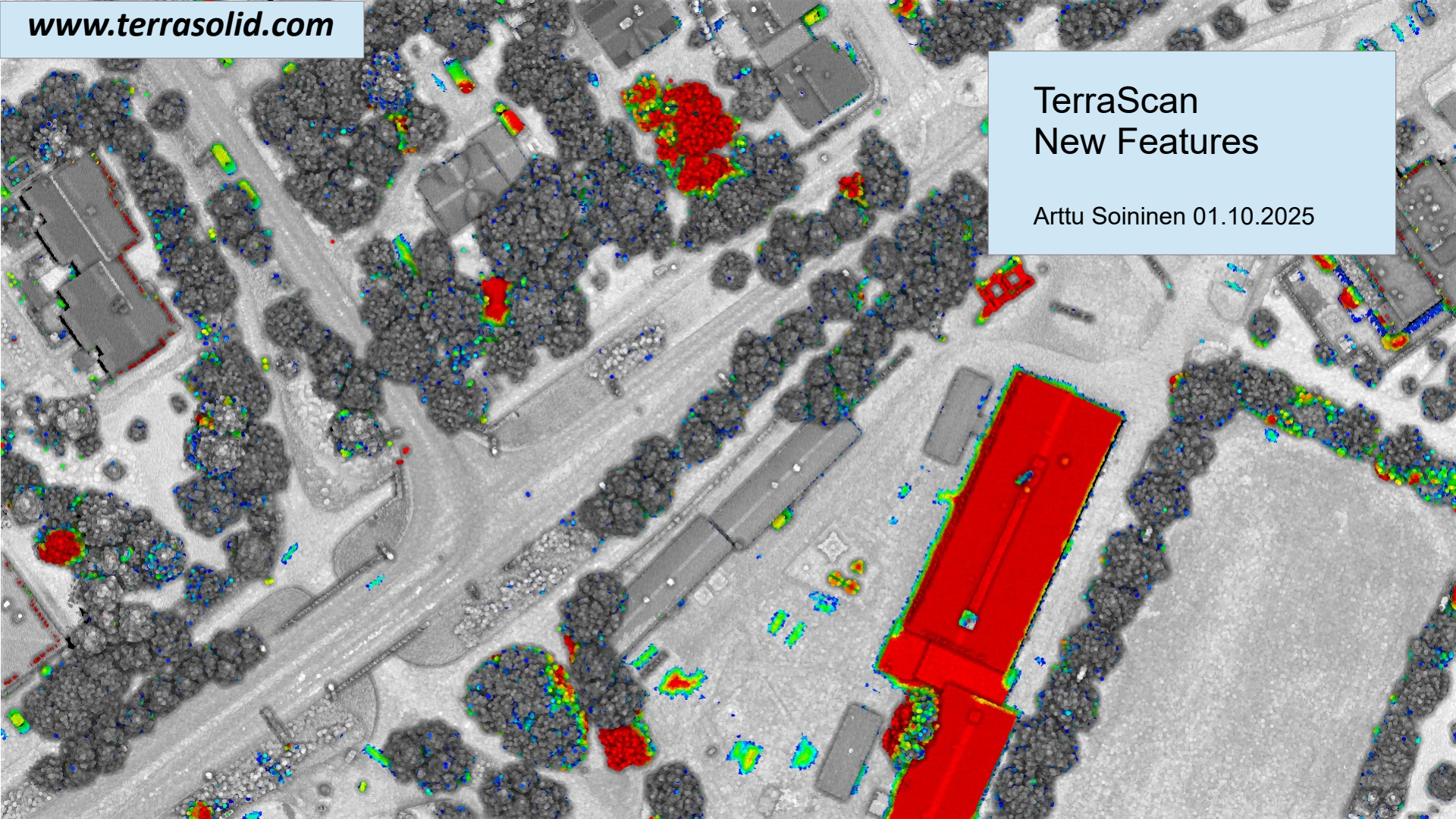


TerraScan New Features

Arttu Soininen 01.10.2025



Various Improvements



- Support for Pseudo-Mercator projection system with EPSG code 3857
- **Flip Z** transformation type as a macro action
- **Show Statistics** window is resizable
- **Project Statistics** window is resizable
- Clicking undo button in **Display Mode** more than once switches between the last two display modes
- Update in **Scan Display** keyin command:
 - Coloring modes IMAGECOLOR, NORMAL, NORMALINT, VEGINDEX, DENSITY, DEVIATION and CLASSIMAGE
 - Support for borders=occlusion
 - displayset=on switches displayset on
 - displayset=off switches displayset off

Various Improvements



- Support for **Reflectance** field in user point formats
- **Save Points As** menu command lets user select multiple lines to save
- Updated public_functions.h and public_classification.h header files
- Support for multiple from classes in **Add point to ground**
- User can select number of color channels in output when using **Export raster** with **Point color** option
- Better handling of points outside coordinate setup in importing points into project
- **Inspect Point** has **Class name** option
- Write group points is available as a macro action. You should load points from neighbouring blocks when running this as a macro on the project
- **Match Passes** step in drone processing wizard has mirror scale correction moved to be second correction to apply. This typically improves the final result on data with a significant mirror scale correction
- **Rotate** tool can apply to trajectories in addition to point cloud

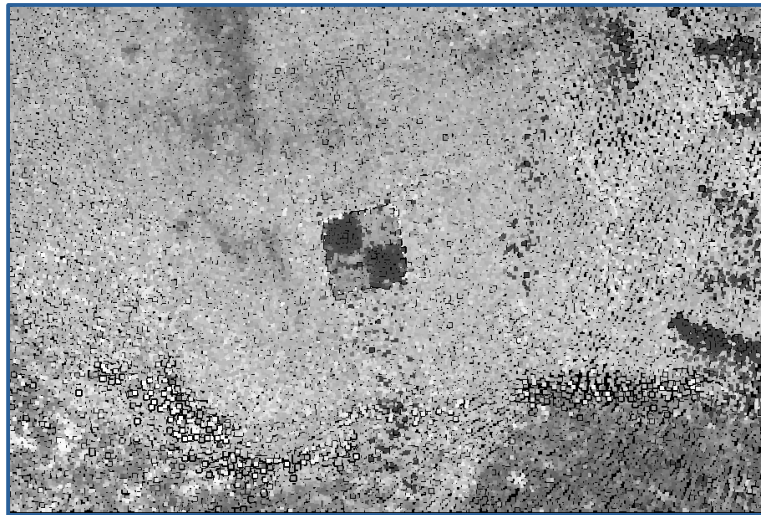
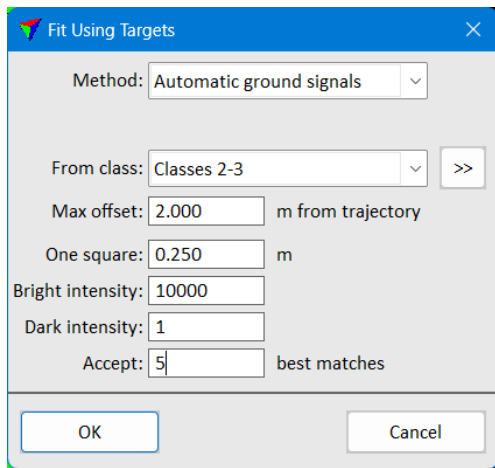
Geoid Model Support

- Finland FIN2023 geoid model
- Poland – Geoid2021 geoid model (PL-EVRF2007)
- Japanese 2024 geoid model
- Korean KNGeoid24 geoid model
- Catalonia EGM08D595 geoid model



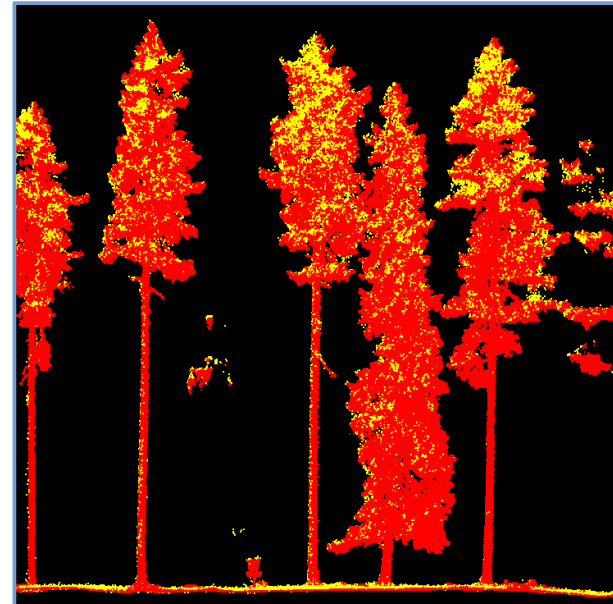
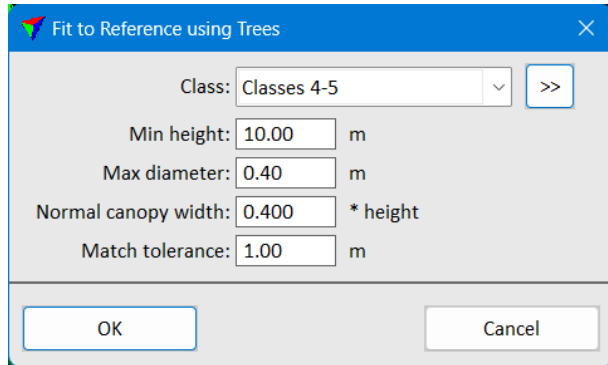
Fit Using Targets & Automatic Ground Signals

- **Fit Using Targets** can now find automatically checkboard pattern signals on the ground



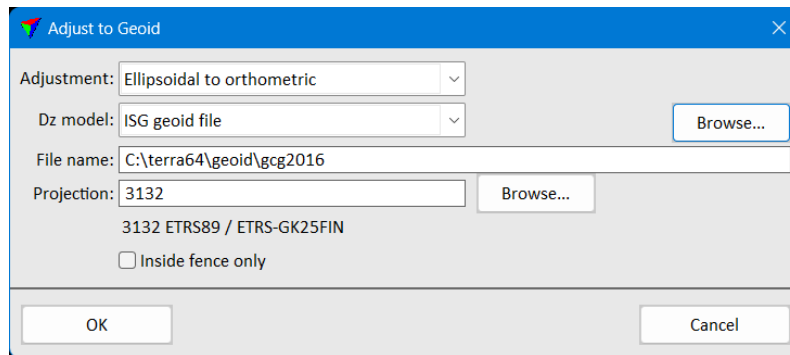
Fit to Reference / Using Trees

- Fits tripod mounted, handheld, backpack or mobile scanner data to airborne point cloud using tree locations
- Searches for approximate tree locations in active and in reference point cloud
- Solves xyz shift and rotation around z axis which matches active and reference tree locations best



Adjust to Geoid & Any ISG File

- **ISG geoid file** choice lets you apply geoid correction using any .isg file

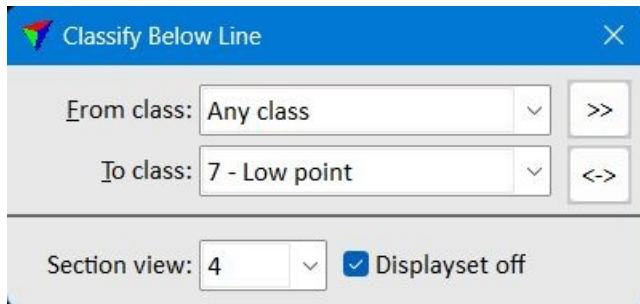


The image shows a software dialog box titled "Adjust to Geoid". It contains the following fields and controls:

- Adjustment:** A dropdown menu with "Ellipsoidal to orthometric" selected.
- Dz model:** A dropdown menu with "ISG geoid file" selected. To its right is a "Browse..." button.
- File name:** A text input field containing "C:\\terra64\\geoid\\gcg2016".
- Projection:** A dropdown menu with "3132" selected. To its right is a "Browse..." button.
- Below the projection dropdown, the text "3132 ETRS89 / ETRS-GK25FIN" is displayed.
- A checkbox labeled "Inside fence only" is located below the projection text.
- At the bottom of the dialog are two buttons: "OK" on the left and "Cancel" on the right.

