Panoramic Views in Virtual Sarajevo

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Abstract

The Virtual Sarajevo project provides a detailed model of the city of Sarajevo which people can explore interactively. An important part of the presentation of this city model are the panoramic views. This paper will describe the process of creating panoramic pictures for our model. We discuss two ways of inserting panoramic viewpoints in the virtual model using the Anchor node: as htm files using PhotoVista and as VRML objects.

1 Introduction

Presentation of virtual cities on the web has become very popular. Besides the importance of preserving the country's cultural heritage, the virtual cities are used to attract the tourists. The tourist associations of many countries have thus decided to create virtual models of their main tourist centers. Many towns in the world already have well created virtual models, and every day new and better models appear.

These models are typically very easy for access via the Internet and don't need any special software for the viewing and navigation apart from VRML[1] which is embedded in standard web-browser with the appropriate plug-ins. It is sufficient to open the application in the browser and the desired model is ready for viewing. Using a virtual model of the city, a user can see the most exclusive and the most attractive parts of the town which he/she wants to visit. Inserting panoramic viewpoints in the model enables the user to see the real appearance of the modeled objects.

The rest of the papers is organized as follows. In section 2 we introduce the basic concept of virtual cities, including purposes and techniques for virtual model creation. Section 3 presents the creation of Virtual Sarajevo project, while in section 4 we discuss the practical work in the creation of the Virtual Sarajevo panoramic views, the software we used and methods of inserting the panoramas in the virtual model.

The final section is a general conclusion about our present work and some details of future work for the Virtual Sarajevo Project

2 Virtual cities

There are four common ways of creating virtual cities [2].

1. Image – Two dimensional virtual city
2. Movie - Panoramic views
3. Model - Static 3D model
4. Scene - 3D model with navigation

A two dimensional virtual city is composed of an interactive map of the city. The user chooses some of the locations on the map. By clicking on these, the user opens pictures, audio and web sites of the chosen location. This is a very popular technique of creating virtual models, as it gives very useful information about the most important parts of the town, and it is straightforward to create compared with the other three techniques.

Panoramic view is a set of neighboring snapshots that is taken from one point of view. They are combined into a 360 degree view by digital processing and mapping on an inner side of a cylinder [2]. Once incorporated in the virtual city, the user can manipulate the view using a mouse and keyboard for going on the left, right or zooming the view.

A large number of the web based 3D cities are static. In these models the user's view is limited just to the rendered images or 3D models. If the model has to be changed, it is necessary to do it in a 3D modeling program such as 3ds Max [8] or in some specialised VRML editor.

A 3D model with navigation enables completely free navigation within the 3D space, including interaction with objects and watching animations, all in real time. Objects in the 3D virtual city are created using the same software used for 3D modeling, such as 3ds max, and then exported in to the most common language for 3D graphic on the web, Virtual Reality Modeling Language (VRML).

Currently on the web virtual cities exist for places such as Paris[9], Prague[10], Glasgow[11], Sidney[12] etc.

3 Virtual City Of Sarajevo

The Virtual City of Sarajevo Project [15] started one year ago. Inspired by previously created models, a team of third year students at the Electrical Engineering Faculty in Sarajevo, Department of Computer Science, as a part of their Computer Graphics course, started the Project. The old heart of town has been recreated. It is the most attractive part of the town with many cultural and historical monuments and attracts large number of tourists.

The virtual model has been created using the 3D technique with navigation. Objects were made in 3ds max using standard primitives as boxes, polygons, pyramids and spheres. Students took digital photos of the real objects, adjusted them in Adobe Photoshop and mapped on the 3D objects in the model.

The model was exported to VRML [7] and can be viewed by Cosmo Player [13]. Cosmo Player was used for it's ability of manually adjusting the parameters of the visualisation, such as performance, pointer parameters, rendering quality, audio quality, speed etc.

The main difference between Virtual Old Prague[10] and our project is that Virtual Sarajevo has not been made for Internet viewing. This model is designed for browsing on the local computer and it requires a lot of memory.

With Cosmo player and using mouse and keyboard, it is very easy to visit the virtual world of Sarajevo and its famous part, Bascarsija. The following pictures show some views from the model.

