

WEBBASED PRESENTATION OF INDOOR MODELING BY MEANS OF PHOTOGRAMMETRY

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Abstract:

In last years, as the result of developments in digital photogrammetry and computer technologies, 3D indoor environment and building modelling has taken place among the research topics. 3D indoor and building models are becoming almost obligatory for city planning, advertisement and tourism. In this case study; it is aimed to produce an indoor virtual reality model of an art gallery by means of photogrammetry and to present this model on web. The model will also include the objects (paintings, sculptures, vases etc.) inside the gallery with their attribute data such as dimensions, painter, production date, price, art flow and technique. There will be a user interface to query the objects on the model. For these purpose a corridor in the Civil Engineering Faculty was selected as the application area. The application example photographs' of a civil engineering firm lying on the walls was assumed as paintings and some objects (replicas) were assumed as valued object of art. This study presents an available method for relevant to reach information about the interested art objects through web.

1. INTRODUCTION

Usage of three-dimensional models is increasing in the virtual world. While companies like Google and Microsoft are trying to more detailed and precise city models, users are enjoying being able to visit these models. In addition to these developments; improvement on game engines also effect indoor modelling. Modelling indoor with the objects existing inside, organizing their attributes in a database, representing this information together on GIS and virtual museum applications is becoming more widespread and popular by the result of these developments. Web; as the presentation platform of these systems, provides to keep pace with today's technology and also provides more convenient access for users.

In this project, indoor and object existence inside were modeled and a database containing the object attributes were created. Finally these data presented on a design web site together.

2. WEB BASED VISUALIZATION TECHNIQUES AND PHOTOGRAMMETRY

Animations; as the output grabbed image sequences of CAD programs, are the first visualization products. Different images from any angle have been added to this array in order to get all side view of the object. Animations were limited with the output format of CAD software at the beginning. In time; no natural lightning rendered 3D vector data became possible and it is followed with texturing with real world images in the middle of 90s. Within its texturing opportunities 3D Studio MAX became more popular for users. Panorama; cylindrical projection of the environment from a projection point called node, should also be mentioned as another type of visualization. Then GIS software provides virtual navigation on the combined data of vector and attribute. Nowadays OpenGIS and Web3D standards provide usage of 3D geo-data over the Web.

Photogrammetry provides accurate, detailed and economical 3-dimensional data. Photogrammetry has significant advantages compared to other techniques:

- Provides large amounts of data belonging to a particular field or a single object in different scales and resolutions.
- Provides accurate 3D data depending on the system and method used.
- Provides detailed and high resolution texture and graphic data.
- Provides geo-referenced data.
- Provides metadata [1].

3. MODELLING AND VISUALIZATION

A corridor inside the Civil Engineering Faculty was chosen as the application area and the pictures on the wall were chosen as the application objects. The images of adverse walls' were taken by a Sony DSC-H9 digital camera according to the picture taking plan given below.

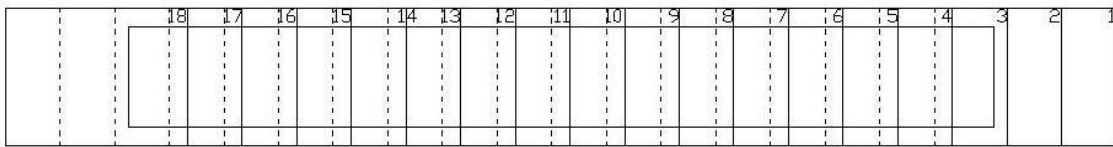


Figure 1: Picture Taking Plan

The control points' coordinates were calculated by intersection method according to the measurements done by GEOMAX ZTS 600 Series Total Station. After orientation steps; borders of the surface, pictures and doors was evaluated to model the application area (Figure 2).

