

3rd International Scientific Conference

Treći međunarodni naučni skup

moNGeometrija 2012

Proceedings

Zbornik radova



Serbia, Novi Sad, June 21st – 24th 2012

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DEVELOPMENT OF 3D OBJECT MODEL BY APPLYING GOOGLE SKETCHUP SOFTWARE PACKAGE

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Abstract

Under the notion of visualization we mean any technique of creating images, diagrams, 3D models or other animations as a form of visual communication. Tree-dimensional view of buildings on Google Earth allows us insight into the real world. Belgrade has recently started to publish 3D content on Google Earth, but Faculty of Mining and Geology is not among the published items, and from there arose the idea for the theme of this paper. The aim is to create 3D model of building of the Faculty and its publishing on Google Earth. During the production of this paper it has been used an open source software for 3D modeling, Google Sketchup.

Key words: visualization, 3D model, Google Sketchup.

1. INTRODUCTION

Google and the Google Earth change the view of the world, put at the disposal of the smallest details of the Earth's surface and give us the opportunity to travel the virtual earth. Turning on a three-dimensional buildings option, Google Earth allows more realistic appearance of a certain territory. Belgrade has recently started to publish 3D content on Google Earth, but the building Faculty of Mining and Geology is not published, and from there came the idea for the theme of this paper.

Visualization today has a wide range of use in science, education, engineering, medicine, etc. A typical field of application is computer graphics. The invention of computer graphics may be the most important development in the field of visualization since the invention of Renaissance central perspective. Development of animation also helped improve of visualization. However, the largest application of visualization is in the technical professions field such as architecture, construction, surveying, geology, mining, mechanical engineering, etc.

The aim of this paper is to explore 3D working environment, coping with it, defining the problem of making, publishing to Google Earth, and finally understanding the spatial model. Also his ability to handle exporting and linking with other software and to operate and process models.

In this paper, by using tools for creating 3D models of buildings, is modeled Mining and Geological Faculty in Belgrade, which is located on 7th Djusina. It is necessary to introduce an old reconstructed (unreconstructed) part of the building. Software that is used in the preparation is Google SketchUp 8.

2. GOOGLE SKETCHUP AND GOOGLE EARTH

Google SketchUp is a software visualization tool, which uses many features to satisfy most users with a simplified user interface. The software package is available in the form of a personal (free to use) or professional (commercial) version, which can be downloaded from official presentation available at <http://sketchup.google.com/intl/en/download/>. This package is just one among many others which deals with the modeling of objects, besides him, there are many other CAD applications. SketchUp is in contrast to the other easily available in the economic sense (there are freely available and commercial version of the software), it is very easy to work, you can quickly learn, a good on line support in the form of tutorials. The good side is that this tool lets you upload various file formats and when we review the results, gives us the optimal solution that is extremely useful.

The world that surrounds us can not really be described by 2D view. We do not live in a 2D environment and therefore has been necessary to present the grounds and facilities as closely as possible. We are increasingly faced with navigation systems that help us to cope with new environments and to easily and quickly reach the desired goal. Manufacturers of this equipment aspire to find a better way to attract their customers. As the competition in the market is large, they came up with the idea that streets and buildings appear on the

screens in three dimensional space. When making presentations of educational institutions in the visual comparison, if we have a 2D and a 3D view of the other buildings, we can say that the visitors attention will be attracted much more to the object with more dimensions. It has been proved that when people get more information, their brains then accept and absorb a greater amount of information. While various reconstruction and repair models of objects can be used for the purposes of rough preliminary estimate of quantities and works to calculate the amount of material required to spend in the project.

After creation of 3D models, is provided his presentation on the Google Earth virtual atlas, which is a 3D explorer of the globe. View of the Earth that we see by opening Google Earth, is the result of many complex satellite images of the territory, not in real time, but the composition of images collected at different time periods. Therefore represents a powerful geographical encyclopedia. The program in the basic version can be used free of charge and there is another type of license Google Earth Pro, to be purchased, and can be used not only for commercial but for professional use. The coordinate system used by Google Earth is WGS84. In newer versions of software appear to be extremely useful services such as 3D objects and 'Street view' or 'Street walk'. With use of these services we will eventually be able to look at our model of Mining and Geology.

