

How to create and export CityGML LOD4 data model from SketchUp

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Extended abstract

This contribution describes the state of the art in the development of a SketchUp, CityGML Export module. It describes, how a user can adapt and export a SketchUp model to CityGML up to the LOD 4 (level of detail 4).

Keywords: 3D model, building, CityGML, SketchUp.

1 Current situation and motivation

The present geographical data are increasingly more focused not only to 2D features, but 2,5D and 3D data as well. This leads to a need for improved 2,5D and 3D data creation. Contemporary geographic information systems (GIS) are able to store and portray data up to third or even fourth dimension (time), but they have very limited tools for creation or modification of 3D objects. Contrarily, 3D editing is a typical domain of computer aided design/mapping (CAD/CAM) applications.

Often there is a need of a 3D data conversion from CAD to GIS. There are many data formats suitable for such a conversion (e.g. Collada, KML, dgn, dxf or CityGML to name at least some which are commonly used).

This contribution shows, how it is possible to create a semantically rich 3D object and convert it from CAD to GIS without losing that semantic information. It is particularly focused on 3D models of buildings.

The contribution focuses on SketchUp software (wide spread, easy to learn CAD based application) and the CityGML data format (a format that has both geometric and topological information, and additionally has semantic information as well).

2 SketchUp CityGML Export Plugin

2.1 Basic description

The *SketchUp CityGML Export Plugin* is a piece of software, which decomposes a 3D model of a building created in SketchUp. The Plugin analyses the 3D model face by face, triangle by triangle and export the geometry and attributes selected by user in an appropriate CityGML class ~ up to the Level of detail 4 (LOD4 – incl. interiors): RoofSurface,

WallSurface, GroundSurface, ClosureSurface (LOD2), Opening (Window, Door), BuildingInstallation (LOD3), CeilingSurface, InteriorWallSurface, FloorSurface, IntlBuildingInstallation, ExteriorFloor (LOD4).

2.2 Short development history

An origin of the contemporary code comes from the <http://citygml.de> page, where the code (v. 1.8) was available for free. The version 1.8 was able to export just LOD2 CityGML classes (RoofSurface, WallSurface, GroundSurface, ClosureSurface).

Therefore the code was further developed at the University of West Bohemia:

- to support CityGML classes up to LOD4.
- to upgrade from the SketchUp 2013 version to SketchUp 2016 version.

The contemporary version of the code is available under open license at https://github.com/wennaspeedy/citygml_for_sketchup2015/wiki.

3 Creation and export CityGML LOD4 data model from SketchUp

The fundamental way of organizing data in SketchUp is using layers, groups, components and polygons and their mutual relations. Using layers is the best way to manage data for successful exporting of data to the CityGML class' specification.

The *SketchUp CityGML Export Plugin* consists of two parts. First part is integrated into a context based menu available under a mouse right-click. This part of the plugin allows a user to organize a 3D model of a building into layers named after appropriate CityGML classes. The second plugin part is integrated in the main SketchUp menu, under Plugins item. It

allows a user to export properly classified model of building into CityGML LOD4 format. Then the data can be converted by an ETL (export/transport/load) tool, such e.g. a FME or Data Interoperability, to a GIS data format (e.g. shapefile, geodatabase) and used in a GIS.

4 Summary

The presentation will show the fundamentals of CityGML, describe the *SketchUp CityGML Export Plugin* and then demonstrate how the 3D model can be categorized according to CityGML, exported to CityGML and further converted to a GIS format and integrated to a three dimensional geographic database.

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