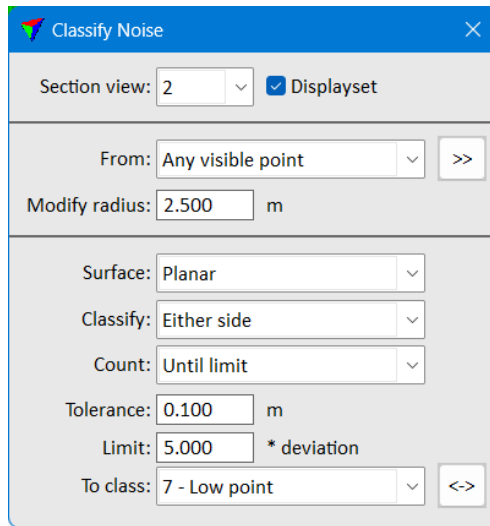
Cross Section in Classify Above/Below Line

- Three mouse clicks in a top view setup a section view
- No need to start **Draw Vertical Section** tool



Classify Noise

- Manual classification tool for classifying out noise
- Analyses points in a circular area
- Fits an elevation, a planar surface or a curved surface to those points
- Classifies points which differ from the found elevation or found surface

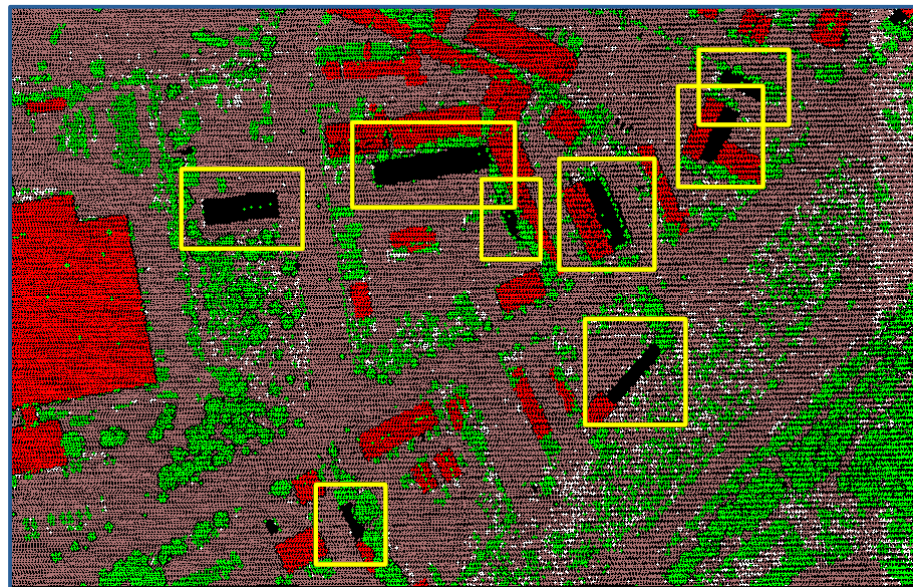
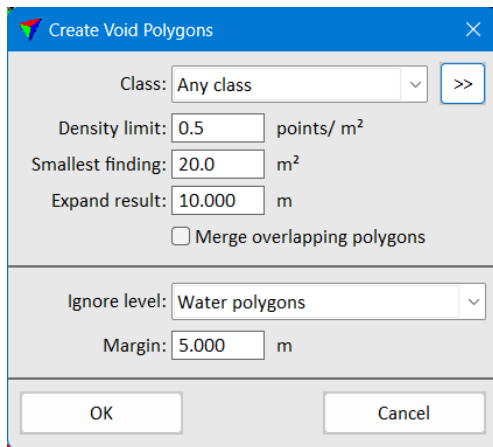


The screenshot shows the 'Classify Noise' dialog box with the following settings:

- Section view: 2 (dropdown menu)
- ☒ Displayset
- From: Any visible point (dropdown menu) with a right arrow button (>>)
- Modify radius: 2.500 m
- Surface: Planar (dropdown menu)
- Classify: Either side (dropdown menu)
- Count: Until limit (dropdown menu)
- Tolerance: 0.100 m
- Limit: 5.000 * deviation
- To class: 7 - Low point (dropdown menu) with a double arrow button (<->)

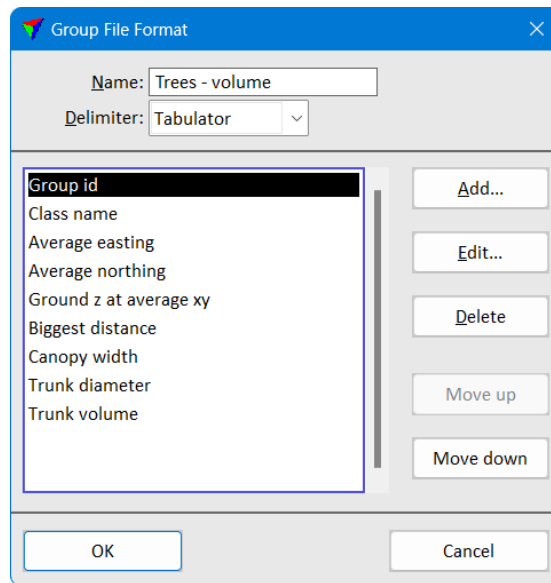
Create Void Polygons

- Creates rectangle polygons marking places where point density in loaded points is lower than given limit
- You can select polygons defining the area which should be covered before starting the tool
- **Ignore level** can contain polygons for water area



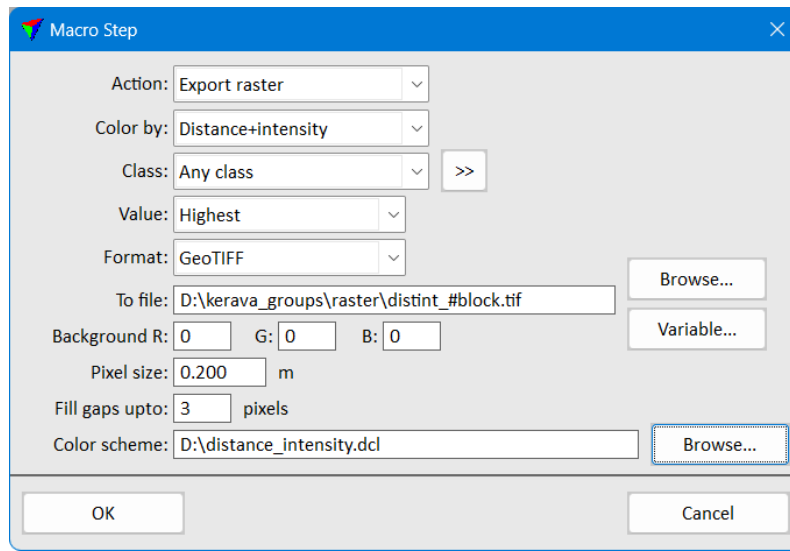
User Group Format Improvement

- **Trunk diameter height** field choices added



Export Raster Macro Action

- Macro action for writing a raster image
- Created raster covers bounding box of:
 - Block polygon if active block exists (run macro on project or **Open block** used)
 - Point cloud points
- Can be run using multiple instances of TerraBatch
- **Distance+intensity** coloring mode now added to export raster tools



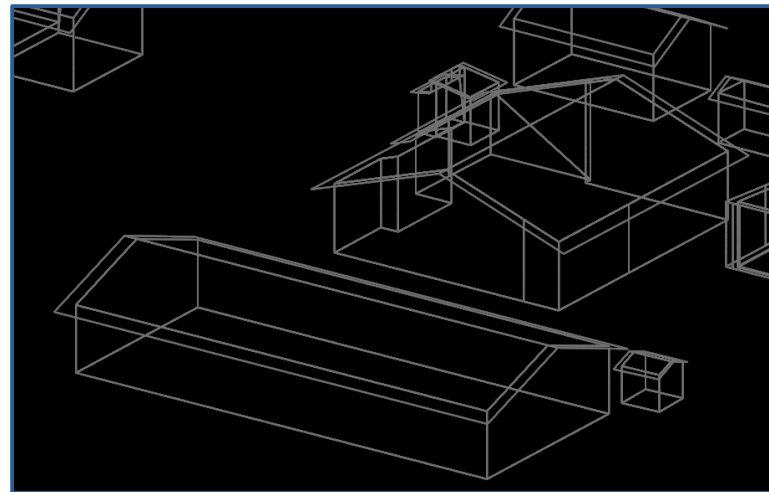
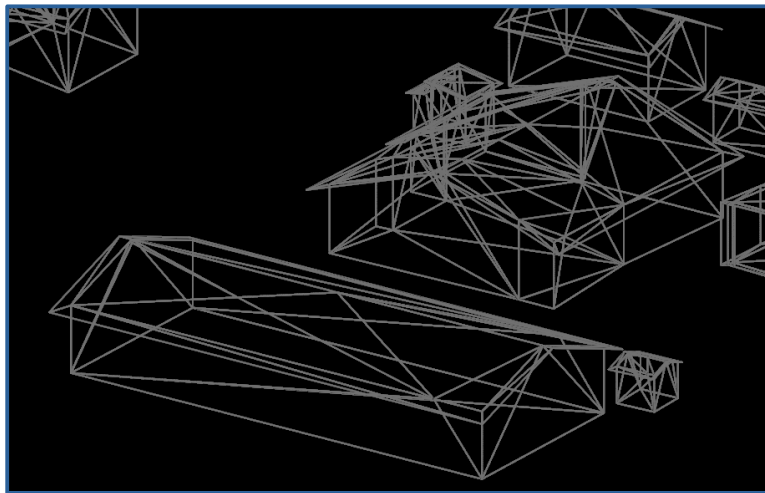
The screenshot shows the 'Macro Step' dialog box with the following settings:

- Action: Export raster
- Color by: Distance+intensity
- Class: Any class
- Value: Highest
- Format: GeoTIFF
- To file: D:\kerava_groups\raster\distint_#block.tif
- Background R: 0, G: 0, B: 0
- Pixel size: 0.200 m
- Fill gaps upto: 3 pixels
- Color scheme: D:\distance_intensity.dcl

Buttons: Browse... (next to To file), Variable... (next to Background R/G/B), Browse... (next to Color scheme), OK, Cancel.

Merge Building Triangles

- Tool for converting building vector model from triangles into polygons
- Example use:
 - Another software has created triangle based vector models into 3DCityDB
 - Read vector models using **Read Buildings from Database**
 - Convert triangles into polygons using **Merge Building Triangles**
 - Run texturing using TerraPhoto **Rectify / Rectify textures**
 - Write textured models back to 3DCityDB using **Write Buildings to Database**



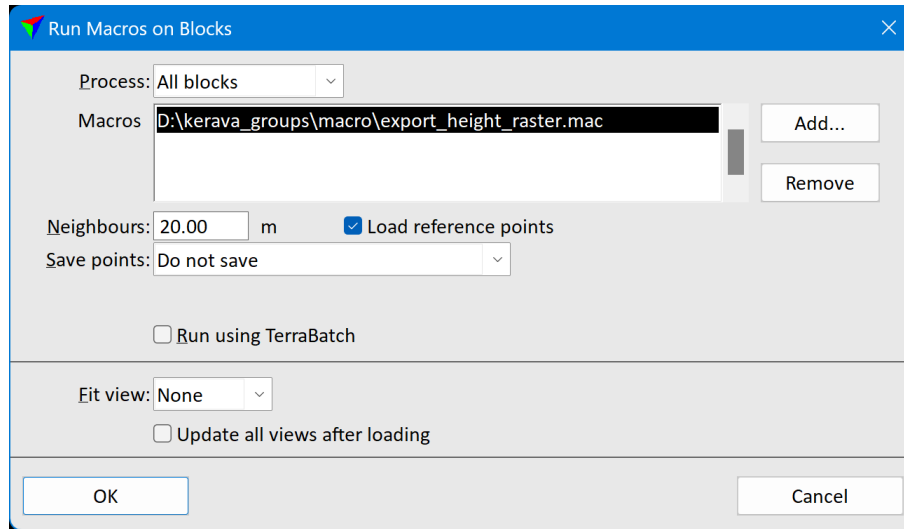
S-JTSK / Krovak Czech 2018 Projection System



- Projection system with dedicated formulas and:
 - c:\terra64\coordsys\table_yx_3_v1710.dat xy correction shift vector grid
 - c:\terra64\coordsys\cr-2005_v1005.dat geoid model
- TerraScan uses EPSG code 5514 for S-JTSK / Krovak Czech 2028

Running Macro on Project & Load Reference Points

- Support for loading reference project points when running a macro on a project
- Makes it easy to use classified reference data when processing a new data set from same area



The image shows a software dialog box titled "Run Macros on Blocks". It contains several configuration options for running a macro on project blocks. The "Process" dropdown is set to "All blocks". The "Macros" list contains a single entry: "D:\kerava_groups\macro\export_height_raster.mac", with "Add..." and "Remove" buttons to its right. The "Neighbours" field is set to "20.00 m" and the "Load reference points" checkbox is checked. The "Save points" dropdown is set to "Do not save". There is an unchecked checkbox for "Run using TerraBatch". The "Fit view" dropdown is set to "None", and the "Update all views after loading" checkbox is unchecked. At the bottom are "OK" and "Cancel" buttons.

Run Macros on Blocks

Process: All blocks

Macros: D:\kerava_groups\macro\export_height_raster.mac

Add...

Remove

Neighbours: 20.00 m ☒ Load reference points

Save points: Do not save

☐ Run using TerraBatch

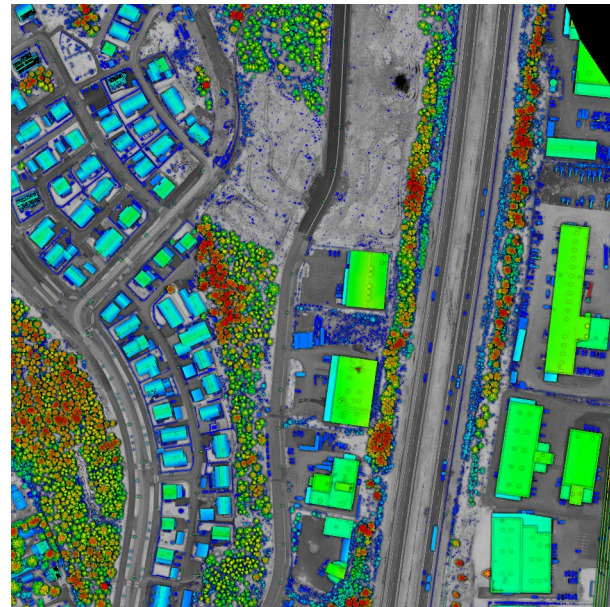
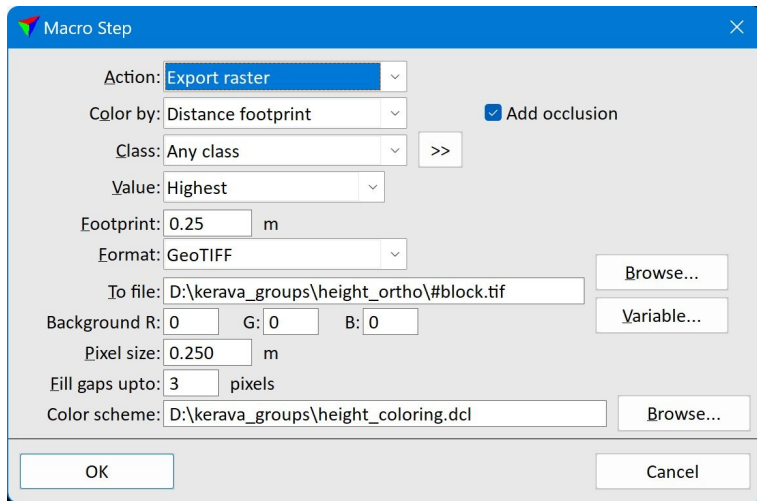
Fit view: None