Figure1:Bravadziluk

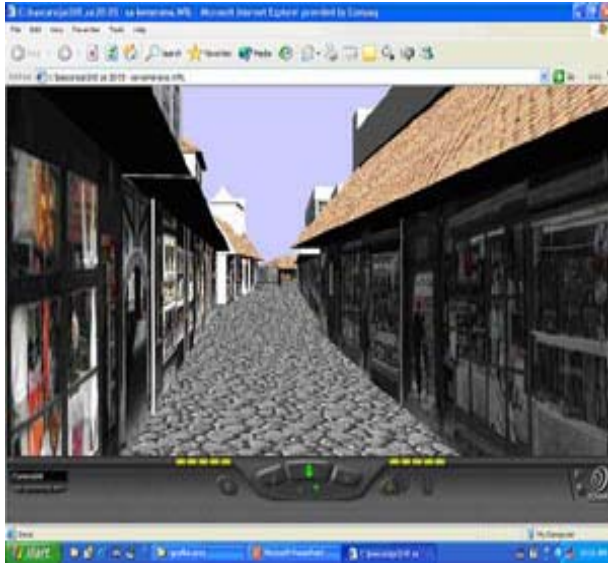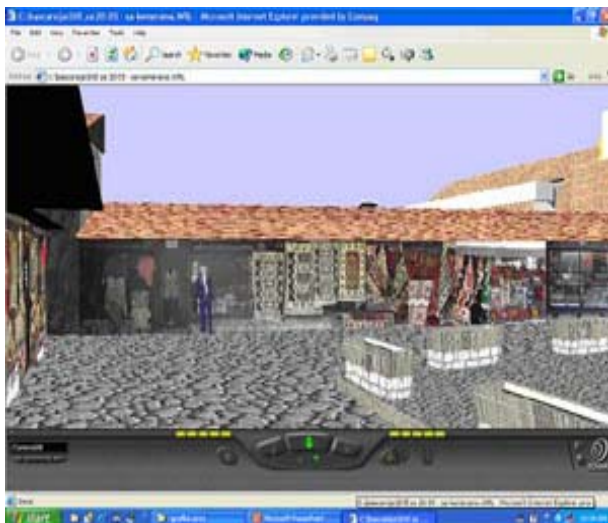**Figure 2: Sebilj, the center of Bascarsija**

Figure3:Saraci

Figure 4: Trgovke

In order to add more reality to the model, we decided to add the panoramic views of some interesting locations in the old town complex.

Panoramic views are opened in a separate window as our model is still very space consuming and it takes too much time to download again after viewing the panorama.

4. Panoramic Points Of View

4.1. Panorama creations

a.Taking photos
The first assignment in creating panoramas was to take digital photos of the most interesting parts of town which have already been created as a 3D model. We took panoramic photos using digital camera. One panoramic photo contains 10 photos made from one point of view in the 360 degrees circle .

We had many problems with traffic, and because of this we had to repeat taking the photos at some locations. After we had transferred the photos to the computer, we had to optimize and adjust them. The photos had a lot of mistakes which we had to fix, and details which we had to delete. Those operations were made with the standard and popular software such as Photoshop and IrfanView.

b. Linking photos
After fixing and optimising the photos, we started to link them into 360 degrees panoramic photos. For that operation we used Photovista[14], which was an excellent solution. We loaded 10 photos for each panorama in Photovista, and the software linked them and adjusted them to each other. We had just to fix some mistakes on the top and bottom edge of the panoramas, because of the unprecise taking of the photos.

The next pictures are the panoramas, which were created from 10 photos in Photovista.

Figure 5: Panorama of Sebilj

Figure 6: Panorama of Bascarsija

Figure 7: Panorama of Bascarsija mosque garden

4.2. Inserting panoramas in the model

Before inserting the panoramic picture into our model we had to find out the best way to attract the user's attention to the object he should click on. As it is highlighted in [2], navigation in virtual worlds is different from the usual point-and-click based user interface and it's not an easy task to point out the place in the scene that contains a link or information. We decided to use a three dimensional letter P placed in a rotating torus, so the user's attention is attracted by noticing this moving object during the browsing.