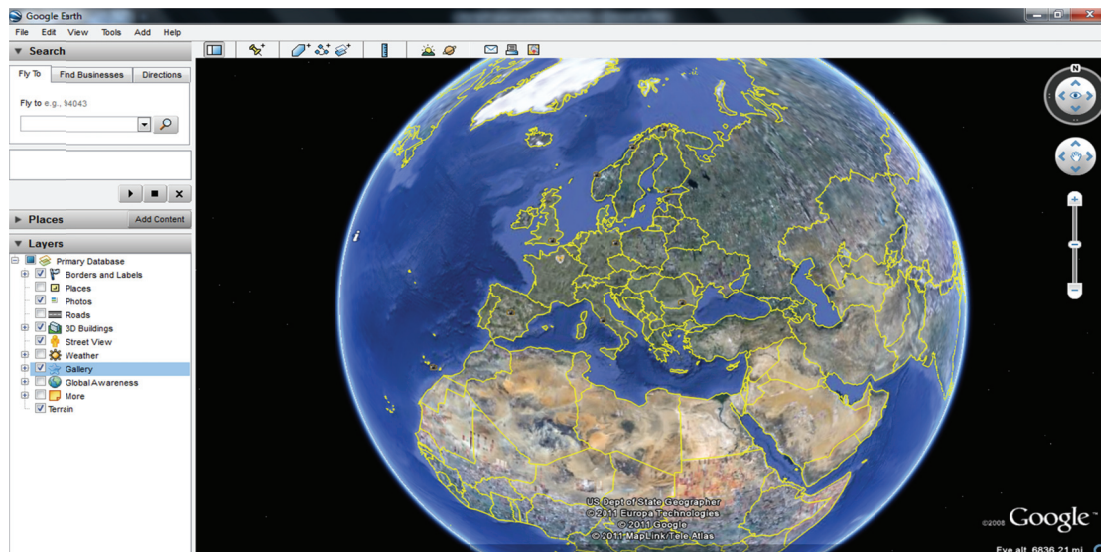


Figure 1. Operating environment Google Earth.

Google Earth interface (Figure 1), is well designed in terms of simplicity and convenience of use. Management system is divided into several regions. Most of the interface takes the desktop where it shows the Earth and navigation buttons that allow control over images which is rotation, zoom, tilt and navigation. On the left is a menu with a choice of locations to look at. The interface part Layers can be turned on to display anywhere on the planet: the world's capitals, rivers, mountains, roads, 3D buildings, grounds, streets, roads,

etc. Searches are done by entering the state, region, city or even a home address, after which the software zooms the view of the Earth from space, until the maximum resolution is reached. You can enable or disable the 3D terrain, buildings, bridges... and read the coordinates of an object or change the angle of view of the location.

2.1. 3D Warehouse

3D Warehouse¹¹ is a catalog that brings together users of Google Earth and Google SketchUp, and where one can find many 3D objects in formats *.kmz and *.skp. This user's database of models can be used over the official web presentation or content of Google SketchUp. Google's desire is to bring people closer to experience of a virtual tour of the entire globe, to make their three-dimensional maps. Format file created in the software tool Google SketchUp is a *.skp and file formats for spatial data managed by the Google Earth *.kml or *.kmz. These formats, KML¹² and KMZ, are used for displaying three-dimensional geographic data in Google Earth. Convert *.skp file in *.kmz file format is done in Google SketchUp.

3. PRODUCTION AND VISUALIZATION OF 3D MODELS

A set of tools Google SketchUp, among other things, consists of tools that are designed for creating a basic two-dimensional shapes, such as tools for creation of lines, rectangles, circles, freehand drawing and others. 2-dimensional elements get the third dimension by using the push-pull tool that works on surfaces. Procedure of the modeling we start with building the basics of object drawing, after which the base is 'pulled' on up, to get the third dimension of the object (Figure 2). Optional details that make the model more complex, such as the representation of windows, doors, air condition appliances, are drawn as rectangles on the surfaces of walls, can be 'embedded' within the walls, or 'drawn' out by the push – pull tools.