☐ Update all views after loading

OK Cancel

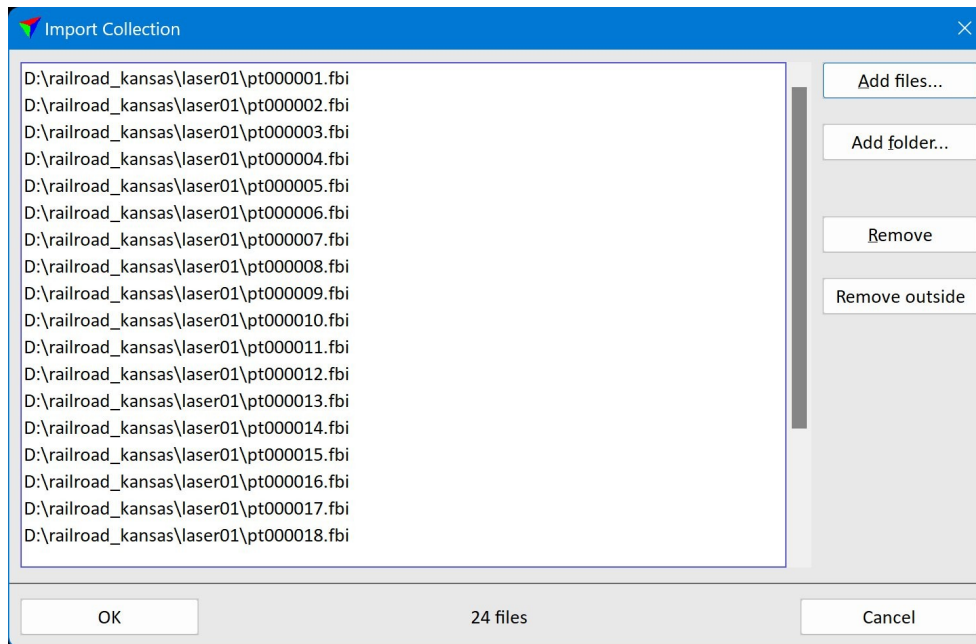
Export Raster Improvements

- **Elevation footprint** coloring mode with support for occlusion option
- **Distance footprint** coloring mode with support for occlusion option
- User can select number of color channels in output with **Point color** coloring mode
- Export raster macro action for project level raster production (TerraBatch can execute)
 - Macro action produces a raster matching active block xy bounding box
 - Nice with rectangle tiles typical with airborne data
 - Not nice with long, narrow blocks of a mobile corridor project



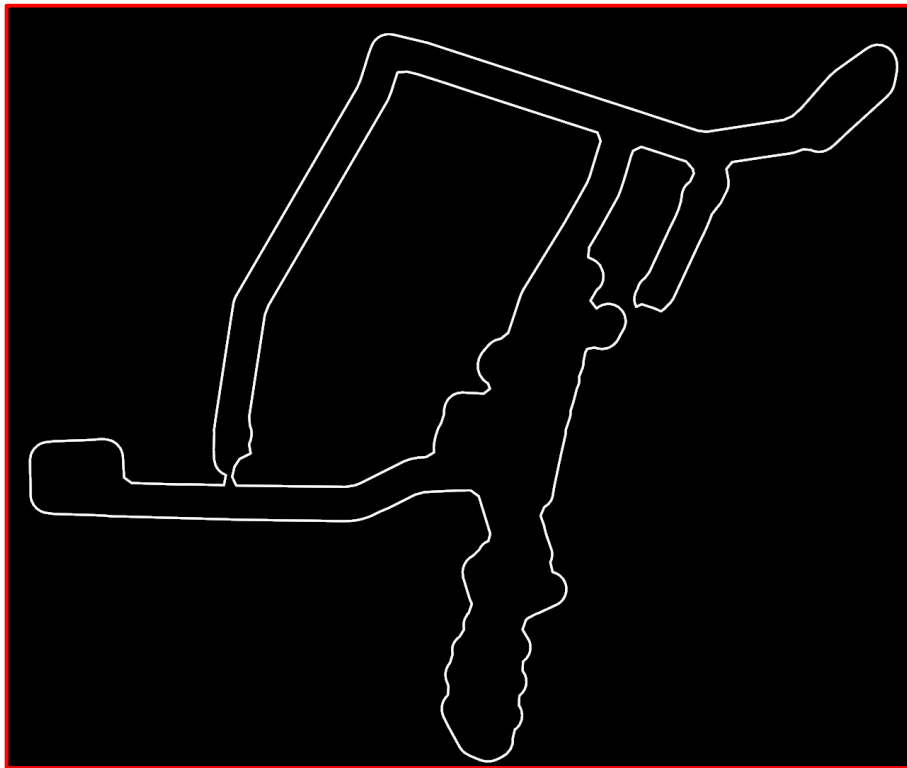
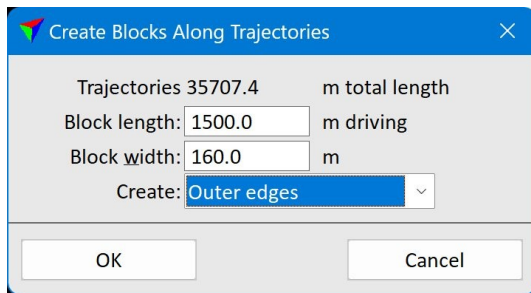
Read Collection and Import Collection Improvements

- Dialogs display number of files selected
- **Import collection** has **Remove outside** button which removes files which have bounding box information outside all current project blocks



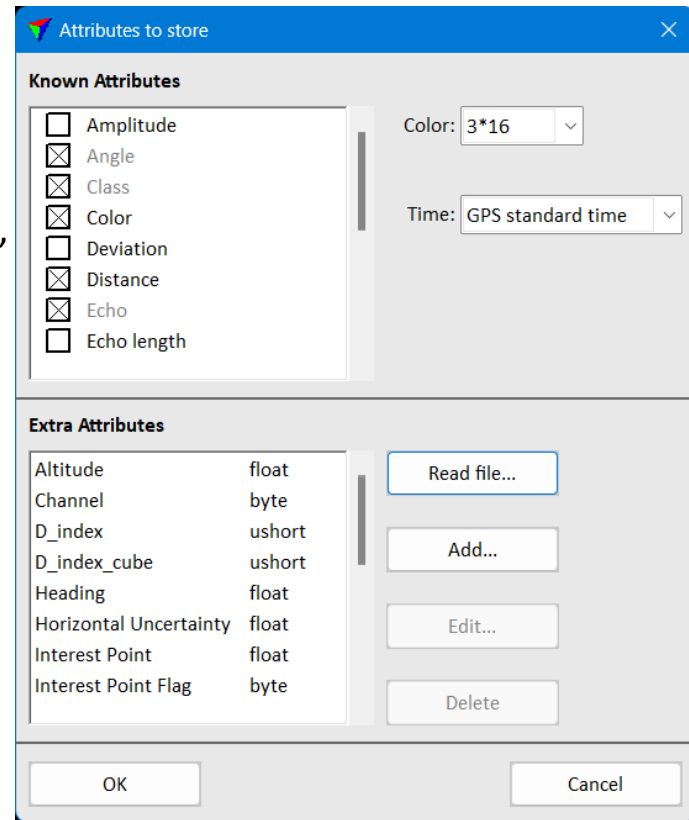
Create Blocks Along Trajectories & Outer Edges

- Outer edges option is good if you are not happy with the automatic block polygons
- **Outer edges** produces good starting line work for **Design Block Boundaries**



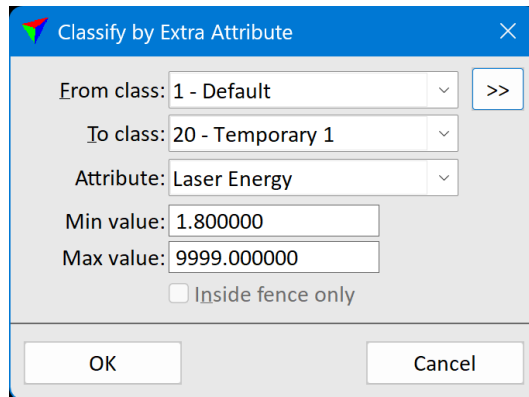
Support for Unknown Extra Attributes

- Read and write unknown extra attributes from LAS 1.2 – 1.4, LAZ 1.2 – 1.4 and FastBinary file formats
- LAS format has the following standard attributes: xyz, class, time, line, scanner, channel, echo, intensity, angle
- TerraScan understands known extra attributes: amplitude, deviation, distance, echo length, image, normal vector, range reflectance, reliability
- TerraScan can:
 - Read and keep attributes of 1 – 8 byte in size
 - Classify points by extra attribute
 - Color points by extra attribute
 - Save extra attributes (into project blocks or by file)



Classify / By extra attribute

- Menu command and macro action for classifying points by unknown extra attribute

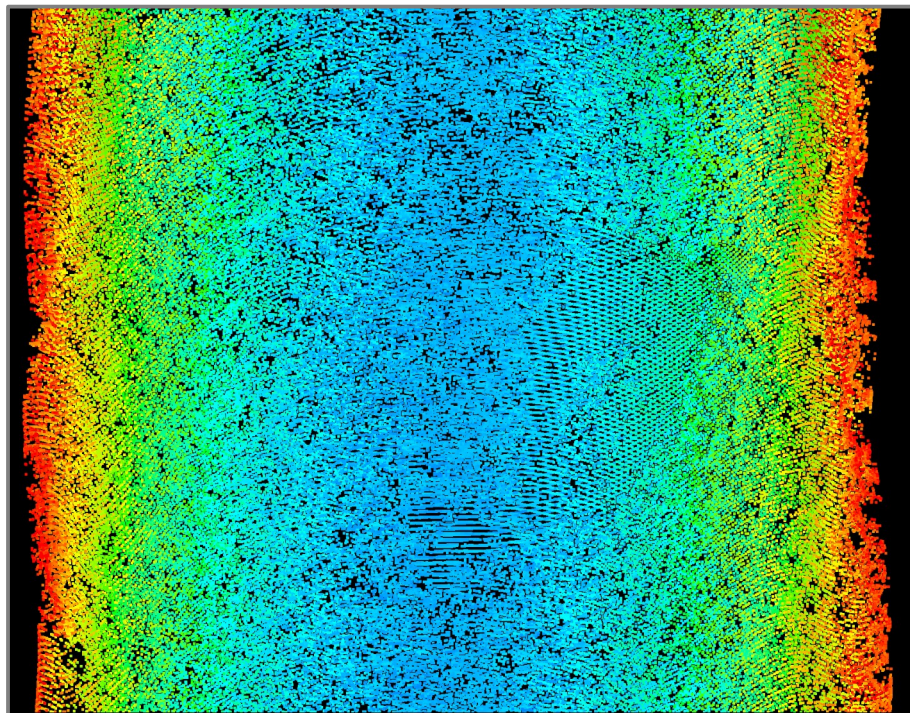
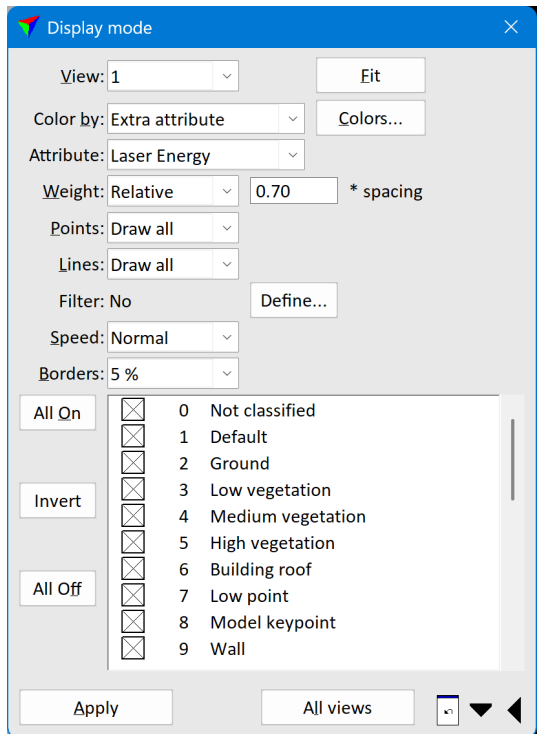


The screenshot shows a dialog box titled "Classify by Extra Attribute" with a close button (X) in the top right corner. The dialog contains the following fields and controls:

- From class:** A dropdown menu showing "1 - Default" with a downward arrow.
- To class:** A dropdown menu showing "20 - Temporary 1" with a downward arrow.
- Attribute:** A dropdown menu showing "Laser Energy" with a downward arrow.
- Min value:** A text input field containing "1.800000".
- Max value:** A text input field containing "9999.000000".
- Inside fence only:** An unchecked checkbox.
- Navigation:** A button with ">>" is located to the right of the "From class" dropdown.
- Buttons:** "OK" and "Cancel" buttons are at the bottom.

