3D Visualization of Platinum Triangle Specific Plan

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Introduction

The Platinum Triangle Master Specific Plan area is a growing area of the City of Anaheim with new development project are coming in. Because of this rapid change, GIS is essential to keep data easy to understand using spatial data and multiple maps. Currently, all the data are in 2D, which has a limitation of showing information such as mixed-use land use. This project created a 3D web application, which allows more information to be shown with more detail.

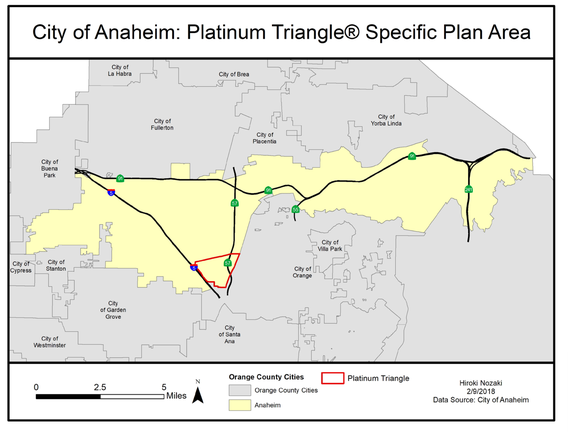


Figure 1. Map of City of Anaheim and location of Platinum Triangle area.

Data and Data Sources

- The LiDAR point cloud was captured by Eagle Aerial and purchased by the City of Anaheim.
- Digital Elevation Model (DEM) and Digital Surface Model (DSM) was created from the LiDAR point cloud.
- Building Footprint came from the City of Anaheim. Only the buildings that are in the Platinum Triangle area were exported and saved onto a Geodatabase.
- Façade Photos were clipped from Google Maps Street View.
- Photographs was taken using a Google Pixel 2. These were clipped and placed on the building using Esri CityEngine.
- The CGA and Python Code were developed as an original composition.

Dataset	Source
LiDAR Point Cloud	Captured by Eagle Aerial, Purchased by the City of Anaheim
DEM and DSM	Created from LiDAR Point Cloud
Building Footprint	City of Anaheim
Façade Photo	Personally collected and Google Maps
CGA Code	Personally written
Python Code	Personally written

Table 1. List of data and data sources used in the project

Methodology

Python Code was used to classify the LiDAR point cloud, which was the input used to create the DEM and DSM, and used to get height information for each building. After the Python Code was executed, errors needed to be corrected manually, and the DEM was recreated after all the errors are fixed. From the DEM and DSM, height information was pulled and inserted in the building footprint layer.

Next step involved creating CGA Code within CityEngine for symbology and façades. The building layer was imported twice so each building can have two different visualizations. Two different sets of code were created for each visualization, and imported into ArcGIS Pro. From ArcGIS Pro, all the layer and data were imported into the City of Anaheim's GIS Portal.

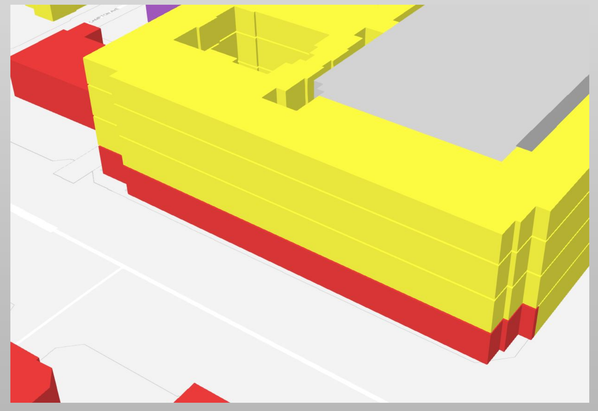
```
@StartRule
Buildings -->
    extrude(world.y,METER) SPLIT

SPLIT -->
    case Land_Use == "Commercial - Residential":split (y){METER/STORIES:Commercial|{0.5:NIL|METER/STORIES:Residential}*}
    else: split (y){METER/STORIES:Use|{0.5:NIL|METER/STORIES:Use}*}
```

```
Residential --> color ("#faf73b")
Commercial --> color("#e83232")
```

Figure 2. (Up) Start of the CGA Code, extrude, and split.

