



POINT CLOUD EXTRACTION WITH SEMI-GLOBAL MATCHING eTRAINING

Introduction

Demonstrates how to extract a point cloud DTM with LIDAR like quality using Semi-Global Matching in the IMAGINE Auto DTM package for IMAGINE Photogrammetry.

Software

- IMAGINE Photogrammetry

Data

- Ireland Quarry

Transcript

0:09

Thank you for watching Point Cloud Extraction with Semi-Global Matching from Hexagon Geospatial eTraining. In this video you will see how to extract a point cloud DTM with LIDAR like quality using the IMAGINE Auto DTM package for IMAGINE Photogrammetry.

Once extracted, the point cloud layer can be viewed like a true ortho, providing a 3D view that can be analyzed and measured.

0:32

1. Start with IMAGINE Photogrammetry open and a block file loaded.

This block has been set up with all information necessary to run and complete triangulation. With the triangulation results accepted, you can now run IMAGINE Auto DTM.

In this module, you will focus on extracting the DTM using the semi-global matching algorithm, or SGM.

2. Start the DTM extraction process by selecting the **Generate > Semi-Global Matching** from the **Photogrammetry** tab. This launches the Semi-Global Matching dialog.

1:01

The first tab in this dialog shows current images to be used in this semi-global matched output. The **pairs with overlap** percentage value determines the overlap percentage required for an image pair to be considered in the DTM extraction process.

To consider more image pairs, this value can be changed to a lower value. Semi-Global matching can run with a minimal amount of overlap. You can change the overlap value to something very low, for example 5% - to include all image pairs in this block. However, setting this value too low can create redundancy, so change it back to 55%.

You could also remove the check marks in the **Active** column to manually deactivate any stereo pairs and prevent them from being included in the SGM algorithm.

1:45

Semi-Global matching requires overview layers generated by Image Station Raster Utility. These layers are similar to the pyramid layers generated from IMAGINE.

If the overview layers are not present, the green boxes under Pyramid will be red.

3. Click on the red box and follow the steps to generate the overview layers. Here, you see a green color in the **Pyramid** column, letting us know that the layers are present and can be used to run the algorithm.
4. Next look at the **Strategy** tab. First set the **Color Band to Match**.

For the best results, you want to select the band with the highest contrast. If you are unsure, you can view the images as a single layer in a viewer and see each band separately. When in doubt, in most cases, the best option is **Green**.

2:28

Changing the pyramid layer level can speed up processing time. Pyramid layer zero has the highest resolution of the pyramids, and they decrease in resolution as you increase the pyramid level.

By changing this to stop at the first pyramid level, it can make the process twice as fast, but you can lose resolution in the output. It's best to leave this value set to zero.

The **Disparity Difference** is for blunder checking. If your output is not as accurate as you had hoped and you see blunders in your output, this value can be changed to increase accuracy.

2:58

5. If you are working in an urban setting, you'll want to choose the **Urban Processing** option so it takes into account building edges and other urban features. This is essential for proper urban output.
6. Place a check mark next to **Keep Vertical Surfaces** if you are working in an area with vertical surfaces like buildings or cliff edges to increase the output accuracy when this type of feature is present.

3:19

Finally, you have the **Output Options**.

7. First, define an **Output Directory** where the output will be saved.
8. Next, if you want to clip the output based on corner coordinates, add a checkmark next to **Two Corners** and define the coordinates.

SGM will create 2 output files: one with full resolution and one that has been thinned.

3:37

The thinned output will have a smaller file size and contain fewer points.

9. Select between **Mild**, **Medium**, or **Aggressive** thinning.

3:45

The generated point cloud can be encoded. To create an encoded output, activate this option and select between **RGB OR False-color Infrared**. This should be selected based on the imagery type you are working with and your project needs.

10. The imagery in our example does not have Infrared, so select the **RGB** option.

11. You can also choose to generate a raster output. The raster output is generated by rasterizing the extracted point cloud, creating an image that has near true-ortho quality.
12. Either run the output to generate the point cloud layers OR use the **Submit** button to define a batch process OR use distributed processing with Condor.

Batching allows you to select a date and time to run the process in addition to defining the number of processes that can be run simultaneously. Running multiple processes can greatly reduce project processing time.

4:34

The number of **Simultaneous Processes** available is based on the number of processors in your computer and your software license.

13. In this case, you have three image pairs so you will tell the software to run all **3** processes at the same time.
14. Click **OK** to run this process.
15. Once the processing is complete, load the point cloud layer into a viewer.
16. Select **File > Open > Point Cloud Layer**, find the point cloud to load and click **OK**.

5:02

The layer is loaded as a raw point cloud colored using elevation.

17. From the **Display** group on the **Point Cloud** tab, you can use the **Color By** menu to change the display type.
18. Since you created an RGB encoded point cloud, you can select **RGB** to see the point cloud in true color.
19. Finally, open this in a 3D viewer.

You can zoom in to see more detail. If you zoom in further, you start to see the individual points.

5:27

There are a few different ways of viewing the point cloud.

- First, you can view the points themselves – as you see now.
- Second, you can use the display tools to increase the point size. This helps fill in the gaps between the points and can makes the point cloud look more like an image in the viewer.
- Finally from the 3D Group, you can activate **Triangle Mode**. Because this point cloud was generated from imagery, points can only be extracted for areas where image pixels exist. Triangle Mode TINs the points and fills in the gaps along the walls, vertical surfaces, and places of missing data.

6:04

Thank you for watching this eTraining module from Hexagon Geospatial. For more eTraining, visit hexagongeospatial.com/eTraining.