

VRMesh Case Study – Volume Calculation Between Two Scans

Introduction

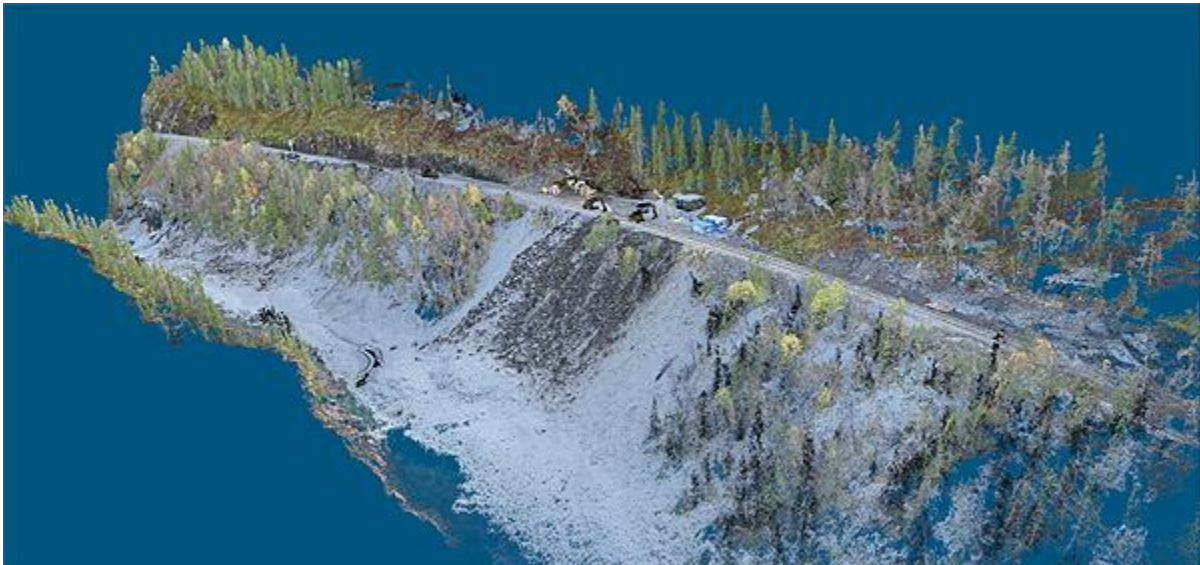
The goal of this case study is to discover the comprehensive workflow VRMesh provides for 3D point cloud and mesh processing. Many users tell us it is always a big challenge when they get billions of points and need to measure the volume between two surfaces. Generally, they have to use more than one software program to finish the task. Especially with extreme variations in terrain, such as steep mountains where most programs don't work well. We will demonstrate the steps that will allow you to complete the challenging tasks using just VRMesh.

Recommended Workflow

We will start with two sets of point clouds that come from a summer terrain scan and a winter terrain scan of the same region. The task is to calculate the snow volume at the location of interest.

Step 1: Import Large Point Clouds

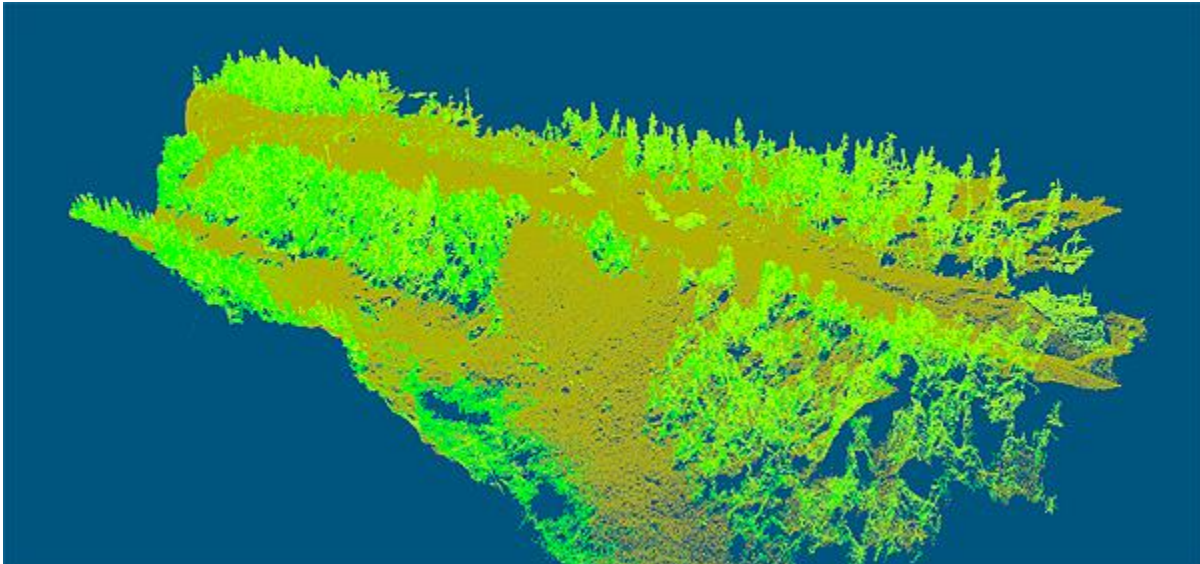
Use the Index/Attach command to load point cloud files into the window. The benefit of this command is that it only retrieves inquiring points into the window, which will speed up the processing of large point clouds. VRMesh can handle large datasets in excess of one billion points. The program has no limit concerning the point cloud and mesh size.