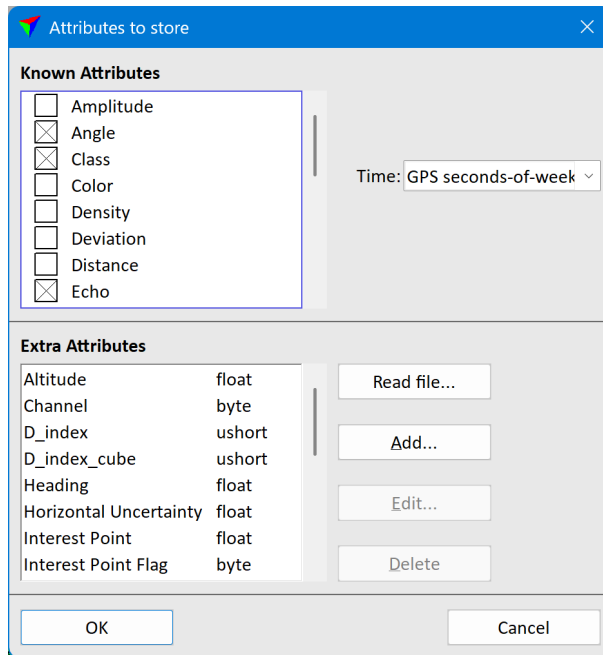
Coloring Mode -- Extra attribute

- **Extra Attribute** coloring colors points by an unknown extra attribute
- If attribute has **List value** category in **Scan Settings**, color scheme is a list of colors linked to a value (similar to scanner or line coloring)



Extra Attributes in Project Definition

- Project definition can specify unknown extra attributes to store
- Unknown attributes can be stored in LAS 1.2, LAS 1.4, LAZ 1.2, LAZ 1.3, LAZ 1.4 and FastBinary formats
- Use **Read file** to populate list with attributes already present in raw files



Attributes to store

Known Attributes

☐	Amplitude
☒	Angle
☒	Class
☐	Color
☐	Density
☐	Deviation
☐	Distance
☒	Echo

Time: GPS seconds-of-week ▾

Extra Attributes

Altitude	float
Channel	byte
D_index	ushort
D_index_cube	ushort
Heading	float
Horizontal Uncertainty	float
Interest Point	float
Interest Point Flag	byte

Read file...

Add...

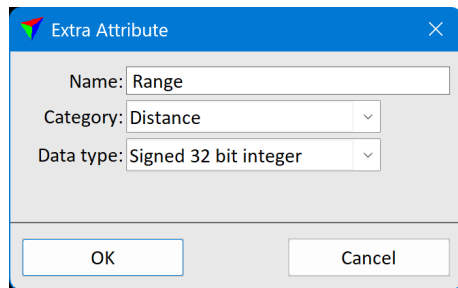
Edit...

Delete

OK Cancel

Extra Attributes in User Settings

- **Extra Attributes** category lets you define multiple lists of extra attributes which may be created
- Macro actions rely on these settings (you can work on macros without any points loaded)
- Macro stores name of attribute
- Extra attribute categories:
 - Number – numerical value
 - List value – number from a limited set of choices
 - Class – 8 bit unsigned integer
 - Distance – 32 bit signed integer



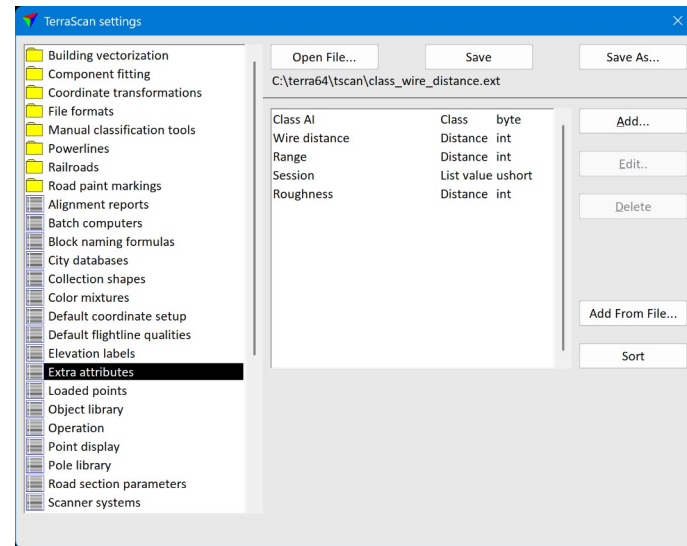
Extra Attribute

Name:

Category:

Data type:

OK Cancel



TerraScan settings

Open File... Save Save As...

C:\terra64\tscan\class_wire_distance.ext

Class	AI	Class	byte
Wire distance		Distance	int
Range		Distance	int
Session		List value	ushort
Roughness		Distance	int

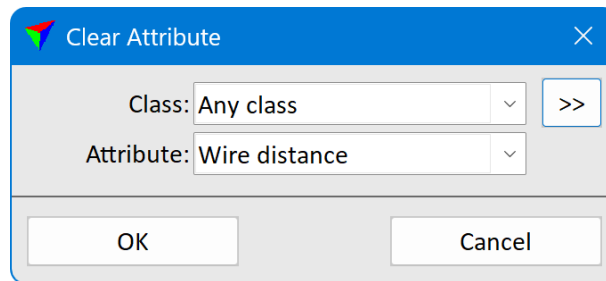
Add... Edit... Delete

Add From File... Sort

Building vectorization
Component fitting
Coordinate transformations
File formats
Manual classification tools
Powerlines
Railroads
Road paint markings
Alignment reports
Batch computers
Block naming formulas
City databases
Collection shapes
Color mixtures
Default coordinate setup
Default flightline qualities
Elevation labels
Extra attributes
Loaded points
Object library
Operation
Point display
Pole library
Road section parameters
Scanner systems

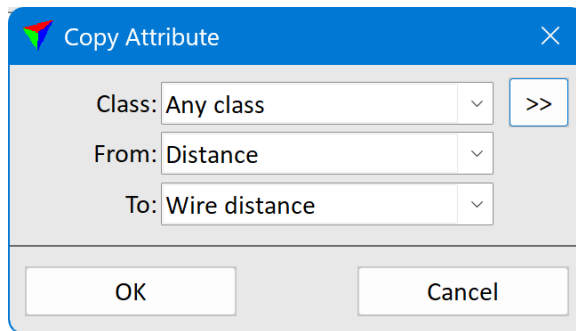
Clear Attribute Macro Action

- Macro action for zeroing selected attribute
- Can clear known attributes (intensity, angle, ...) and unknown extra attributes



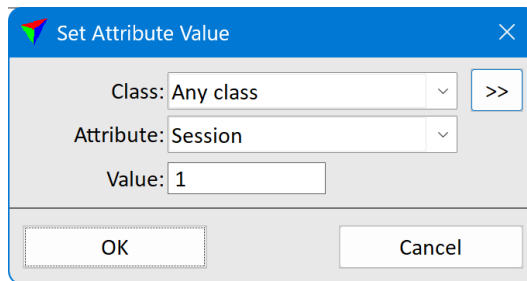
Copy Attribute Macro Action

- Macro action for copying values from one attribute to another
- Can use known attributes (intensity, amplitude, ...) and unknown extra attributes



Set Attribute Value Macro Action

- Macro action for setting value of an attribute
- Can set known attributes (scanner, time, ...) and unknown extra attributes



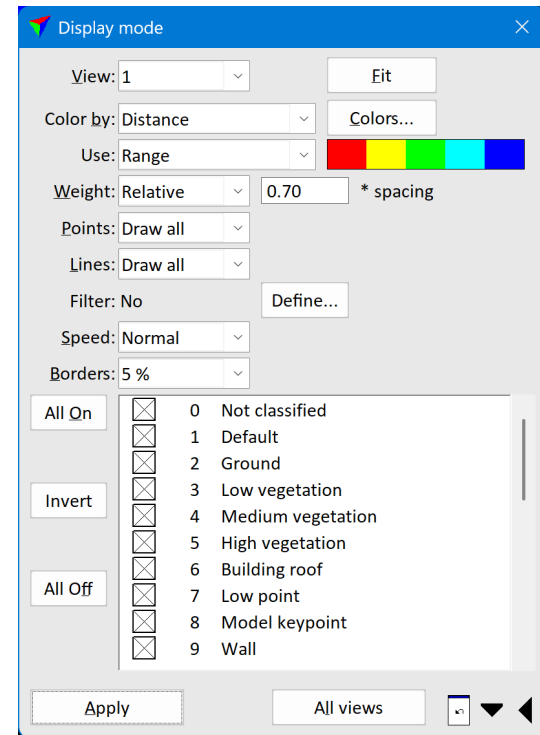
Swap Attribute Values Macro Action

- Swaps the values of two attributes
- Attributes must have same size



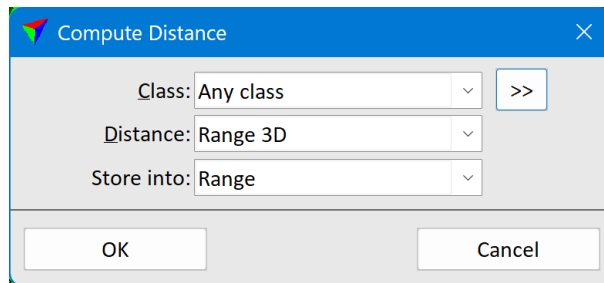
Display Mode & Extra Attributes

- User can select an extra attribute to be used for coloring points when display mode coloring is set to **Class**, **Class+intensity** or **Class image**
- User can select an extra attribute to be used for coloring points when display mode coloring is set to **Distance** or **Distance+intensity**
- Class difference coloring mode highlights differences between two classifications



Compute Distance & Extra Attributes

- **Compute Distance** actions let user select extra attribute for storing computed values
- Makes it possible to store multiple distance values with the points such as:
 - Height from ground (**Distance** attribute recommended)
 - Distance to wires



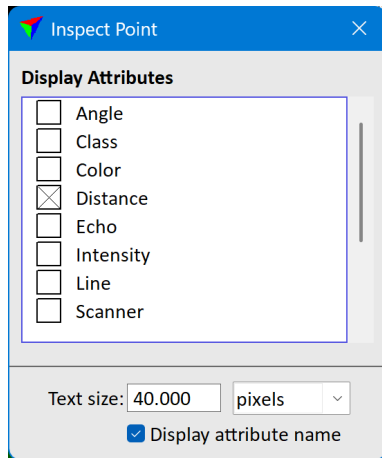
Scan Display Keyin Command Updates



- Support for coloring modes IMAGECOLOR, NORMAL, NORMALINT, VEGINDEX, DENSITY, DEVIATION and CLASSIMAGE
- Displayset control: displayset=on or displayset=off
- Occlusion supported as borders=occlusion

Inspect Point

- Tool for viewing attributes of point closest to mouse



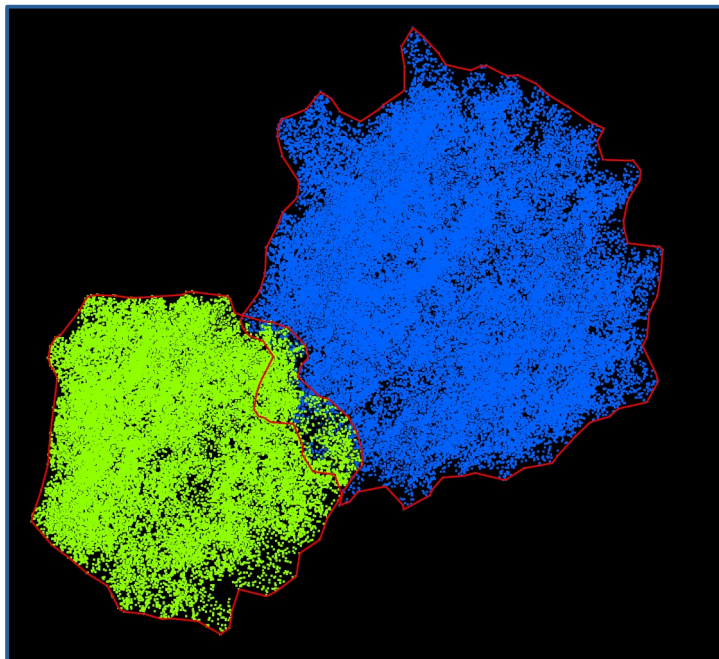
Python Scripting Examples



- Latest MicroStation version can run Python code
- TerraScan setup includes Python examples for scripting
- Examples install in c:\terra64\example:
 - adjust_laser_angles.py
 - distance_histogram.py
 - open_trajectories.py

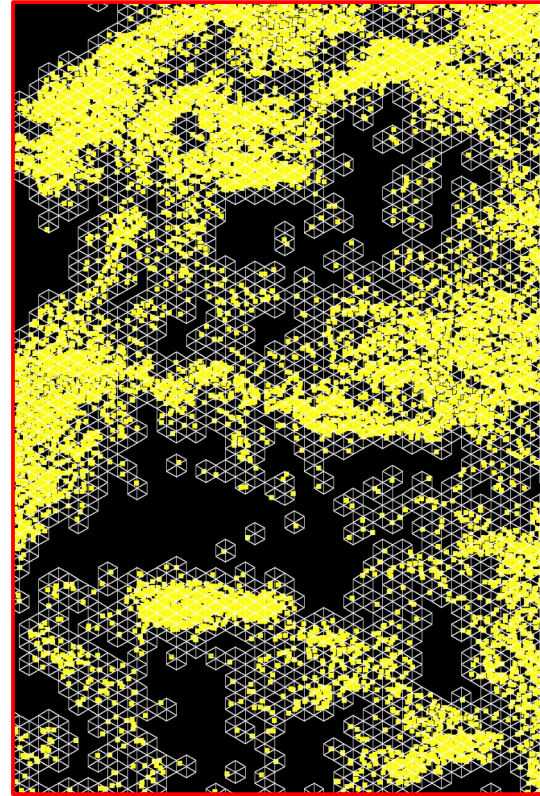
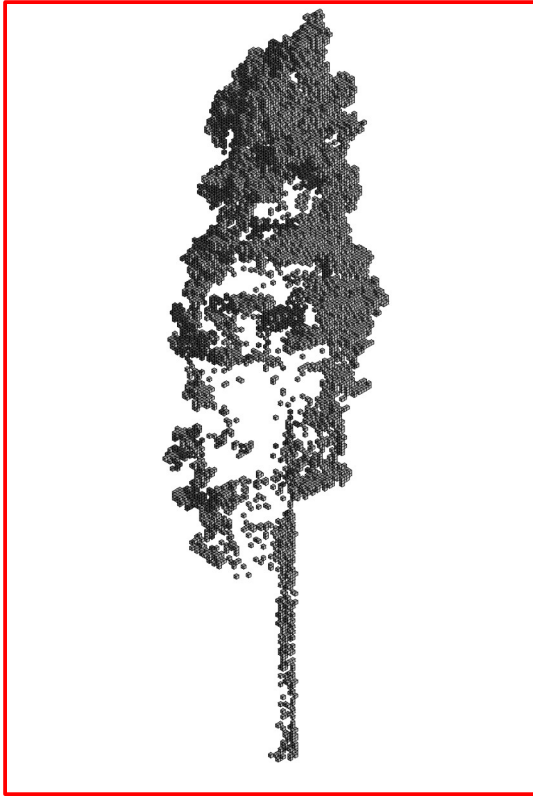
Canopy Area Field in User Group Format