Figure 3. (Left) Symbology color for residential and commercial.

Figure 4. (Bottom) View of mixed use building with land use.



Timeline

Task	Start	Finish
LiDAR Classification	12/1/2017	1/31/2018
Error correction on LiDAR classification	2/1/2018	3/31/2018
Create DEM and DSM from LiDAR points	2/1/2018	3/31/2018
Data/attribute collection	4/1/2018	4/30/2018
Create 3D enhancement	4/1/2018	5/25/2018
Complete all 3D visualization and web application	5/25/2018	5/31/2018

Table 2. Table of start and finish to each task.

Results

The 3D visualization web application clearly shows the mixed use buildings separated by floor. All the information is provided on screen, including the legend. As a built in function in the Web App Builder, the sun can be moved around to see the shadow effect.

The building layer can be changed into buildings with façades. Depending on the building land use type, there are different façades on the buildings. Most façades were taken from Google Maps, which gives the façade a very cookie cutter look. Façades which are the actual picture of the building have a higher resolution, and a more realistic look than a generated texture.

Figure 5. (Top) First display of the web application.

Figure 6. (Bottom) Mixed Use building with Google Street View picture.

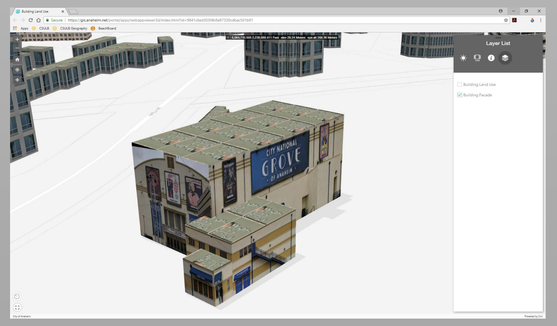


Figure 6. City National Grove of Anaheim with actual picture of the building.

Discussion

When this project started, there was little to no information about how to set up a 3D visualization, being a relatively new concept for Esri's software presenting many limitations which make the overall 3D visualization and application not as clean as expected. When creating the application, there was no way to edit the fields of the attributes to provide meaningful names. Because of this, the user might have a difficult time understanding the type of information displayed.

Another limitation involved the mixed-use buildings that had to be split into two different buildings in order to display the colorization correctly. Splitting the building is not the ideal way to display each building since an attribute table's information becomes useless. The building footprint contains the square feet of each building, but when the building is split, there is no way of telling how much square feet are in the split building section.

Conclusion

For future work, a few things could be added to make improvements on this project. First, by adding the ground surface or the DEM would enhance the application, which will make it closer to real world conditions. The portal server was able to publish raster information, but it could not be referenced from the server and displayed in the web scene. Second would be to add the General Plan and zoning information, since this application was designed for developers and planners to make decisions for future development. Without this information, they will not know what can be legally constructed. The third improvement would be creating a realistic façade for all buildings in The Platinum Triangle area. A 3D visualization should look as realistic as possible, such as with the Saddleback Church Anaheim campus, and City National Grove of Anaheim, where photos were taken at the location. Fourth would be to add buildings that are missing from this web application, which are Angel Stadium, the ARTIC, and the Honda Center. These are special buildings that require more time to show in a 3D visualization, which can be done in CityEngine or Sketchup, and imported into the scene. Lastly, including a few miles outside of The Platinum Triangle Area, (Anaheim outside of the extent, Orange, Garden Grove, and Santa Ana), would improve this project. To know what legally can be constructed, knowing as much as possible about areas around The Platinum Triangle area is important. In addition, including the entire extent of the City of Anaheim would provide more information, which would also help developers and planners generate new development plans for areas outside of the Platinum Triangle area.

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https://gis.anaheim.net/portal/apps/webappviewer3d/index.html?id=9841c6ed303f4b8e87330cdbac561b81