TerraScan: Tree Database Tools

TerraScan, versions 016.033 and above

GeoCue Group Support
2/6/2018
Revision 1.0

Introduction

Commonly, municipalities are responsible for the management of trees in public spaces, such as parks, the landscape of city buildings, along streets, and in road medians. These trees need to be located, identified, measured and monitored over time. With this information, the city can evaluate and sustain the health and safety of their trees and their surroundings. In the past, to gain this information required massive amounts of manpower and time. Using LIDAR, either aerial, mobile or drone based systems, several pieces of information that can inform the city's tree database can be quickly extracted with ease and precision. TerraScan's tree tools can contribute to this database by providing tree locations, heights, and width, among other attributes derived from a point cloud and associated imagery. This information is captured and stored in the design file by creating representative tree cells at the locations of the trees and then outputting the information into a table suitable for ingestion into the database tool.

Preparation

Before creating the tree cells, some preparation work needs to be done. First, 3D tree cells need to be created within a MicroStation cell library. Terrasolid provides some example 3D cells for this purpose (Figure 1). Upon installation of TerraScan, a cell library located in C:/terra/cell/karttali.cel contains these cell templates.

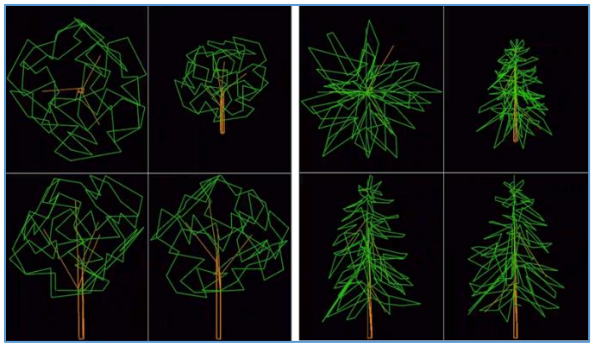


Figure 1: Right-Cell KOIVUD; Left-cell KUUSID; tree cells from the Karttali cell library.

Second, TerraScan needs to know which tree cells to assign to which tree species. For example, using KUUSID cells to represent coniferous trees.

Third, the point cloud needs to be prepared. We recommend using the group classification workflow. At minimum, ground needs to be classified and the trees need to be in a separate class with unique group numbers assigned.

Create Tree Cells

To create tree cells, place a MicroStation fence surrounding the trees you wish to measure (Figure *2*), then select the 'Create Tree Cell' tool. The fence is used to restrict the cell placement to only pertinent trees. In the 'Create Tree Cells' dialog, specify which point classes will be considered which tree species in the 'Class to species mapping' dialog. Also, specify which class represents ground. Clicking "OK" will assign and place the tree cells to each tree according to the species mapping settings (Figure *2*) and group assigned.

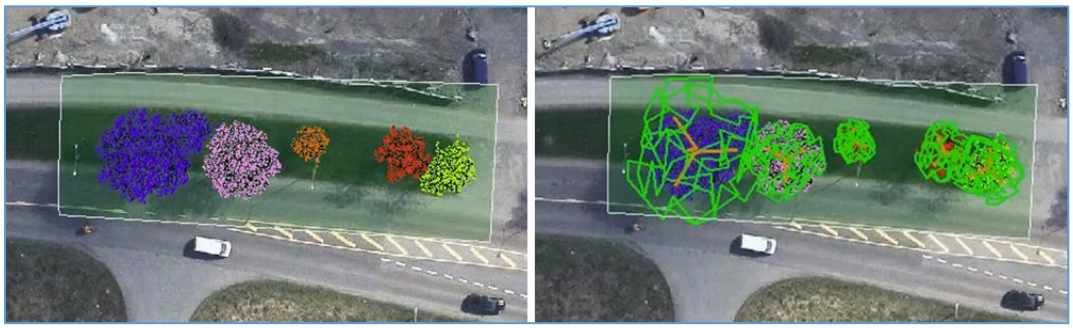


Figure 2: Right- Fence drawn around tree groups; Left- Tree cells automatically assigned to each tree group.

Modify Tree Cells

Reviewing the results of the Create Tree Cell tool could reveal some mismatches between the data and tree cells. Outlier points within point groups representing trees could cause the assigned cells to have inaccurate dimensions (height, width, etc.) or to be off center (Figure 3).

Figure 3: Profile view of automatically assigned tree cells.