¹¹ <http://sketchup.google.com/3dwarehouse/>

¹² KML (Keyhole Markup Language) is a descriptive language that is used in Earth visualization and whose base is an XML language. The company Keyhole, Inc. originally developed the language for a virtual atlas of Keyhole Earth Viewer, which is grown in Google Earth when the company in 2004 was taken over by Google. Of 14 April 2008. The KML is an official standard OGC (Open Geospatial Consortium) and consistent with basic standards of OGC visualization. KML is complementary to the OGC GML (Geography Markup Language), WFS (Web Feature Service) and WMS (Web Map Service).

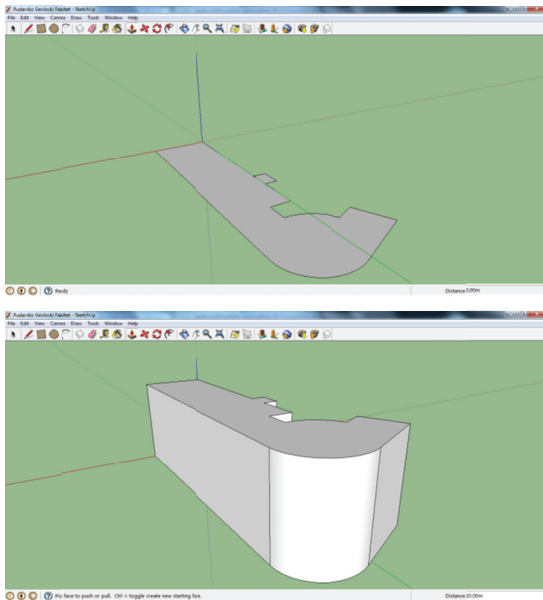


Figure 2. Rendering of the building and grounds of a cube.

In terms of models, Google Earth offers a variety of flavors - from the classic model through X-ray view in which the pages are transparent objects, the wire models when there are presented only the outlines of the object.

The final part of the modeling object is created by assigning the material side of the building with offered textures from Google Sketchup library (Figure 3 left) or you can add new materials (Figure 3 right), which can represent the object and photographs, resulting in a more realistic model.

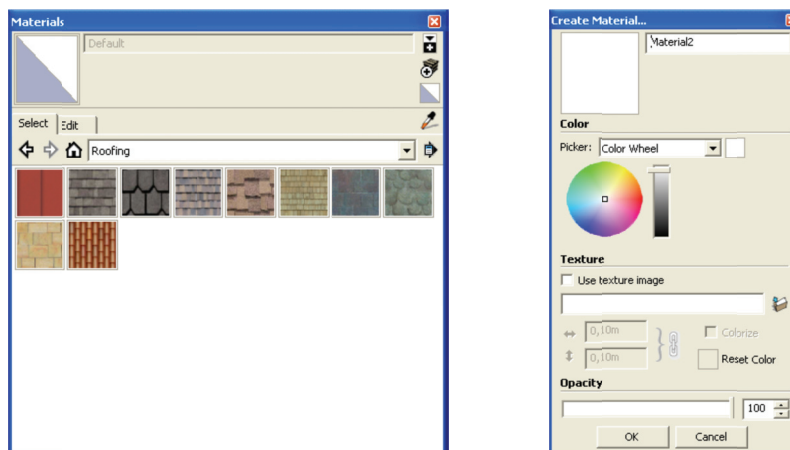


Figure 3. Used textures from the SketchUp library and add new material.

In the Materials window, pictures of an object can be added to the image of the object as a new texture. After loading the corresponding photograph, true dimensions of the object may be placed to which the image sets and we can change the transparency and color of basic photography. Inserting images of objects, which are recorded on the ground, largely influences the degree of realism of the model. It is often not possible to make a photo that represents a whole object, the most common reasons are the obstacles in the form of buildings and trees. On this occasion, making picture of an object from different angles, moving evenly around the entire building, as shown in Figure 4, leads to the eventual merging of photos and getting a photo that represents a whole object.

