

## Digital City 3d Model Making Technology

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**Abstract**—Starting from the concept of digital city, this paper briefly introduces the specifications and requirements, the three-dimensional modeling of digital city are introduced from the practical Angle in the 3 ds MAX software used in two-dimensional environment tracing and extrusion method model, and use Photoshop software to modify pictures to make 3 d map, finally using UV coordinates in 3 ds MAX software to complete the whole 3 d model.

**Keywords**- multimedia technology; digital city; 3d model; making technology

### I. INTRODUCTION

Digital city based on computer technology, multimedia technology and mass storage technology as the foundation, the urban geography, resources, environment, population, economy, society and the social situation of social service and so on complex system digitization, network, virtual simulation, optimization decision support and visualization. Through the broadband multimedia information network, geographic information system, virtual reality technology and other basic technology, integration of city information resources, construct the basic information platform, the establishment of e-government, e-commerce and information system and information community, realize the informationization of the national economy and social public service information digitization.

Because our country digital city construction starts late, at present in four stages to synchronize period, communications infrastructure progress faster, the government and the enterprise internal information system of the construction and development of the slowly, integrated digital city is still at the lower stage.

Three dimensional modeling is to establish the focus of the digital city, people are through all kinds of ways of city modeling, and have made important progress, Japan and 1998 and 1999 held twice, entitled "Urban Multi - Media / 3d Mapping" international academic seminar, many academic papers on 3d digital modeling, three dimensional city map, computer city and other related content was studied. The 2000 international photogrammetry general meeting on 3dCM study the complex operation and analysis listed as one of the theme. There are many university, company research institutes focus on relevant 3dCM quite warm research and development. Such as Zurich, Switzerland, federal industrial university Gruen and Xinhua for 3dCM conducted the thorough research, in order to solve the three dimensional modeling problem, specially developed a called Cyber City

Modeler system, can allow users interactive 3d object modeling. Many software companies at a very fast speed development a fairly good 3d software, including Autodesk company 3ds Max software. In this paper the author in 3ds Max software for the object, talk about digital city, the three-dimensional model making technology.

#### A. Digital city 3d modeling specifications and requirements

From three dimensional digital city to establish work flow can learn, pre-production 3d model in the late in Unity digital platform joint, and at the same time, make the 3d digital city virtual system. So late Unity digital platform on the three dimensional model of the production is required, and at the same time, in order to improve the three dimensional model of the production efficiency, better coordination within the working group members work, in manufacture time also need to follow a certain production specification.

##### 1) Establish good communication channels

Digital city project often because of according to the different requirements of customers also different, so provide for the customer to meet the requirements of product is the mission of production staff, but also improve the production efficiency of the gist. So we must establish good communication channels.

In the production before and customer communication, a clear understanding of customers' real demand; Production process and customer communication, make sure production plan. Because usually building model can first whole production and segmentation, but also can directly according to the actual situation of each household, each area to do accumulation into the whole house building way making. Therefore making scheme is chosen by the customer need. In the late stage of production is need customer communication, because model making modification is completed, will import Unity digital platform joint, if there is need to modify model, the price is very huge, if it is a single model modification, the cost is relatively small much more. So late model making, contact customers to check and accept, and then further joint.

##### 2) To standardize the management of the data

Digital city project information content is very large. File type and quantity are many. Common file type AutoCAD software .DWG file, 3ds Max's .Max model file, .Maps model mapping files, .Tga: storing 3ds Max software UV documents, and made with Photoshop .PSD mapping work file, .JPG: final model mapping file and model transparent textures. PNG file.

Can say both provide the original material, also have the production process field acquisition of geographic information material, and intermediate production process documents and final generated results and supporting documents. So in every step are need to be material standard management, especially as the core of the model making part, not only BaiMo file to standardized management, texture mapping file also want to standardized management, color die file but also to standardized management. Therefore a regular inspection sorting data system, and establish the FTP server project folder, another group leader or technical leader can do part-time document material administrator, specialist exclusive well service.

**B. In 3ds Max software 3d modeling skills**

*1) Preparation work*

In the organizational work well preparation, on the basis of 3d modeling can start. In the 3ds Max software, modeling before and some preparation work: the first is set modeling environment.