- List of trees output can include **Canopy area**
- **Canopy area** is 2D surface area of a tree and its canopy
- Software builds TIN model and computes polygon(s) enclosing tree hits
- Polygons may overlap each other if groups overlap each other



Tree Volume in User Group Format

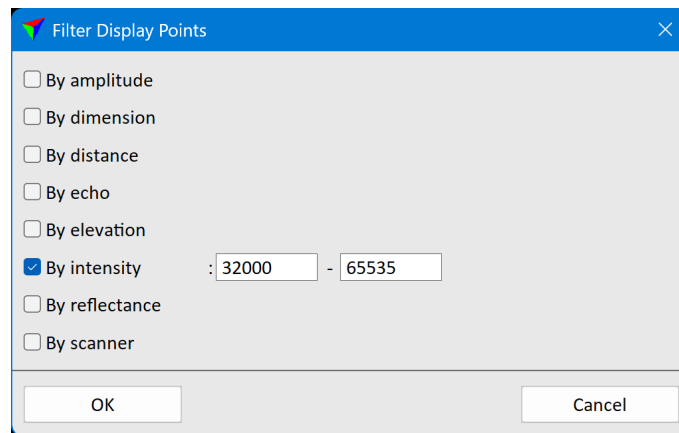
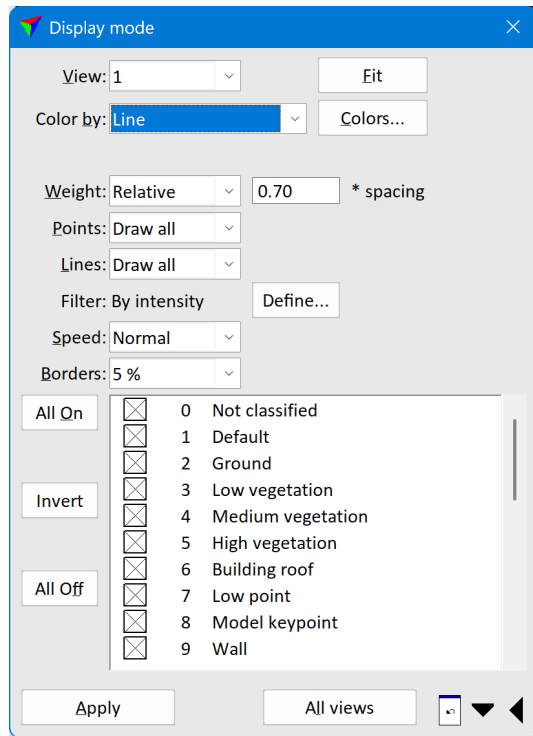
- Tree Volume is computed using voxel model built using points
- Software decides voxel cube size from point density



Display Mode & Filter Settings

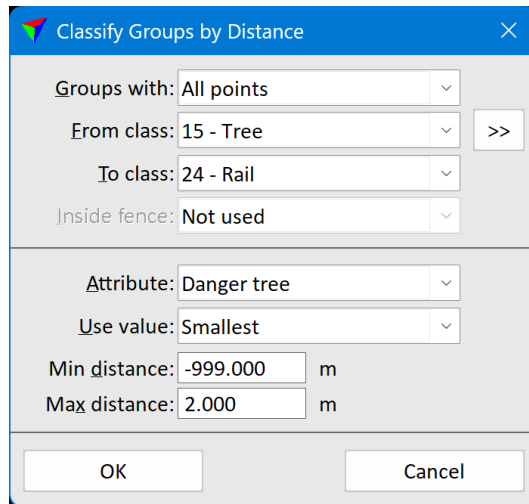


- Settings for controlling visibility of points based on amplitude, distance, echo, elevation, reflectance or scanner value



Classify Groups by Distance & Extra Attributes

- **Group / Classify / By distance** lets user select extra attribute to use as distance



The screenshot shows a dialog box titled "Classify Groups by Distance" with a close button (X) in the top right corner. The dialog is divided into two main sections. The top section contains four dropdown menus: "Groups with:" set to "All points", "From class:" set to "15 - Tree", "To class:" set to "24 - Rail", and "Inside fence:" set to "Not used". There is a ">>" button to the right of the "From class:" dropdown. The bottom section contains two dropdown menus: "Attribute:" set to "Danger tree" and "Use value:" set to "Smallest". Below these are two input fields: "Min distance:" with the value "-999.000" and "Max distance:" with the value "2.000", both followed by a unit "m". At the bottom of the dialog are two buttons: "OK" and "Cancel".

Classify Groups by Distance

Groups with: All points

From class: 15 - Tree >>

To class: 24 - Rail

Inside fence: Not used

Attribute: Danger tree

Use value: Smallest

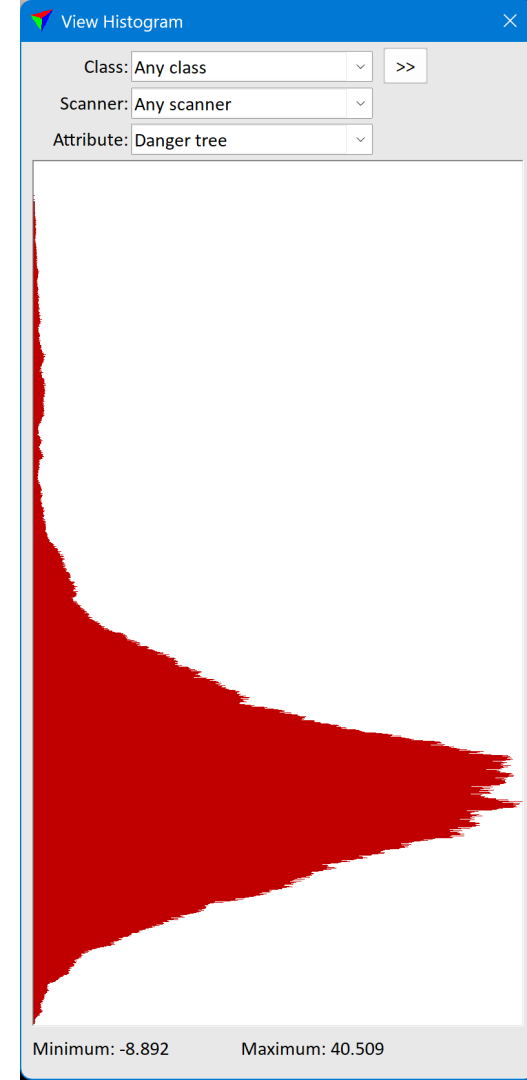
Min distance: -999.000 m

Max distance: 2.000 m

OK Cancel

View / Histogram

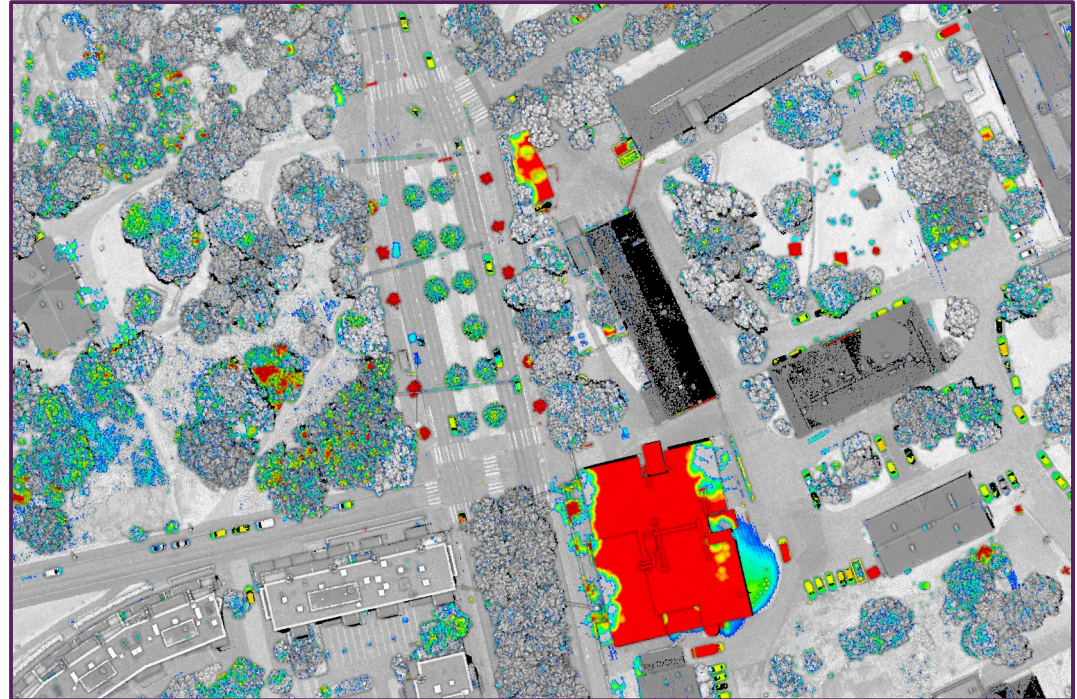
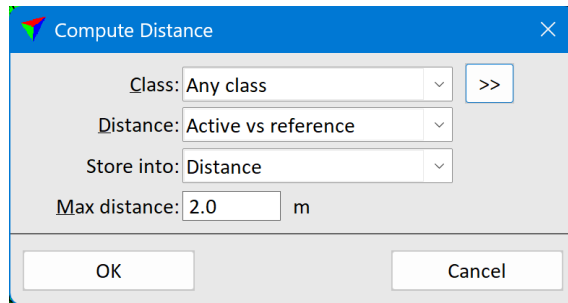
- **View / Histogram** menu command for viewing histogram of any attribute
- Can give better understanding of unknown attributes or computed values



Compute Distance & Active vs Reference

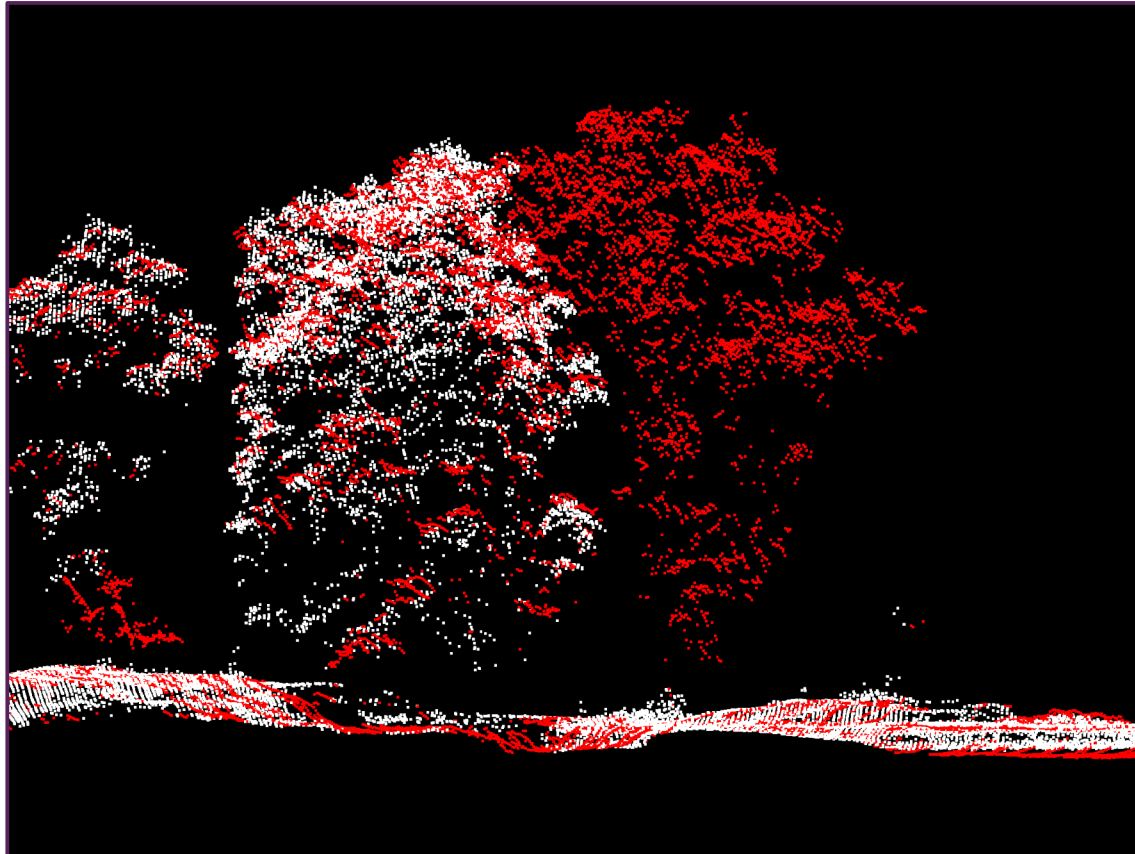


- Computes distance from each active point to closest reference point and from each reference point to closest active point