Step 2: Classify Ground Points

VRMesh will automatically identify vegetation, building roofs and ground in LiDAR data and produce well classified points, no matter whether the data gathered from steep slopes covered with dense vegetation

or areas where there are very few ground points available. The composite commands can be finished by one-click batch processing.

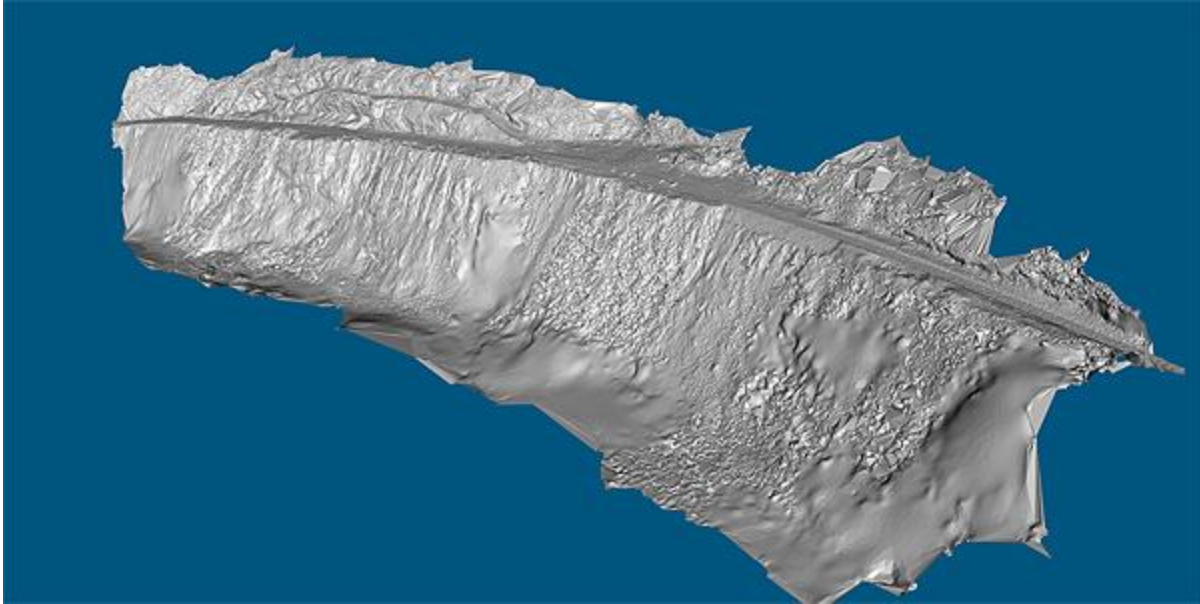


Step 3: Convert Point Clouds to Meshes

Generally, there are two ways to create a bare-earth surface. You may directly create a grid surface to represent the bare earth, which is simple and fast, but is not accurate enough and therefore not suitable for steep slopes.