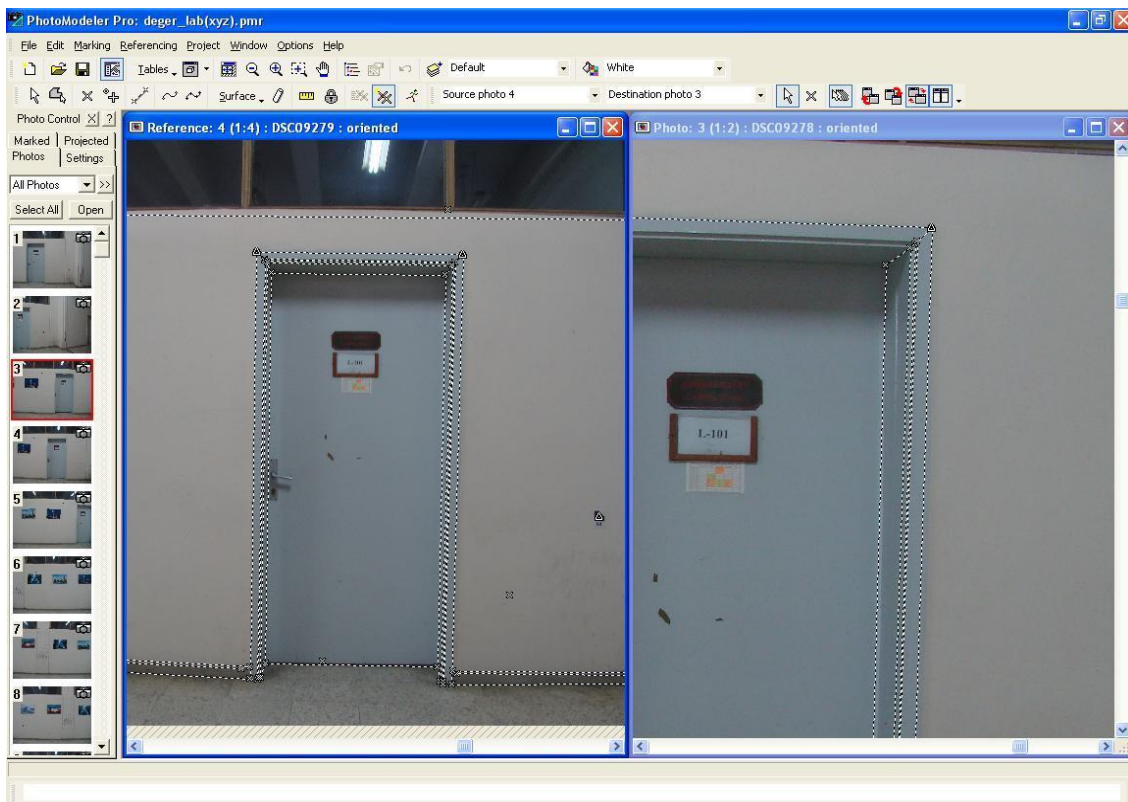


Figure 2: Evaluation

After evaluation; pictures depicted as surfaces for covering them with original images and videos for the website were composed.