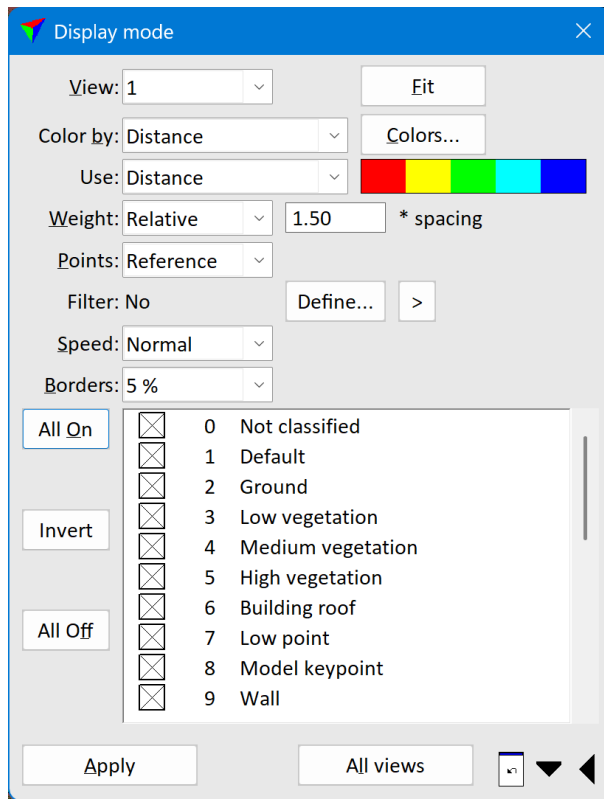
Coloring Mode -- Active-Reference

- One color for active points, one color for reference points



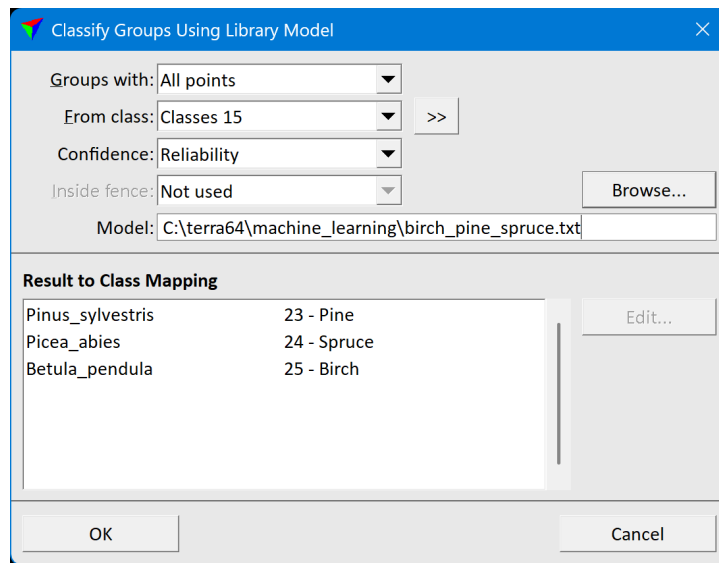
Active and Reference in Display Mode

- You can set view to display only active points or to display only reference points



Classify Groups Using Library Model

- Classifies groups using a library model Terrasolid has delivered using Python code
- Library model is trained to classify certain type of data into a set of classes
- Result classes have names
- User can specify mapping from classification name into class in active .ptc
- Library model is .txt file with a matching .pkl file in c:\terra64\machine_learning



The dialog box titled "Classify Groups Using Library Model" contains the following fields and controls:

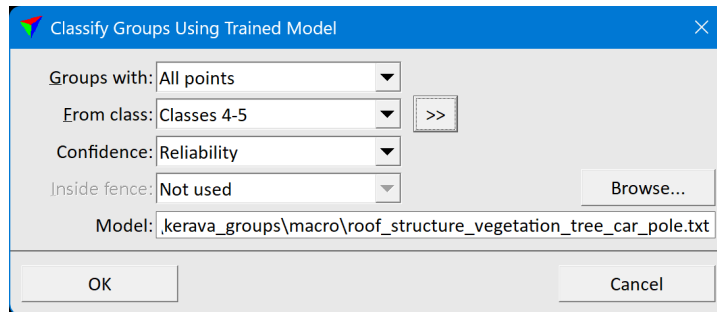
- Groups with:** A dropdown menu showing "All points".
- From class:** A dropdown menu showing "Classes 15", with a ">>" button to its right.
- Confidence:** A dropdown menu showing "Reliability".
- Inside fence:** A dropdown menu showing "Not used", with a "Browse..." button to its right.
- Model:** A text field containing the path "C:\terra64\machine_learning\birch_pine_spruce.txt".
- Result to Class Mapping:** A section containing a table with two columns: classification names and class names.

Result to Class Mapping	
Pinus_sylvestris	23 - Pine
Picea_abies	24 - Spruce
Betula_pendula	25 - Birch

At the bottom of the dialog are "OK" and "Cancel" buttons. An "Edit..." button is located to the right of the mapping table.

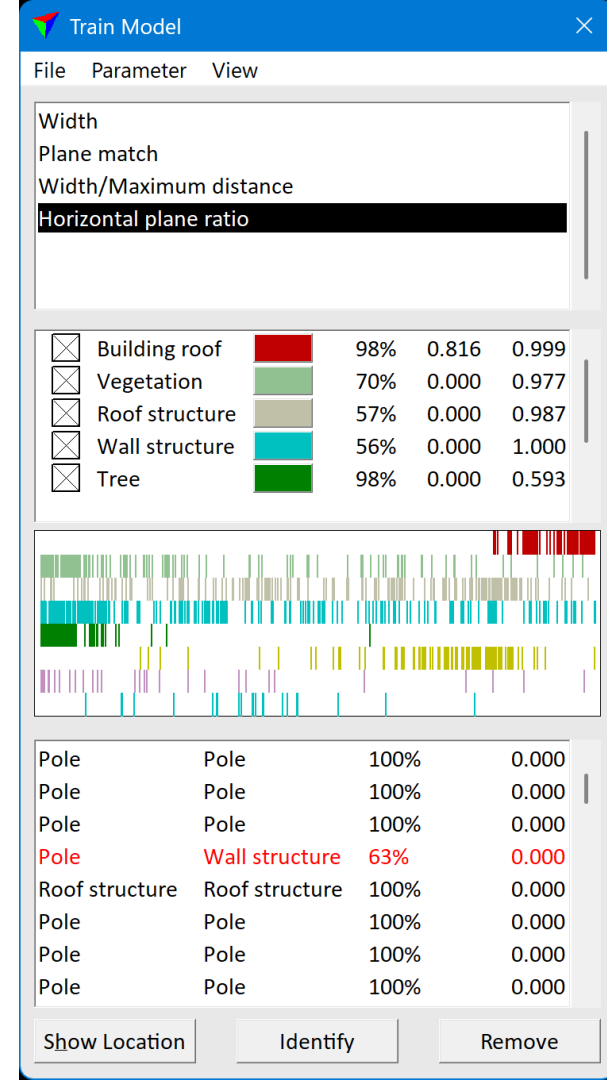
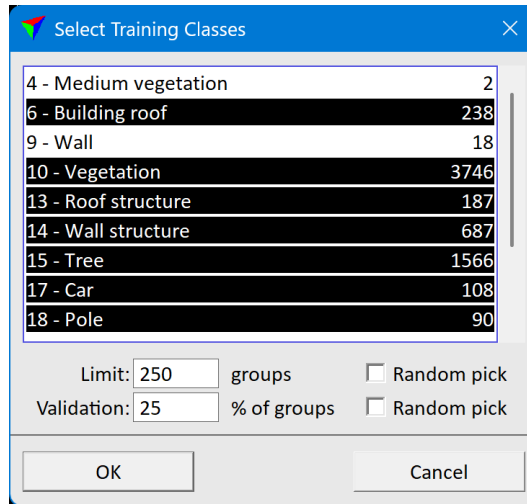
Classify Groups Using Trained Model

- Classifies groups using a model user has created with **Train Model** menu command
- Model gives result as class numbers
- Trained model is .txt file with a matching model file (.pkl)



Train Model

- Tool replacing **Test parameters** menu command
- Builds a machine learning model for classifying groups based on training groups user has classified and parameters user selects
- Uses some of the groups as training and some as validation groups
- Trains model using training groups
- Reports classification success rate using validation groups



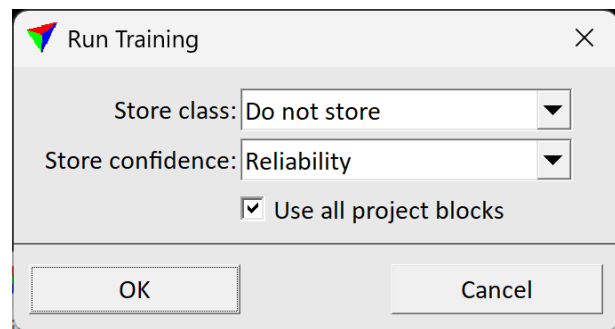
Train Model Improvements



- Selection of groups is now more systematic
 - You get mostly the same groups selected when you rerun the tool also when some groups have been classified differently
- New **Plane Roughness** parameter: average mismatch from point to plane fitted to neighbours
- New **Surface Roughness** parameter: Average mismatch from point to second degree surface fitted to neighbours

Improvements in Train Model

- New geometric parameter **Point count**
- New radiometric parameters **Amplitude variation**, **Intensity variation** and **Reflectance variation**
- Systematic model **Deep forest** model result with **Run Training** (used to have random variation)
- **Run Training** can use data from all project blocks
- **Run Training** gives report on model creation and validation



Run Training

Store class: Do not store

Store confidence: Reliability

☒ Use all project blocks

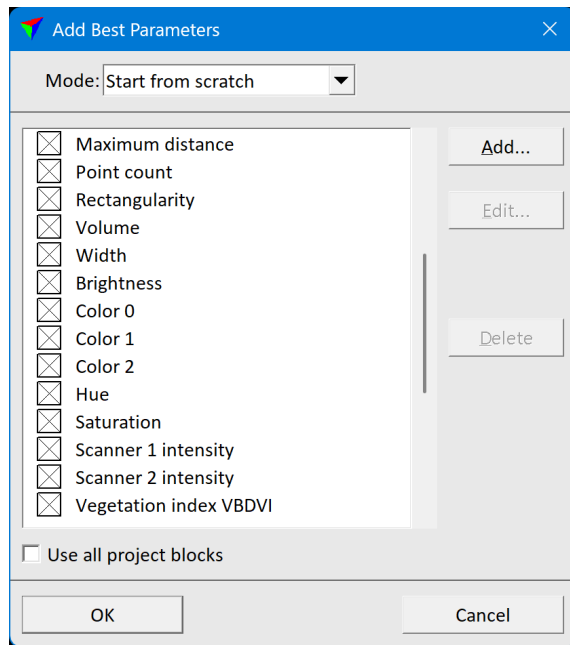
OK Cancel

Model Training Group Counts

Class	Training	Validation	Correct	Success
10 - Vegetation	375	125	123	98.4%
13 - Roof structure	140	47	41	87.2%
14 - Wall structure	375	125	112	89.6%
15 - Tree	375	125	124	99.2%
17 - Car	81	27	24	88.9%
18 - Pole	66	22	22	100.0%
27 - Structure	58	20	10	50.0%
28 - Machinery	16	6	5	83.3%
Total	1486	497	461	92.8%

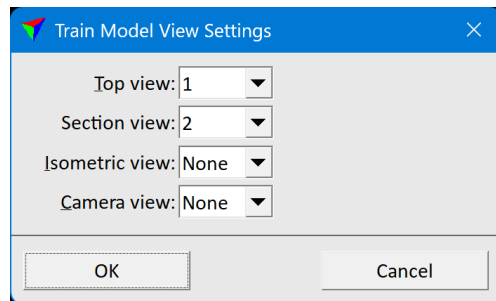
Add Best in Train Model

- Evaluates parameters and selects a set which gives the best overall validation result
- Builds a list of all possible single parameters
- User can change settings associated with parameters or add ratio parameters before running the automatic search for ones which work the best



View Settings in Train Model

- Setup of automatic views for selected group



Geometric Parameters



Area	2D area of the group from enclosing polygon.
Average distance	Average height from ground value.
Average z ratio	Position of average z between maximum and minimum z.
Circularity	2D area of group / area of enclosing circle.
Crown sharpness	Sharpness of the top of group.
Edge complexity	How long perimeter is compared to a rectangle with same area.
Edge ratio	How many of the points are on the edge.
Height	Maximum z – minimum z.
Length	Length of the group based on 2D line fitted thru the points.
Minimum distance	Smallest height from ground value in group.
Maximum distance	Biggest height from ground value in group.
Rectangularity	2D area of group / area of rotated bounding box.
Volume	Volume of group using voxel based computation.
Width	Width of the group based on 2D line fitted thru the points.

Radiometric Parameters



Amplitude	Average amplitude value.
Amplitude variation	Variation in amplitude values.
Brightness	Average brightness from point color using HSV model.
Color	Average color value from selected channel 0-9.
Hue	Average hue from point color using HSV model.
Intensity	Average intensity value.
Intensity variation	Variation in intensity values.
Reflectance	Average reflectance value.
Reflectance variation	Variation in reflectance values.
Saturation	Average saturation from point color using HSV model.
Scanner amplitude	Average amplitude value of points from selected scanner 0-255.
Scanner intensity	Average intensity value of points from selected scanner 0-255.
Scanner reflectance	Average reflectane value of points from selected scanner 0-255.
Vegetation index	Average vegetation index value (NDVI, VBDVI or user defined).

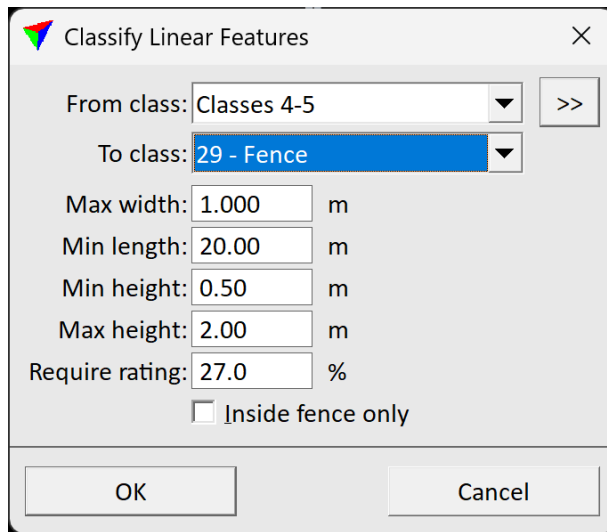
Computational Parameters



Closeby 2D ratio	Relative number of points which have a closeby point in given class in 2D.
Closeby 3D ratio	Relative number of points which have a closeby point in given class in 3D.
Complex ratio	Relative number of points with complex dimension.
Edge complexity	How long perimeter is compared to a rectangle with same area.
Edge ratio	How many of the points are on the edge.
Horizontal plane ratio	Value describing how vertical normal vectors of points are.
Linear ratio	Relative number of points with linear dimension.
Planar ratio	Relative number of points with planar dimension.
Plane match	Average difference from points to a plane fitted to group.
Plane roughness	Average mismatch from point to plane fitted to neighbours
Solid ratio	How many of the group points are last echo and above a given minimum height from ground.
Surface roughness	Average mismatch from point to second degree surface fitted to neighbours
Transparent ratio	Relative number of non-last echo points.
Vertical plane ratio	Value describing how horizontal normal vectors of points are.
Group verticality	Value describing how vertical 3D line fitted to the whole group is.