After optimising and linking photos into the panoramic photo, we had to insert panoramic viewpoints in 3D model of the city. Insertion was done using the Anchor node. We have inserted the Anchor node in 3ds max, as this nod exists amongst 3dsmax's VRML helper objects. Anchor node is a group nod that starts loading the file specified under the URL attribute.

```
Anchor {
  description ""
  parameter "target=my_frame"
  url          "C:\bascarsija\web\TIM1-PAN\panorama-
bascarsije.htm"
  children [
    DEF Text01 Transform {
      translation 1.5e+003 -347 4.01e+003
      rotation -0.013 -0.707 0.708 -3.17
      scale 1.67 0.208 1.7
      scaleOrientation 1 0 0 0
      children [
        Shape {
          appearance Appearance {
            material Material {
              diffuseColor 0.878 0.776 0.341
            }
          }
          geometry DEF Text01-FACES IndexedFaceSet
{
            ccw TRUE
            solid TRUE
            coord DEF Text01-COORD Coordinate { point
[
```

```
...
]
        }
      }
    ]
  }
] }
```

The code above represents the inserted Anchor node that starts the file "panorama-bascarsije.htm" containing the panoramic picture generated by PhotoVista (fig.8). The file is loaded after the user clicks on the child node Text01 of the Anchor node.
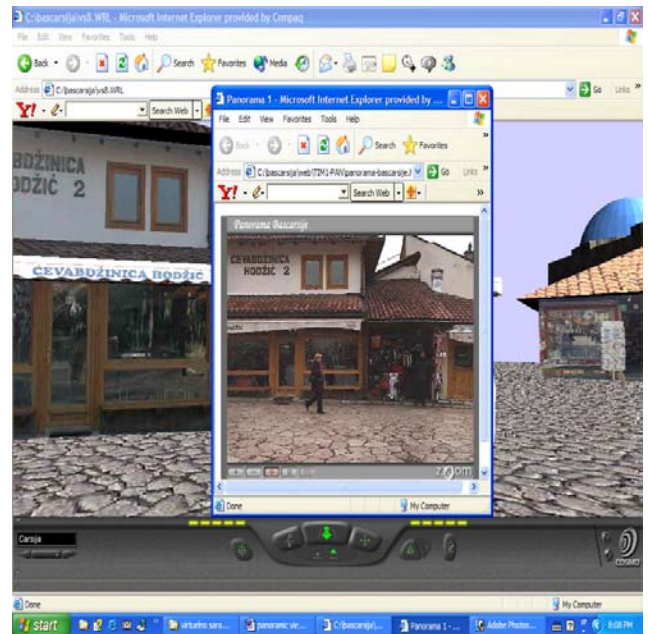

Figure 8: Panoramic view of Bascarsija

For the users who are not able to use the PhotoVista software there is another way to create the panoramic viewpoint. After connecting the photos in Adobe Photoshop, the panoramic picture can be mapped to a cylinder and viewed as a wrl file by the VRML browser.

In 3ds max we generated a cylinder with a radius calculated from the dimensions of the panoramic photo.

We mapped the cylinder with the panoramic picture bitmap and exported it in a separate wrl file (fig. 9). That file we have called from the Anchor node.
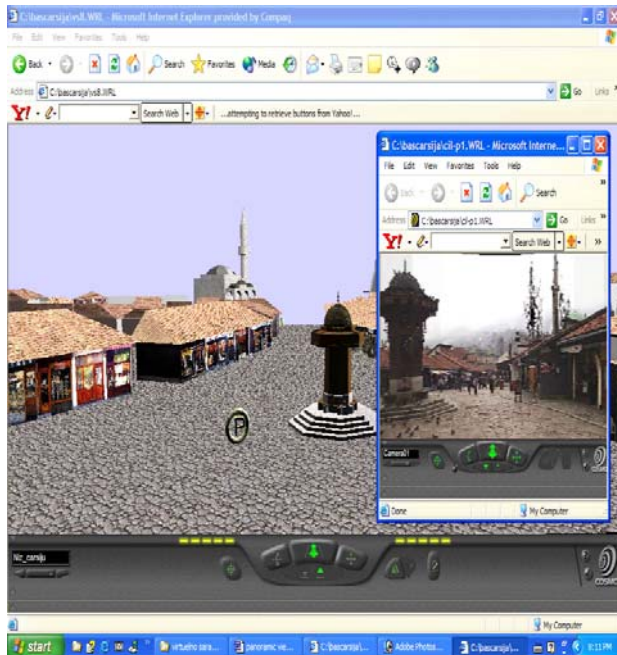
Figure 9: Panoramic view of Sebilj