The 'Modify Tree Cells' tool allows one to review and edit the assigned tree cells on a tree-by-tree basis. It can be useful to have imagery accompanying the data to assist in the interpretation of the fit of the cells to the tree points (oblique imagery is particularly useful). If that is not available, TerraScan has a "Street View" tool (new in v016.033) that displays images available from Google Street View©. These tend to be better images for making interpretation calls than airborne imagery due to their resolution, proximity, and perspective.

Upon activating the 'Modify Tree Cells' tool, the 'Tree view settings' dialog will appear automating the setup of MicroStation views for top, section, and camera views.

The 'Modify Trees' dialog lists each of the tree cells, their species, and if they have been accepted or are pending the check process (Figure *4*). Selecting each tree from the list automatically adjusts the views (as defined in the 'Tree view settings' dialog) to the locations of the selected tree, as defined in the 'Tree view settings' dialog. From here, one can adjust the height, width, trunk size or position to ensure that the cells faithfully represent their trees (Figure *4*). For airborne data, the trunk size will probably not be measurable, however, with mobile data there would be enough points at an appropriate angle to visualize that criteria.

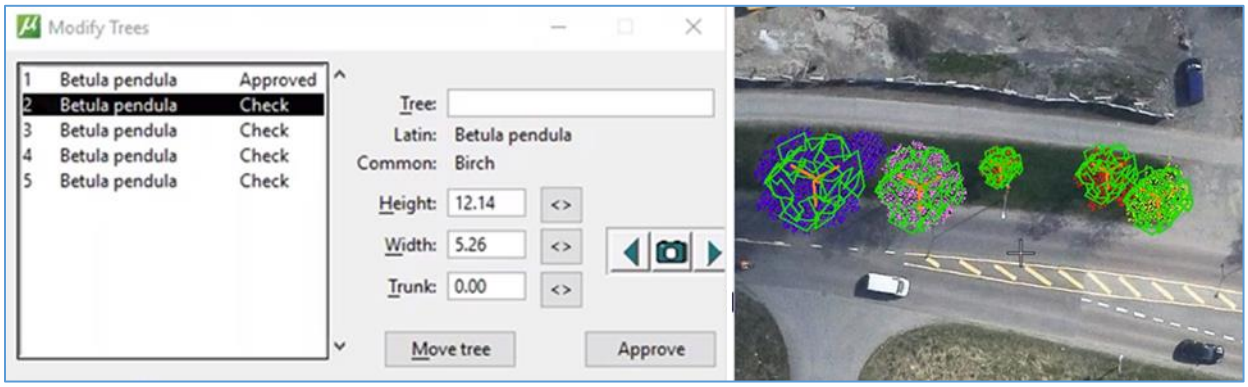
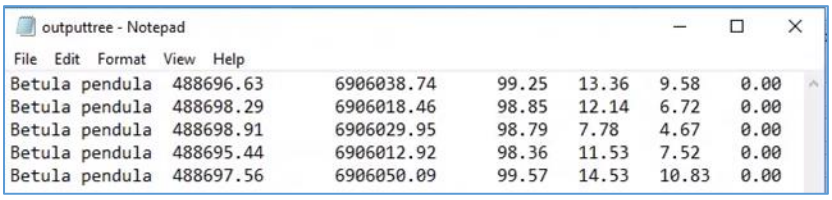


Figure 4: Right- Modify Trees dialog; Left- Modified tree cells.

Output Tree Cells

Once the cells have been reviewed and verified to match the available data, reliable information can be gleaned from them. After selecting the desired tree cell elements and activating the '[Output Tree Cell]' command, a text file will be created (Figure 5). This output report lists each tree's species name (Latin name), its position (Easting, Northing, and Elevation), and its dimensions (height, width, and trunk size) in an ASCII space delimited file that is easily ingested into many of the common tree database tools available on the market.



outputtree - Notepad

File Edit Format View Help

Betula pendula	488696.63	6906038.74	99.25	13.36	9.58	0.00
Betula pendula	488698.29	6906018.46	98.85	12.14	6.72	0.00
Betula pendula	488698.91	6906029.95	98.79	7.78	4.67	0.00
Betula pendula	488695.44	6906012.92	98.36	11.53	7.52	0.00
Betula pendula	488697.56	6906050.09	99.57	14.53	10.83	0.00

Figure 5: Example tree cell output text file.

This data can then be input into a city's tree database. An example of a city tree database is New York City's [tree database, which is available online for public review]. If you have any questions on this new toolset or associated workflow please do not hesitate to contact us at [support@geocue.com].