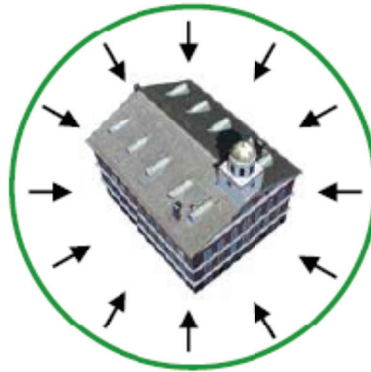


Figure 4. The circular object photography.

Because of these problems, the building of the Faculty is not done with images, but all its elements are modeled by using tools from the software itself. Windows and doors are imported from the 3D Warehouse, which looks the most suitable to the existing university buildings. The final appearance of the 3D model from different perspectives can be seen in Figure 5.

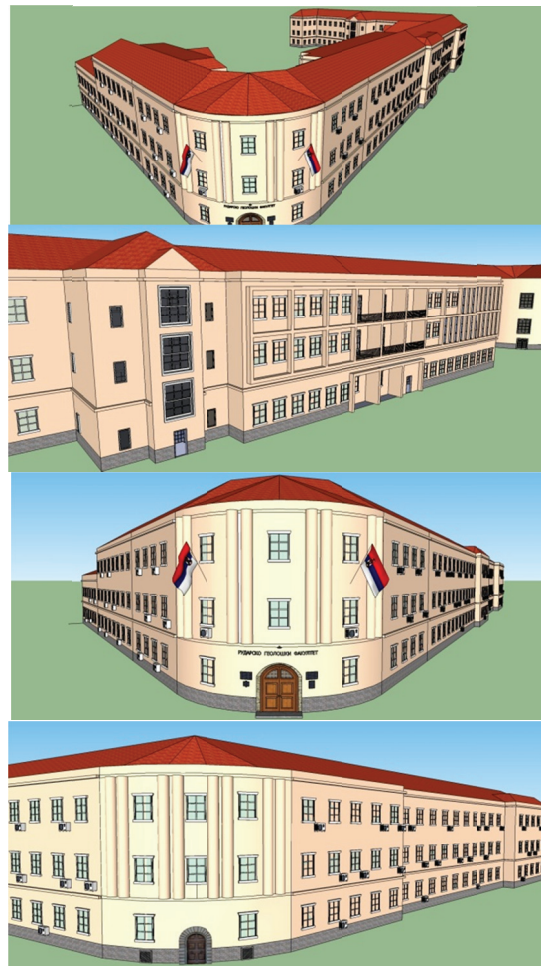


Figure 5. Model of Mining and Geology Faculty from several angles.

To be published in the 3D model in Google Earth, it is necessary to fulfill the requirement that the model is pre-set to the 3D Warehouse, and after that being accepted by the administrator Google Earth as a model that is correctly modeled and placed on the right location (for all 3 coordinates).

4. CONCLUSION

The purpose of the map is to represent reality. Maps are a graphical representation of the Earth and objects that are on its surface. A further step in making maps is reached at the moment when the 2D visualization is surpassed. In order to realistically present a reality, scientists have added a third dimension (3D) and have made world closer to a human eye.

The main advantage that came with the 3D modeling is the spatial perception of a complete building and infrastructure. This detail is a major asset

that brings a third dimension. Most manufacturers use it to present their projects, because it leaves a much stronger impression on a potential customer than 'less interesting' 2D drawing.

During the modeling of the building, we can say that is made in a simple program, which can be easily mastered, but on the other hand very practical, which for our purposes, primarily publishing model on Google Earth gives excellent results. The model can be used in various seminars for the presentation of faculty and other forms of presentation. The model can be used when precision is required of the object itself, since the foundations of the building are taken from Google Earth.

The basic version of Google SketchUp does not offer a wide range of export file formats, and this fact is considered as one of the disadvantages of this program. Unlike the basic version, Pro version of the software offers a lot more extension choices Export-ing, like for example * .3ds and *.dwg, corresponding to 3DS Max and CAD formats. So I think that this is not the finished 'product' SketchUp but can be used for further handling and processing.

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