Classify / Linear Features

- Classifies fences or other similar linear features
- Requires:
 - Ground classified
 - Height from ground stored as distance values
 - Medium and high vegetation classified

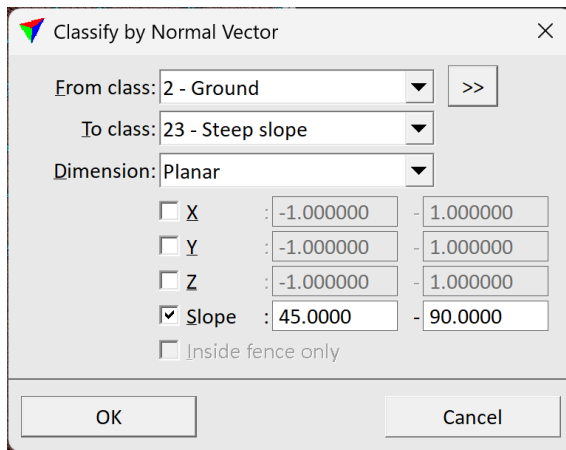


The screenshot shows a dialog box titled "Classify Linear Features" with a close button (X) in the top right corner. The dialog contains the following fields and controls:

- From class:** A dropdown menu showing "Classes 4-5" with a right-pointing arrow button (>>) to its right.
- To class:** A dropdown menu showing "29 - Fence" with a right-pointing arrow button (v) to its right.
- Max width:** A text input field containing "1.000" followed by a unit label "m".
- Min length:** A text input field containing "20.00" followed by a unit label "m".
- Min height:** A text input field containing "0.50" followed by a unit label "m".
- Max height:** A text input field containing "2.00" followed by a unit label "m".
- Require rating:** A text input field containing "27.0" followed by a unit label "%".
- Inside fence only:** A checkbox that is currently unchecked.
- Buttons:** "OK" and "Cancel" buttons at the bottom of the dialog.

Classify / By Normal Vector & Slope

- New **Slope** option to make it easier to classify points by slope angle



Classify by Normal Vector

From class: 2 - Ground >>

To class: 23 - Steep slope

Dimension: Planar

☐ X : -1.000000 - 1.000000

☐ Y : -1.000000 - 1.000000

☐ Z : -1.000000 - 1.000000

☒ Slope : 45.0000 - 90.0000

☐ Inside fence only

OK Cancel

Gaussian Splat Support



- TerraScan can read Gaussian splats from .PLY file
- Splat attributes are handled as extra attributes
- You can manipulate splats (classify, modify coordinates, delete, ...)
- TerraScan can write Gaussian splats to .PLY file
- TerraScan displays splats as points – does not have full Gaussian splat display support

Read points - Hanasaari.ply

Cloud type: Airborne photo System: Other

Format: PLY Points: 3 000 000

Fit view: 1

Input projection: >> Not found

Active projection: >> Not found

Transform: None Define...

Coordinates: E0.93 N-2.30 --> E0.93 N-2.30

☐ Only every 10 th point

☐ Only class 2 - Ground >>

☐ Inside fence only

☒ Normal vector	4 bytes	All on
☒ Xyz	12 bytes	
☒ "f_dc_0"	4 bytes	All off
☒ "f_dc_1"	4 bytes	
☒ "f_dc_2"	4 bytes	
☒ "f_rest_0"	4 bytes	
☒ "f_rest_1"	4 bytes	
☒ "f_rest_2"	4 bytes	

Default: 1 - Default

OK Cancel

Gaussian Splat Display Extension



- Extension to TerraScan with its own price tag -- product name to be decided
- Provides full Gaussian Splat rendering capability
- Requires NVIDIA graphics card to run



Merge Splats

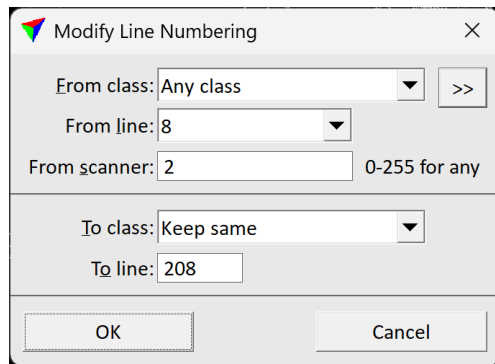


- Menu command in **Main Window** for merging splats into active lidar point cloud
- Assigns attributes of splats to closest lidar point
- Optionally adds non-linked splats to points
- Creates one point cloud which has lidar points with splat attributes and some splat points
- You can classify lidar points and copy classification to splats from closest classified lidar point
- You can view combined point cloud with full splat rendering

A screenshot of the "Merge Splats" dialog box in a software application. The dialog has a blue title bar with the text "Merge Splats" and a close button. It contains several input fields and dropdown menus. The "Input system" is set to "xml file" with a coordinate "24.835,60.163,79.929". The "Input elevations" is set to "Ellipsoidal". The "Active system" is set to "3132" with a coordinate "3132 ETRS89 / ETRS-GK25FIN". The "Active elevations" is set to "Orthometric". The "Geoid model" is set to "Finland - FIN2005". The "Max distance" is set to "0.500 m". The "Non-linked splats" is set to "Add as points". The "Class" is set to "25 - Splat". The "Line" is set to "65530". The "Scanner" is set to "255". There are "OK" and "Cancel" buttons at the bottom.

Modify Line Numbering & From Scanners

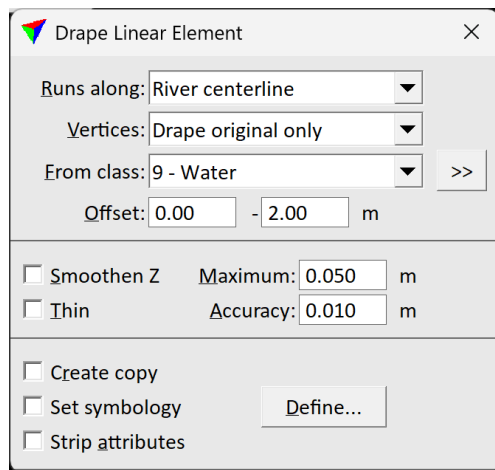
- New **From scanners** option to makes it possible to:
 - Modify line numbers of specific scanner(s) only
 - Classify points from specific scanner(s) only (and lines)



The screenshot shows a dialog box titled "Modify Line Numbering" with a close button (X) in the top right corner. The dialog is divided into two main sections. The top section contains three input fields: "From class:" with a dropdown menu showing "Any class" and a ">>" button to its right; "From line:" with a dropdown menu showing "8"; and "From scanner:" with a text input field containing "2" and a label "0-255 for any" to its right. The bottom section contains two input fields: "To class:" with a dropdown menu showing "Keep same" and "To line:" with a text input field containing "208". At the bottom of the dialog are two buttons: "OK" and "Cancel".

Drape Linear Element & River Centerline

- **River centerline** choice is good for draping river centerline to follow point cloud enforcing downstream flow at the same time
- You need to have some point cloud points on the water surface
- Tool does not require water hits close to every line string vertex



The screenshot shows the 'Drape Linear Element' dialog box with the following settings:

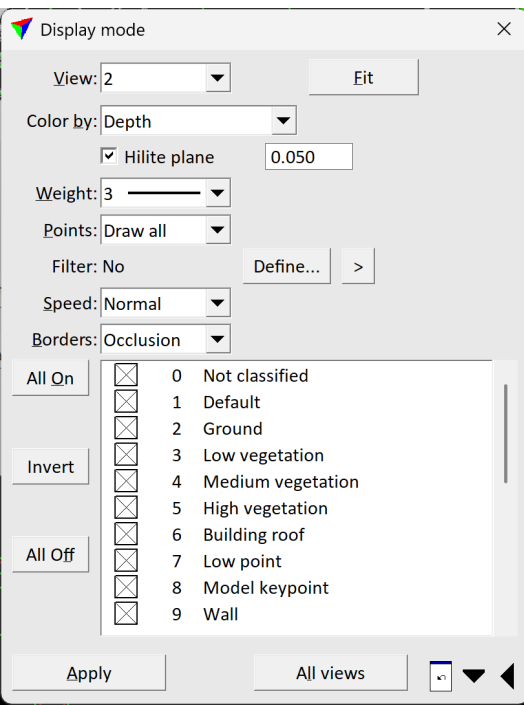
- Runs along:** River centerline
- Vertices:** Drape original only
- From class:** 9 - Water
- Offset:** 0.00 - 2.00 m
- ☐ **Smoothen Z** Maximum: 0.050 m
- ☐ **Thin** Accuracy: 0.010 m
- ☐ **Create copy**
- ☐ **Set symbology** Define...
- ☐ **Strip attributes**

Various Improvements

- **Assign Groups / By Tree Logic** now makes use of **Spacing** parameter to control how many groups to form
- **Fit to Reference / Using Trees** can apply transformation also to trajectories and to image list
- **Fit to Reference / Using Trees** copies result transformation to clipboard
- **Canopy diameter** field added to user group file format definition. This fits a minimum circle around the group and writes out the diameter of the circle
- **Move Section** tool has option **Fixed step** and **Step** setting to specify the movement size in master units
- **Classify / By distance** supports using an extra attribute as the distance value
- **Classify / By distance** has a setting for classifying points with no distance value
- **Draw polygons** macro action has choice for producing circles for group
- Support for multiple classes in **Fit Linear Element**
- New choices in **Label Clearance** for label rotation
- **Show location** in **Define Project** lets user select hilite color, weight and style

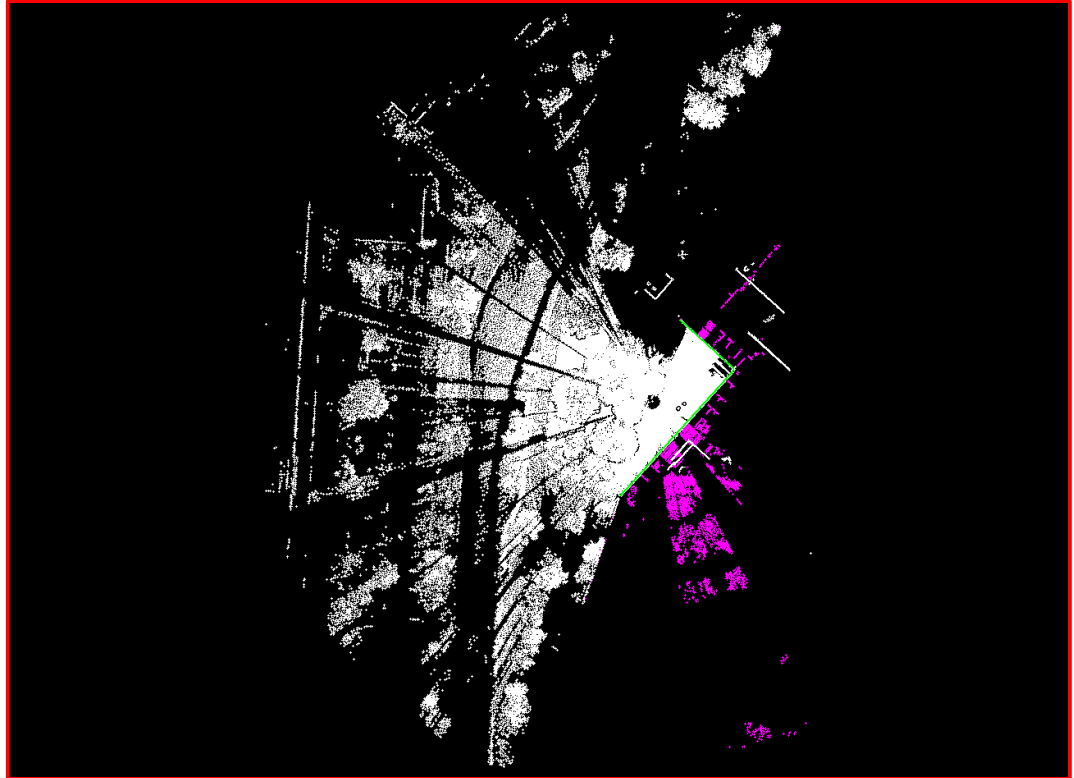
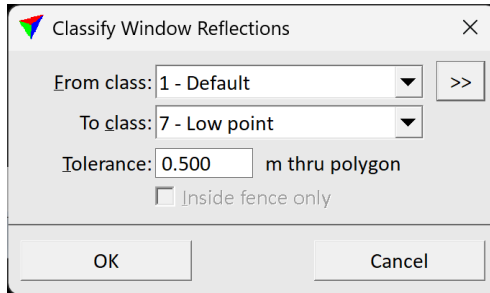
Hilite Plane in Depth Coloring

- **Hilite plane** hilites points matching active depth plane in a view window
- Useful when working with building wall polygons
- Coloring shows which parts of the building wall match the active depth plane



