A 3D GIS Model of Colby College Campus

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Colby

Introduction

Three dimensional modeling capabilities are a unique addition to ArcGIS software. The goal for this project was to create a semi-realistic 3D model of Colby College Campus using ArcGIS 10.3, and Google Sketchup. No such model has been created as of yet at the college. I hope this project can be useful for Colby as new buildings are constructed in the coming years, and provides ideas for a new way to view and map the campus.

Methods

Data were initially gathered from the Maine Office of GIS. Satellite imagery, as well as digital elevation models (DEM) were downloaded and transferred into ArcMap. All data were projected in NAD 1983 Zone UTM 19N. Figure 2 shows the DEM layer from the Maine Office of GIS, as well as the campus buildings vector layer from the Colby Physical Plants Department (PPD). The DEM and satellite imagery for the campus were downloaded in two pieces each, and the data sets were merged in ArcMap using the 'Mosaic To New Raster' tool.

The data were then transferred to ArcScene. The DEM layer was set as the base layer for the map and extruded to it's elevation. This gave the layer a realistic 3D elevation. The satellite imagery and campus buildings vector layer were draped over the DEM to mimic the elevation.

Building elevation data were gathered from the Colby College PPD. Building heights were estimated by manually measuring CAD data from PPD. The data was transferred into an Excel spread sheet, imported to ArcScene, and joined to the buildings vector layer in ArcScene. The buildings were then extruded to convey accurate elevation.

Individual shape files were selected within the buildings layer and the 'Layer 3D to Feature Class' tool was used to create a copy of the file within the map. Google Sketchup is not compatible with shape files within ArcGIS, and the 'Multipatch To Collada' tool was used to convert individual shape files into collada files that could be manipulated in Sketchup. Files were exported to the fileserver and manipulated in Sketchup to give them a more realistic look. The buildings were modeled off of first hand observations and images from Google Earth. Finished buildings were exported as collada files and imported to ArcScene through an editing session. Selected buildings were replaced with new 3D models. The process was repeated on Miller Library, F.W. Olin Science Center, Arey, Keyes, Diamond, Garrison-Foster, and Lorimer Chapel. Although the process was completed in the same way for all buildings, some collada files were unable to be exported for Sketchup manipulation.

To show a more unique view of the campus, the Fly tool in ArcScene was used to record fly-overs. The video clips were compiled and edited into one video which displays the 3D map from various angles and depicts different base layers to give viewers a unique look at the campus.

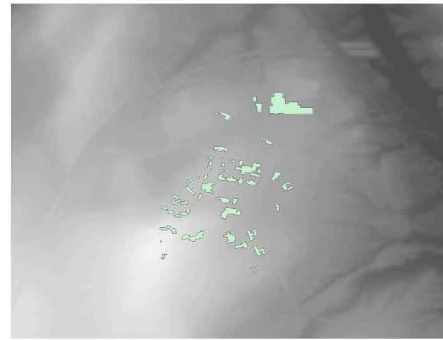Figure 1. The final map of Colby College campus.

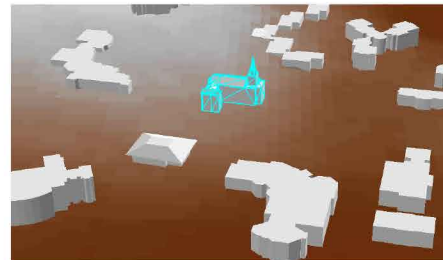Figure 2. The DEM and satellite imagery were joined in ArcMap and the buildings layer was placed on top.

Figure 3. Individual buildings were selected in ArcScene and converted into collada files before being manipulated in Google Sketchup.
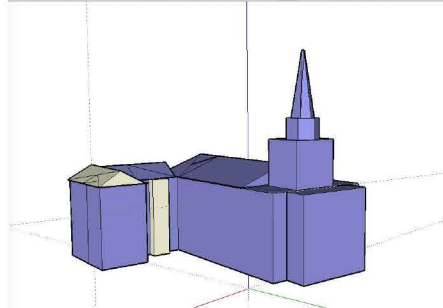

Figure 4. Details were added to the buildings in Google Sketchup before being exported back into ArcScene.

Figure 5. The final map of Colby College campus.

Figure 6. The buildings that were manipulated in Google Sketchup are depicted.

Results

- I was able to model Miller Library, F.W. Olin Science Center, Arey, Keyes, Diamond, Garrison-Foster, and Lorimer Chapel using ArcGIS and Google Sketchup
- 3D flyovers were conducted using the 'fly' tool in ArcScene to give viewers a unique perspective on the map
- I constructed a 3D map of Colby College Campus
- The map could be used in a variety of different ways in the future including: planning new building projects on campus, running interesting visual analysis while taking into account elevation, and as an aesthetically appealing, accurate map of campus.

Acknowledgements