We have compared these two ways of presenting the panoramic pictures and concluded the following:

- visualisation is much better in the PhotoVista generated htm file. If we browse the wrl file by Cosmo, we have to adjust the Image/Texture Quality to "Best Quality" manually as it's adjusted to "medium" by default.
- navigation is easier to restrict in Photovista then in the wrl file
- the file size is almost the same as in the both cases we use the same panoramic photo

5 Conclusion

In this paper we have presented two ways of implementing panoramic views in the Virtual Sarajevo model, as a htm file and as a wrl file. In the future we will make experiments with other panorama pictures software tools in order to achieve better visualisation quality and efficiency of the model.

As the present Virtual Sarajevo model is designed for viewing on a local computer, our future work will also be to carry out a web implementation of the model. The second phase of our future work will also include a contribution in developing a GPRS system for the city of Sarajevo that should improve the orientation of the visitors in town and point out the places most interesting to visit.

References

[1] The Virtual Reality Modeling Language, VRML97 Functional specification and VRML97 External Authoring Interface (EAI) International Standard ISO/IEC 14772-1:1997 and ISO/IEC 14772-2:2002

[2] Zara Jiri: Virtual Reality and Cultural Heritage on the Web. Invited talk. In: *Proceedings of the 7th International Conference on Computer Graphics and Artificial Inteligence (3IA ' 04)*, Limoges, France, p. 101-112, ISBN 2-914256-06-X

[3] Zara Jiri: Preparation and Presentation of Cultural Content in Virtual Environment. *Electronic Imaging 2003*, Santa Clara, California, USA, January 2003, p. 72-79. ISBN 0-8194-4818-4.

[4] Zara Jiri, Slavik Pavel: Cultural Heritage Presentation in Virtual Environment: Czech Experience. In: *Proceedings Fourteenth International Workshop on Database and Expert Systems Applications*. Prague. IEEE Computer Society Press, 2003, p. 92-96. ISBN 0-7695-1993-8.

[5] Zara Jiri, Benes Bedrich, Rodarte Rocio Ruiz: Virtual Campeche: A Web Based Virtual Three-Dimensional Tour. In: *Proceedings of the Fifth Mexican International Conference in Computer Science (ENC '04)*. Colima, Mexico, IEEE Computer Society Press, 2004, p. 133-140, ISBN 0-7695-2160-6

[6] Ferko Andrej, Martinka Josef, Sorman Mario, Karner Konrad, Zara Jiri, Krivograd Sebastian: Virtual Heart of Central Europe. In: *Proceedings of 9th Symposion on Info & Communication Technology in Urban and Spatial Planning*. Wien: Technische Universität, 2004, p. 193-200. ISBN 3-901673-11-2.

[7] S.Jeginovic, S.Rizvic, A.Chalmers, "Interactive 3D models - From 3ds max to VRML", CESCG 2004

[8] Discreet 3dsMax. www.discreet.com .

[9] Virtual Paris. www.2nd-world.fr/ .

[10] Virtual Old Prague Project. www.cgg.cvut.cz/vsp/

[11] Virtual Glasgow. iris.abacus.strath.ac.uk/glasgow/

[12] Virtual Sidney. www.planet9.com/earth/sidney/ .

[13] Cosmo Player. www.cosmosoftware.com .

[14] MGI Photovista 2.0. www.mgisoft.com

[15] Virtual City of Sarajevo –
www.etf.unsa.ba/~srizvic/rgrafika/virtualna_realnost/v
sarajevo/home.htm