ESRI CityEngine Evaluation for Automatic Generation of 3D Models

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ABSTRACT

Automatic generation of low-rise 3D house models is important for the current study of urban planning. Sugihara et al., 2014 had demonstrated a 3D house model reconstruction by analyzing the rooftop segments. It was a great breakthrough. However, the prototype was built based on ArcGIS (arcpy), VB.NET and 3ds Max, which caused a compatibility issue and increased the complexity of the workflow. In this study, we investigated the possibility of integrating all algorithms under the Esri system, primarily using Esri CityEngine (Esri CityEngine online document) for the automatic generation of 3D house models. We are expecting to develop a new module in ArcGIS environment for general urban planning and insurance liability assessment applications.

In the original Sugihara study, VB.NET was used for rooftop segmentation and 3ds Max for 3D graphic display while Esri ArcGIS was still in a VB environment. Esri CityEngine is developed to improve urban planning, architecture, and design. It primarily uses the 3D visualization power to see the relationships of projects, assesses their feasibility, and plans their implementation. It is perfect for the future plan, 3D visualization and possible to host online for public viewing. The major differences between 3D MAX and CityEngine are the adoption of the geodatabase, which means 3D MAX based on an arbitrary building footprint, roof segments, and building height, while the CityEngine can directly import vector and raster building data, e.g., Open Street Map. We compare the new house models build in City Engine to the ones created in 3D MAX. The challenges are converting the 3D MAX implementation into CityEngine. CityEngine currently only accepts SketchUp and Maya. In this study, we are investigating the utilities the CityEngine SDK to solve this problem. Once this is achieved, all procedures from rooftop construction to 3D house modelling are all under python scripting using Esri package. It is the potential
solution to automatically generate the 3D model of existing buildings from the current geospatial data.

References
