Web Based Generation and Management of 3D City Models at Condominium Level

Ziya Usta, Muhammed Emre Yildirim and Çetin Comert (Turkey)

Key words: 3D Modelling, Web based Modelling, WebGL, HTML5, ondominium Units, Spatial Information Management, 2D/3D/4D Geospatial Models, Algorithms, Visualization, Standards and Applications, Web and Mobile GIS

SUMMARY

A 3D City Model (3DCM) is a digital representation of an urban environment with a three dimensional geometry of common urban objects and structures, with buildings as the most prominent feature. 3DCMs are used in many applications which requires presentation, analysis and management of objects in 3D.

Although many applications require condominium based query and analysis, in most of the 3DCMs, representation of condominium units have been neglected. This situation makes condominium based 3D spatial data management impossible.

Generally two options are widely used to obtain 3DCMS. One option is to generate 3D models from LIDAR data and the other option is to generate 3D models from 2D datasets such as building footprints. Using 2D datasets to obtain 3D data has some advantages over LIDAR data. This had already been investigated in a previous work of authors (Usta and Cömert, 2017). The subject of that work was developing an application that models condominium units as 3D using condominium unit plans (CUP). In that work a methodology has been developed to accomplish this task.

With recent advancements in web technologies such as HTML5 and WebGL, now it is possible to analyze and visualize 3D content on browsers without any plug-ins. WebGL is a low level graphic API and utilizes GPU accelerated algorithms to display and perform operations on 3D content. Using benefits of WebGL, it is possible to develop cross platform and cross browser 3D web applications. Unsurprisingly, many high level libraries like THREE.js, X3DOM, Babylon.js and Cesium.js that abstracts many of the more code intensive WebGL functionalities have been developed.

The aim of this work is to combine aforementioned methodology with web technologies and develop a web based application that models, visualize and perform operations on condominium units in 3D. A RESTful web service will be developed using open source components. Cesium.js, an open source WebGL based javascript library will be used at the front end to visualize and interact with the data in 3D.