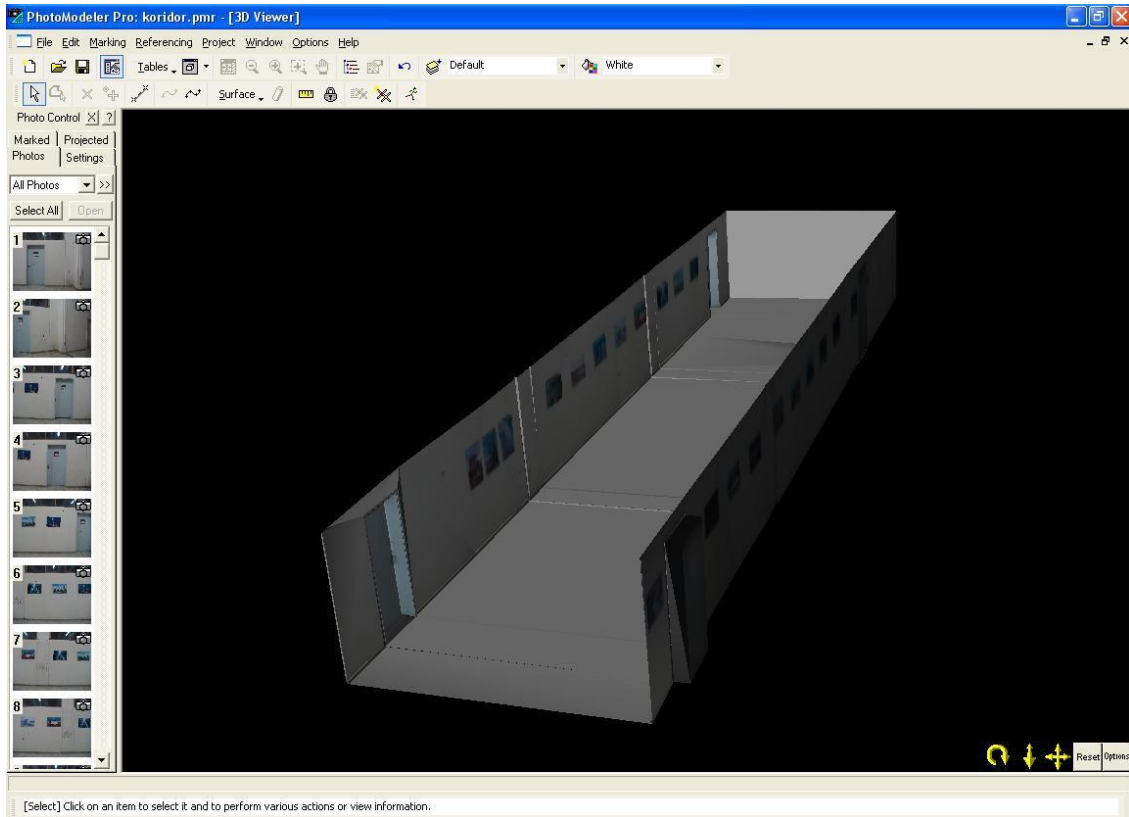


Figure 3: 3D Textured Model

For organizing the database attributes were described as follows: Name of the Work, Artist, Method, Year Painted, Dimensions, Country, Art Trend, Exhibition Dates, Price and Room stored. Since the object are only examples, attributes were randomly described (Table 1) [2].

Table 1: Attribute Data

Object ID	Name of the Work	Artist	Method	Year Painted
1	Development Projects	John Brown	Oil Colored	1950
2	Schools	Cole Cand	gouache	1945
3	Motorway Precast	Lacre Nos	acrylic	1977
4	Retail Center	Antov Sola	acrylic	1942
5	Hospital	Matt Herris	gouache	1960

Dimensions	Country	Art Trend	Exhibition Dates	Price (USD)	Room stored
50 x 70	USA	Modern	05.12.2005	10000	12
50 x 70	UK	Baroque	12.02.2007	26000	12
50 x 70	Poland	Pop-Art	25.04.1998	29000	12
50 x 70	Russia	Surrealism	23.12.1997	17000	12
50 x 70	Brazil	Cubism	12.02.1997	20000	12

The videos for the website was created using SnagIt and Adobe Flash Video Encoder and the website was created using Adobe Dreamweaver. The website can be reach through: <http://www.itu.edu.tr/~arpaceke>.

4. CONCLUSION AND REMARKS

In this project, indoor and object existence inside were modelled and a database containing the object attributes were created. Finally these data presented on a design web site together.

Problem occurred during the project can be defined as follows:

- During the modelling phase; singularity problems were observed. Taking oblique images instead of parallel will solve the singularity problems while modelling flat surfaces.
- Tone differences were observed during surface texturing because of the geometric expectations during the image taking. To solve such problems; additional image should be taken by considering light settings.
- Fluid connection could not be established between the links and videos during the website design phase. This problem can be solved by using programs; that restrict user's movements and provides more fluid relationship between video-link, such as Adobe Flash instead of html code.

5. REFERENCES

- [1] Duran, Z., 2003. *Tarihi Eserlerin Fotogrametrik Olarak Belgelenmesi ve Coğrafi Bilgi Sistemine Aktarılması*, PhD Thesis, ITU Institute of Science and Technology, Istanbul.
- [2] Arpacı, K. E.: *Fotogrametrik yöntemle iç mekan modellemesi ve sanat eserlerinin veritabanı oluşturularak sanal ortamda gösterimi*, BSc Thesis, İ.T.Ü. Department of Geomatics Engineering, Istanbul, 2009.