames on the local computer.

## 5. 3ds Max and VRML-Based Virtual Campus Landscape Model

**5.1 Production Process of Three-Dimensional Modeling Campus Map Under 3ds Max. as Figure 3 Shows:**

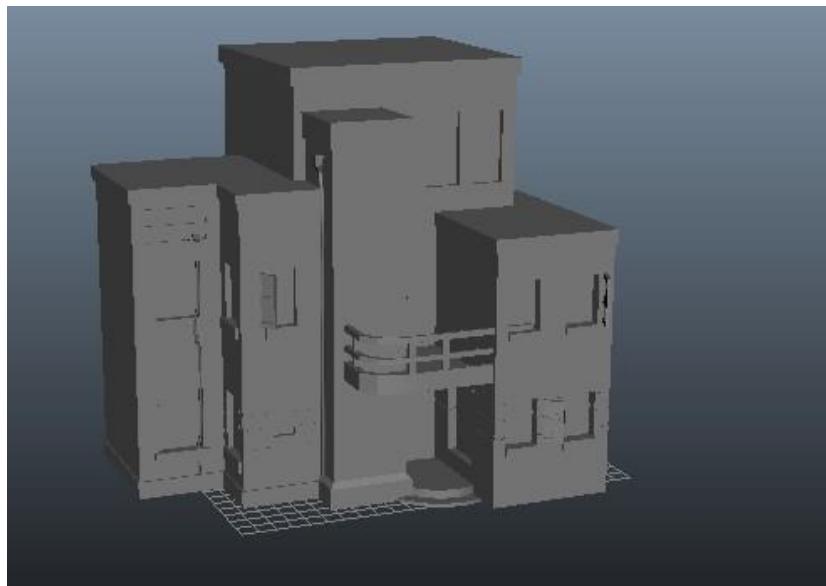


Figure 3 Production process of the campus map.

### 5.2 Export VRML File

Select File / export menu, then it comes a dialog box, click the "Save as type" drop-down menu box, Select "VRML97.wrl file types, and finally take a corresponding name, click the "Save", then a VRML97Exporter dialog box appears, Select the default value, Click ok to generate ".wrl" file.

### 5.3 Model Optimization

VRML is an internet application; it is constraints of the speed of network. It is necessary to control the size of a VRML file. We can use two methods to model optimization.

4.3.1 Accuracy of the model optimization. Many realistic VRML model are created by modeling tools. When VRML file is generated, accurate data is been used. Although the precision of the data helps construct accurate model, in order to compress the file, we can appropriate to reduce the accuracy of the data. Re-set the accuracy of the value of all the data, reduce the amount of data.

For example, we can use 0 instead of 0.0012[1]

4.3.2 Naming and prototype. We can find out the important points of VRML file through DEF、 USE, to reduce the length of the file, shorten the file download time.

### 5.4 Dynamic Control of Model

Using 3ds Max to Create Flying Objects. Put flying object into Cosmo Worlds, By the Cosmo Worlds software key frame animation tools to complete the flight path of the specified object set.

### 5.5 VRML Files on the Network Released

Publishing the work on the internet after three-dimensional scene is finished. Before release, we should check out the effect of the scene. So, you can use other 3D browser to preview the work, such as: Cosmo Player,World View,Cortona.

If it is satisfied after previewing, then should use VRML compression tools gzip or WingZ vrmppad to compress your. wrl file, These compression tools is the best tool of VRML file "downsizing".[2,3] Finally, we can use web authoring tools to create a page file, and add the VRML file. VRML create pages gives a true 3D experience, from a design standpoint it is impossible for any other tools to

achieve. We can also add some video and other effects into VRML web to rich Web content at the same time.

## 6. Concluding Remarks

Based on the complementary research of 3ds Max 3D modeling technology, virtual reality modeling, combined VRML with 3ds Max to make network interaction in virtual reality real. Use the feature of 3DMAX that it can model conveniently, and use the feature of VRML to make web browser highly realistic, so that the three-dimensional virtual reality to achieve easier and simple. Just to transmitted a small amount of data that transformed via the internet. And once it has sent no longer need the model to the next step send. In this process, the change is only the observer's viewpoint in the model. Thus, only continue to transfer the azimuth of the observer in the internet, greatly save the data bandwidth.

VRML has nothing to do with the device; it is independent existence as a description of the language of the virtual realm. System can create different grades based on VRML and 3ds Max, this feature is also one of the fundamental driving force of the rapid development of VRML and 3ds Max. At the aspect of games, engineering and scientific visualization, education and construction, it also has higher implementation efficiency and broad prospects.

## References

- [1] Lai Cheng, Wang Yi gang. Three-dimension Map-making of City by 3DS MAX. Journal of Institute of Surveying and Mapping, 2003,23(4) :48-51.
- [2] Xu Botao. The basic tutorial of 3dsmax7 by Chinese. Beijing Qinghua University Press.2006.
- [3] Gao Zhiqing.3ds Max boutique computer Architectural Renderings. Beijing: China Water Power Press. 2002.