Open as shown in figure 1 shows "user custom interface", in which to "keyboard" and "color", "unit Settings" item options for setting.

"Keyboard" is designed to restore 3ds Max software own shortcuts Settings; "Color" is set in order to import AutoCAD after drawing more clear view of AutoCAD map information.

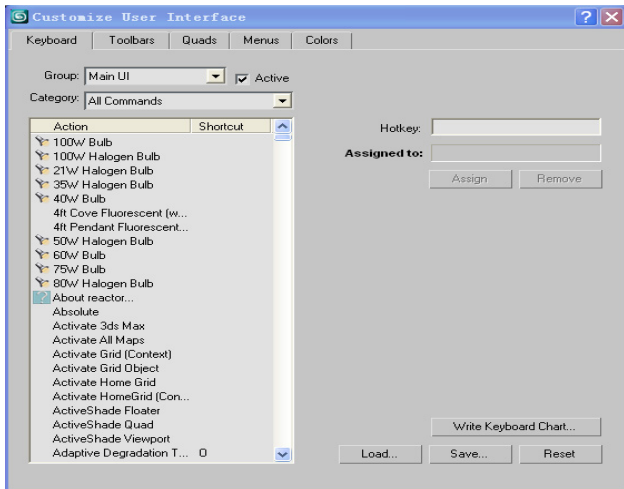


Figure 1. In 3ds Max "user custom interface" dialog box

"Unit Settings" item set is all the modeling environment set in the most important Settings. The general situation of interior design is often small size modeling, so design unit is generally mm, in the digital city completely can't use, need to be made from rice a unit can be shown in figure 2.

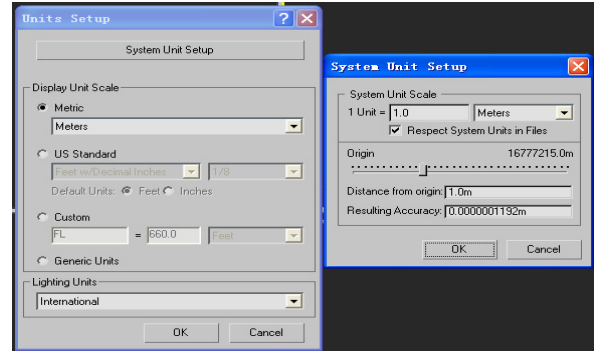


Figure 2. In 3ds Max in setting unit

In order to easily use AutoCAD reference map construct a three dimensional model for Angle capture and the corresponding contents need to be some Settings.

In the toolbar "Angle capture" click the right mouse button, pop-up dialog box. Select "Snaps" option card, check the box "top", "end" and "neutral" option (as shown in figure 3 shown); The Options dialog box "Options" TAB option card, check the box "capture the freezing object" and "the use of shaft constraint" option (as shown in figure right 3 shown).

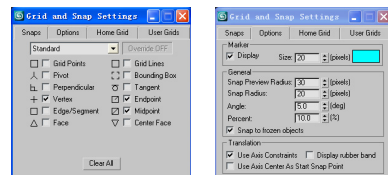


Figure 3. "Angle capture" associated Settings

*2) Create original model*

Create original model from import processing good AutoCAD map began to make use of the 3ds Max capture tracing combined function extrusion order to realize modeling. Specific steps:

According to the introduction of AutoCAD map in 3ds Max in tracing

Enter the create panel, choose "splines" of the "line" the order, in the "top view" in open 2.5 d capture options, in import AutoCAD map, along the graph of the shape tracing operation, finally forms a closed spline line. Draw a line is closed is very important, so in tracing the last one o'clock when the just and the first point coincidence, will pop up as shown in figure 4 shows "Spline" dialog box, click the "yes" button closed curve can complete tracing.