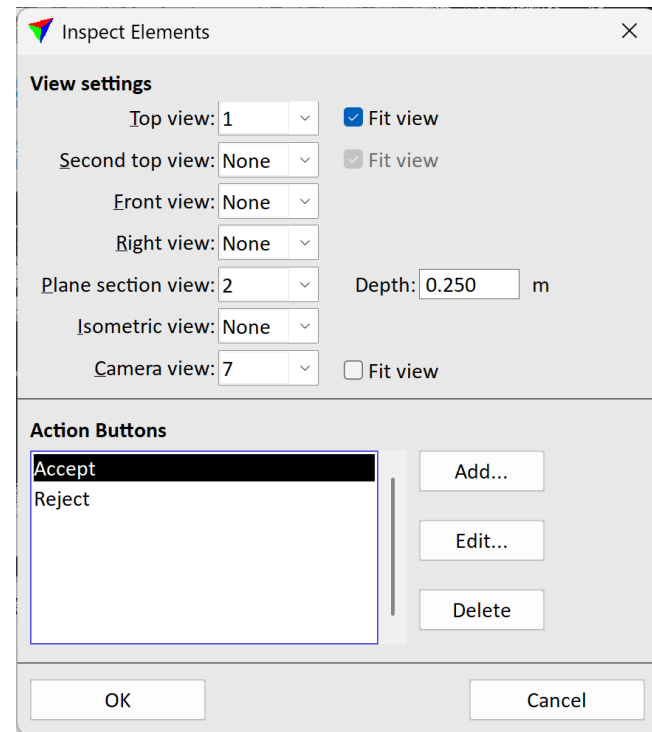
Classify / Noise / Window Reflections

- Classifies points where pulse vector goes thru selected polygons of wall surfaces
- Needs trajectories and wall polygons



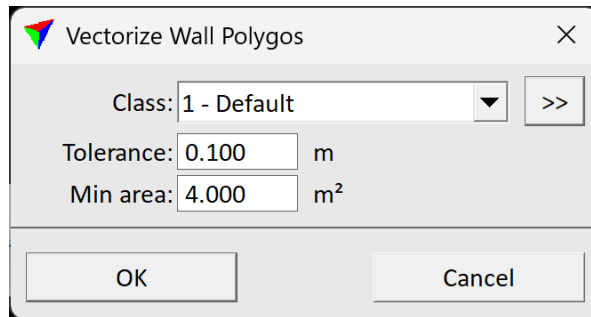
Inspect Elements Improvements

- **Inspect Elements** has new view option **Plane section view**. This creates a section view using plane equation fitted to the vector element
- **Inspect Elements** window is resizable
- **Inspect Elements** lets user define action buttons for modifying selected CAD element in the list



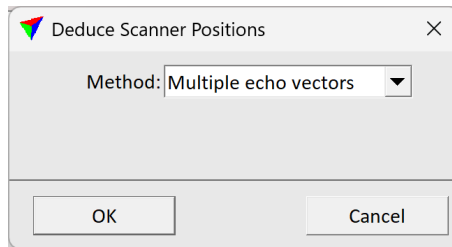
Vectorize Wall Polygons

- Finds large enough planar and vertical surfaces
- Creates a polygon for each wall surface found
- You can use **Inspect Elements** check created polygons and CAD tools to modify the result



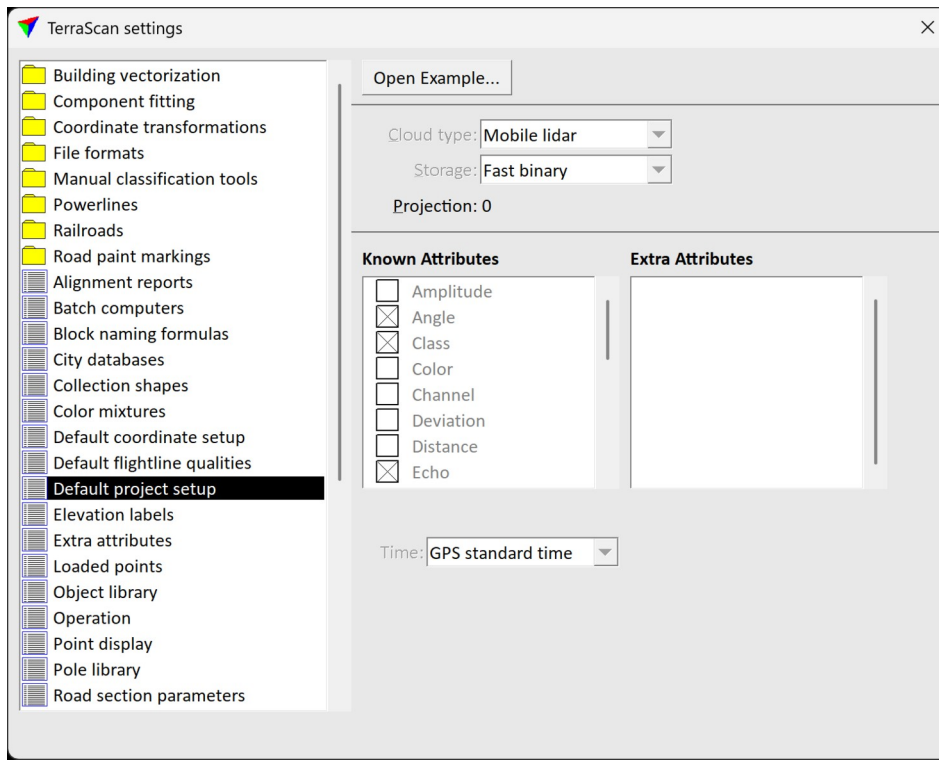
Deduce Scanner Positions using Pulse Vectors

- **Deduce Scanner Positions** in **Manage Trajectories** has new option **Method**
- **Multiple echo vectors** can create accurate scanner positions for tripod data where:
 - Some of the pulses have produced multiple returns
 - Points are in scan order – points from same pulse are consecutive



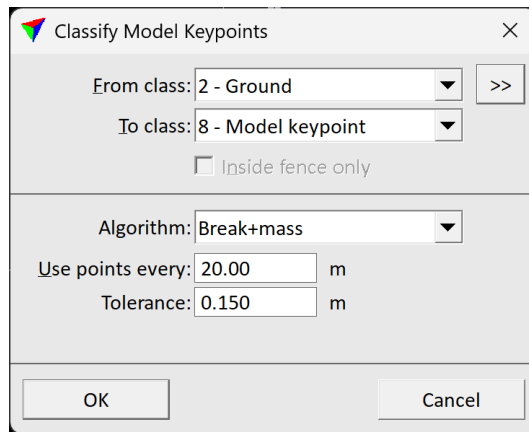
Default Project

- Category in **Scan Settings** tool
- User can load an example project which will be used as template for any new project



Break+mass Algorithm in Model Keypoints

- New option in model keypoint classification
- More time consuming computation than **Classic** but creates a more optimal selection of points
- Result: 30% smaller number of points than **Classic** to produce TIN model with same accuracy



The screenshot shows a dialog box titled "Classify Model Keypoints" with a close button (X) in the top right corner. The dialog is divided into two main sections. The top section contains two dropdown menus: "From class:" set to "2 - Ground" and "To class:" set to "8 - Model keypoint", with a right-pointing arrow button (>>) to the right. Below these is a checkbox labeled "Inside fence only" which is currently unchecked. The bottom section contains an "Algorithm:" dropdown menu set to "Break+mass". Below this are two input fields: "Use points every:" with the value "20.00" and "Tolerance:" with the value "0.150", both followed by a unit "m". At the bottom of the dialog are two buttons: "OK" on the left and "Cancel" on the right.

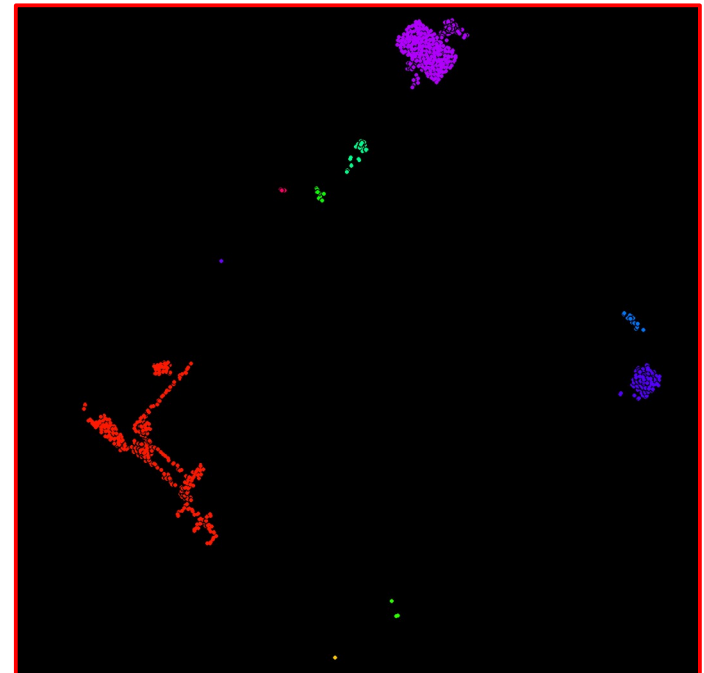
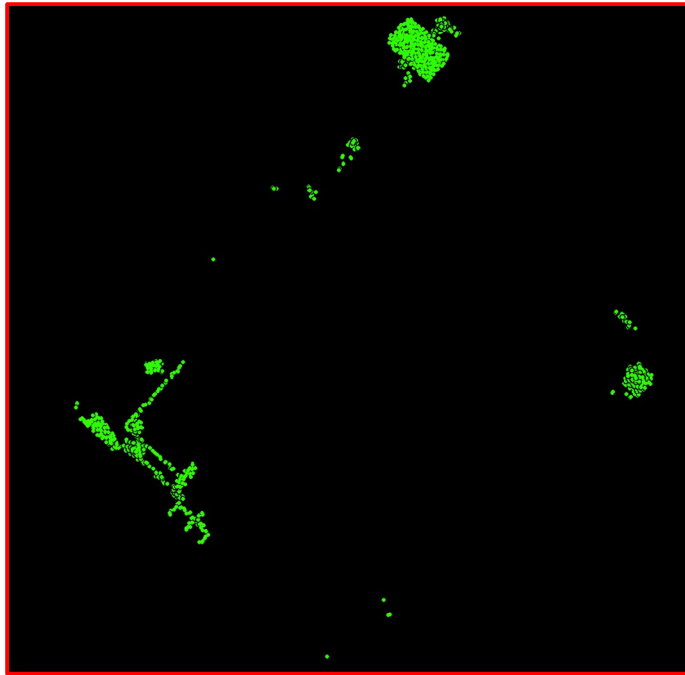
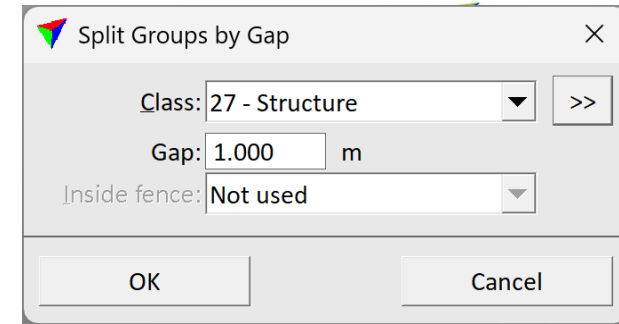
Scanner Systems in Wizard

- Support for **TrueView 540** scanner system
- Support for **iTwin Capture Modeler** photogrammetric point clouds



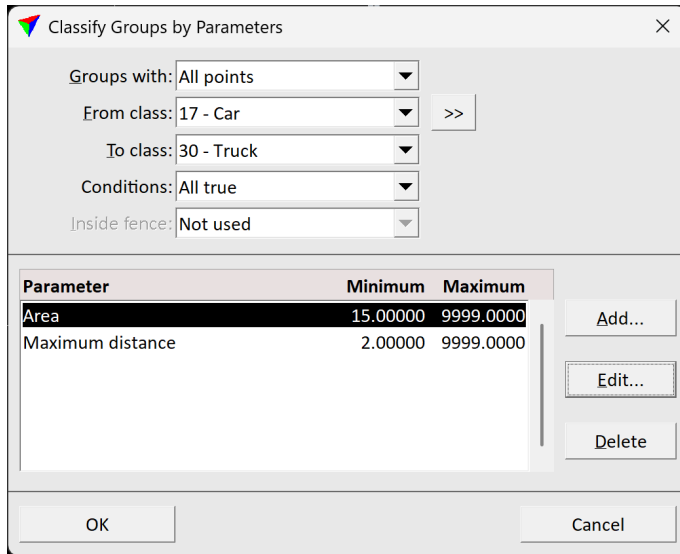
Split Groups by Gaps

- Splits groups if one group has parts separated by a bigger gap
- You may have groups with separated parts after manual classification



Classify Groups by Parameters

- Classifies groups by parameter values
- User selects parameter(s) and specifies minimum and maximum value for each parameter
- Same set of parameters as in **Train Model** (but no option for using ratios of two parameters)



Classify Groups by Parameters

Groups with: All points

From class: 17 - Car >>

To class: 30 - Truck

Conditions: All true

Inside fence: Not used

Parameter	Minimum	Maximum
Area	15.00000	9999.0000
Maximum distance	2.00000	9999.0000

Add...

Edit...

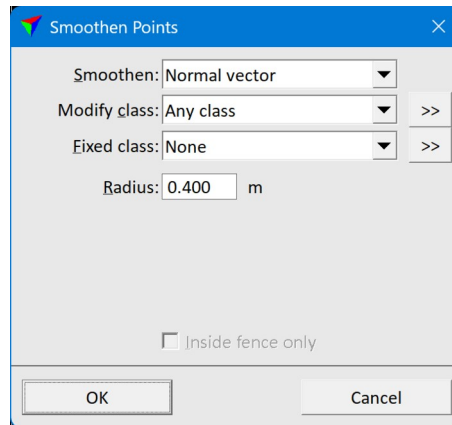
Delete

OK

Cancel

Normal Vectors Option in Smoothen Points

- Smoothen points can now smoothen normal vectors
- Smoothing is done using only **Planar** dimension points



PTS File Format Write Support

- **File / Save points As** can write .PTS
- **Output points** macro action can write .PTS
- Output PTS file will contain:
 - Xyz coordinates
 - Intensity values if present
 - RGB color if present