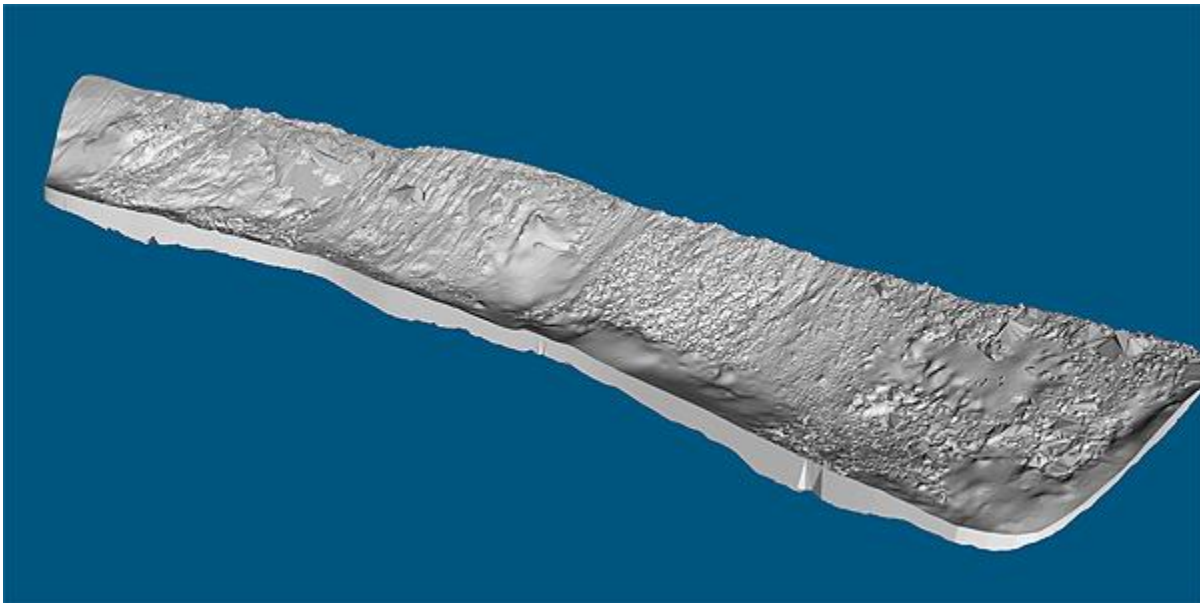
Another way is to triangulate point clouds into meshes which is more accurate in representing the bare-earth topography. In this case, we show you how to create a triangulated ground surface to better represent the volume difference.

You may decimate and smooth the point cloud before triangulation. After the point cloud is converted into a triangle mesh, you can use mesh repair and editing tools to seam gaps, fill holes, and reduce the number of triangles into an acceptable amount. VRMesh provides advanced triangle mesh processing tools for dealing with complex meshes. The final surface mesh is shown below. All details on the surface are kept accurate.



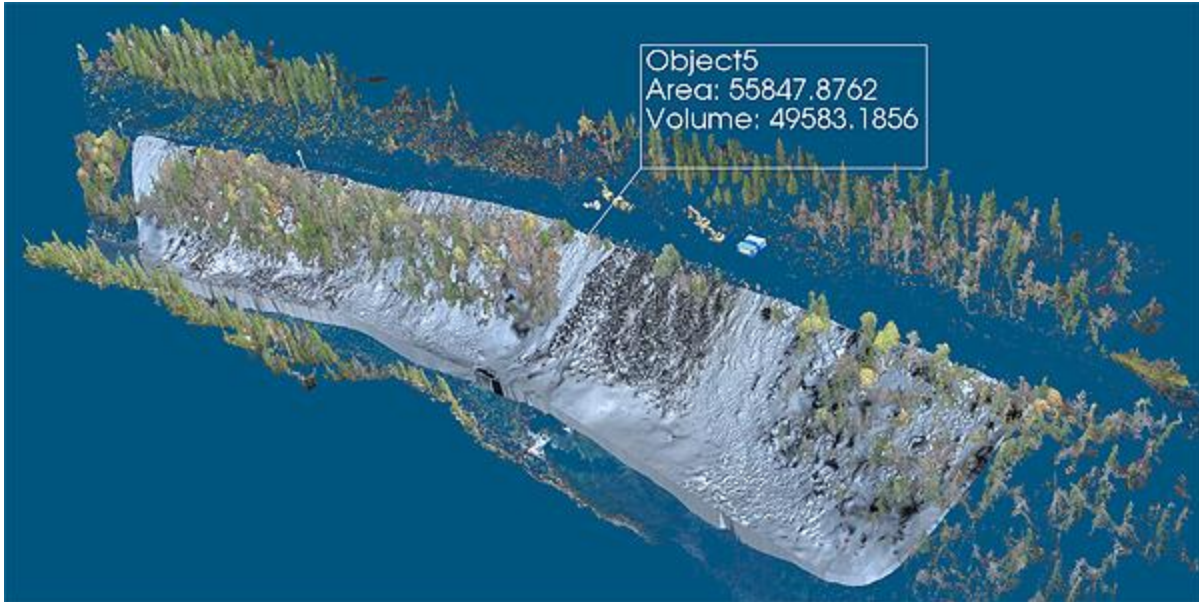
Step 4: Cut and Fillet Two Surfaces

To calculate the volume between two surfaces, we need to trim both surfaces, and then fillet the two surfaces into a watertight object.



Step 5: Calculate Volume

Now we are ready to analyze the snow volume and area of the target terrain surface.



Summary

The workflow presented in this case study can be used for many fields such as land surveying, mining, transportation, urban planning and architecture.

Over ten years of development, VRMesh has become the most powerful and comprehensive point cloud and mesh processing software product covering everything from automatic point cloud classification to feature extraction, accurate point cloud meshing and advanced mesh repair and editing.

Please watch the video here: <https://youtu.be/clgta7ulRtk>