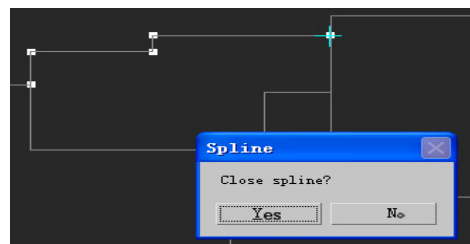


Figure 4. In 3ds Max in tracing

*a) Will tracing extrusion into three dimensional model*

Choose trace good curve, click the right mouse button, select "Convert To/Convert To Editable Poly" conversion command will its conversion into geometry, and then in the modifiers into "Editable Poly" son command of the surface level. Choose corresponding surface, click the right mouse button, select "Extrude" in front of a check box, and input value will its extrusion into three dimensional model, as shown in figure 5 shows.

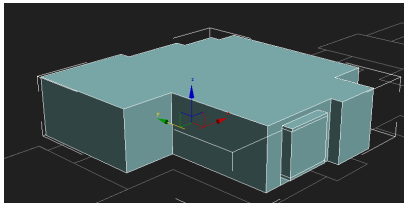


Figure 5. In 3ds Max household a three dimensional model

*b) Repetitive operation completed building model*

With reference to AutoCAD map, each layer of each household in two steps in front of a three dimensional model. Note that if there are stairs or elevator hoistway, according to an independent household treatment, and ultimately a floor 3d model as shown in figure 6 shows.

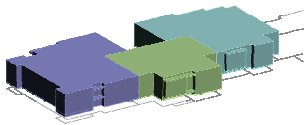


Figure 6. In 3ds Max layer of a 3d model

According to the actual situation of building, duplicate each layer, thus forming the whole building three-dimensional model, as shown in figure 7 shows.

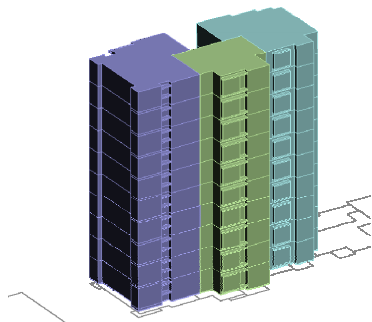


Figure 7. In 3ds Max in 3d model of the building

Sorting model, delete redundant surface finish original model to create

Make 3d model is in order to later in the digital platform use, so in addition to meet customer need outside, more needs to accord with late synthesis need. According to the late synthesis needs and modeling standard requirement, for three-dimensional model of the those who see face need to delete (as shown in figure 8 shows), one is can guarantee that

the late show no flicker, the other is a can reduce the information redundancy and reduce the computer operation burden.

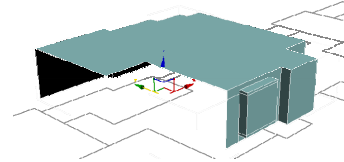


Figure 8. Delete the three-dimensional model of the redundant surface

*3) Production texturing*

To add in building material is according to a door for the unit, in order to make it more accurate texture mapping in place, need to first division UV, and then make maps, and eventually add texture mapping.

*c) Unwrap UVW*

Choose figure 8 of the three-dimensional model, the modifier panel down menu select "Unwrap UVW" the order, to model add UV expansion. Click "UV expansion commands" son hierarchy of the "face" hierarchy, press the keyboard of "Ctrl + A"key, select all the surface, then the selected face present red, as shown in figure 9 shows.

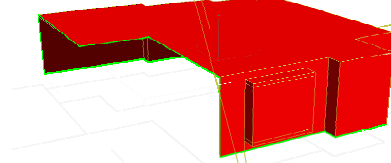


Figure 9. Selected to Unwrap UV face

Click the modifier of the "edit" button, pop-up "edit UVW" dialog box. In the "map" drop-down menu of click "open map" option, pop-up as shown in figure 10 shows "flattening map" dialog box, check the box "according to material Ids" options, click the "ok" button on UV, as shown in figure 10 shows.

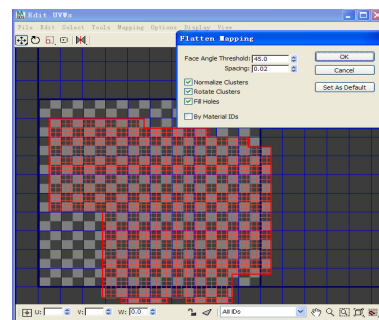


Figure 10. Unwrap UV

*d) Render output UV*

All the UV is divided, click on the "tools" menu of "render UVW template" the order, pop-up as shown in figure 11, as shown in the dialog box, click the bottom "render UV template" button can be obtained after the render UVW map.

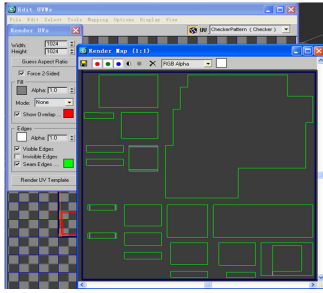


Figure 11. Render output UV profile

Click the panel on the "save" button, pop-up dialog box, in which fill in the save the path, it will be kept in advance has built good engineering project, file type choice TGA type. Note that the file name to and their model of named consistent, so that it is convenient for later check and modification.

*e) Production map*

Open Photoshop software, and open saved UV export documents, and at the same time open obtain actual geographical information photos, according to photos to cut map, and according to map the need for processing. As shown in figure 12 shows.



Figure 12. In Photoshop software processing complete map

*4) Complete 3d model making*

*f) Using UV coordinates location map*

In figure 10, as shown in the dialog box, open and shown in figure 12 texture. Use toolbars amplification, narrow, mobile and command, yes map files and UV coordinates correspondence, as shown in figure.13.

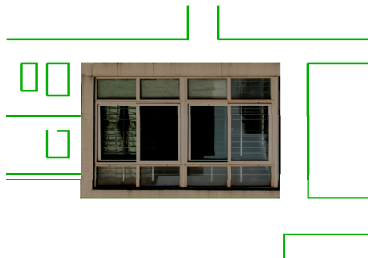


Figure 13. In 3ds Max positioning map to UV coordinates

*g) 3ds Max software of material Settings*

Open 3ds Max of the material editor window, choose a material sample ball, in "Diffuse reflection" column map channel selection "a map", and put into the corresponding map file. As shown in figure 14.

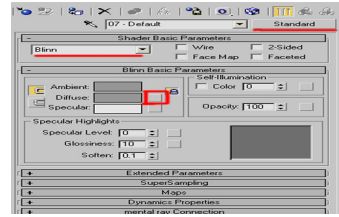


Figure 14. In 3ds Max will be posted in front of material diffuse channel

*h) Will the material assigned to the 3d objects*

Will make good material sample ball material assigned to object object, in turn, will all the UV coordinates the corresponding parts are done, the effect such as 15 shows.



Figure 15. Complete material after setting a 3d object

If meet the attic has rail or other hollow out object object, need in material sample ball "transparent" map channel add extra made transparent texture.

Complete the inspection to achieve real effect, the need to get back to modifiers, choose "UVW Mapping" command click the right mouse button, in the popup menu click on "Collapse to" make UVW Mapping Collapse in the corresponding plane, as shown in figure 16 shows. The aim is to behind in the operation of won't affect the operation of this step, to ensure the effect of the map.

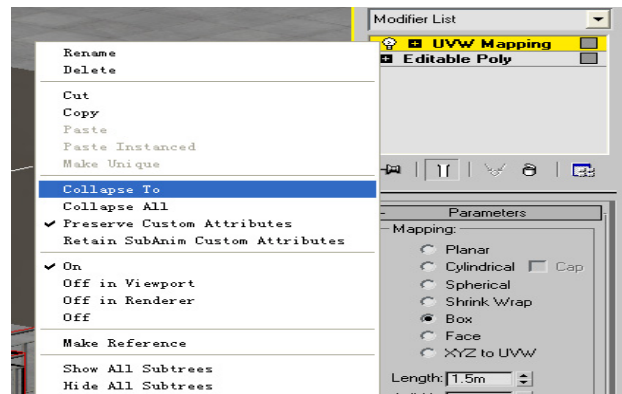


Figure 16. Collapse texture mapping to 3d object surface

By a family to a layer of floor, and then to multi-storey building, and gradually make, can finish the whole building 3d model manufacture, the whole building effect such as fig.17.



Figure 17. The whole building 3d effect

To sum up, through the introduction of front preparation stage, original model production, map production and complete 3d model four link, can complete digital city 3d model making work, for complex scene only need to order management in turn make, can finish the whole scene production.

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