Point Cloud Feature Intelligent Extraction and Analysis Software

LiDAR360MLS

GreenValley International

SOFTWARE

POINT CLOUD FEATURE INTELLIGENT EXTRACTION AND ANALYSIS SOFTWARE

LiDAR360MLS is an intelligent feature extraction and analysis software independently developed by GreenValley International, which supports the processing and analysis of LiDAR point cloud and image data obtained by mainstream vehicle-mounted, backpack, or handheld mobile mapping systems on the market. It has a complete processing chain from point cloud data processing to GIS asset survey, architectural drawing, 3D vector mapping, road condition assessment, railway inspection, urban forestry inventory, 3D Gaussian Splatting, digital twin, virtual reality and delivery of other industry results. LiDAR360MLS ushers in the era of 3D Data Intelligent Processing 2.0.

Massive Data Loading and Cluster Processing

Multi-Source Data Fusion Processing, Mapping, Analysis, Modeling
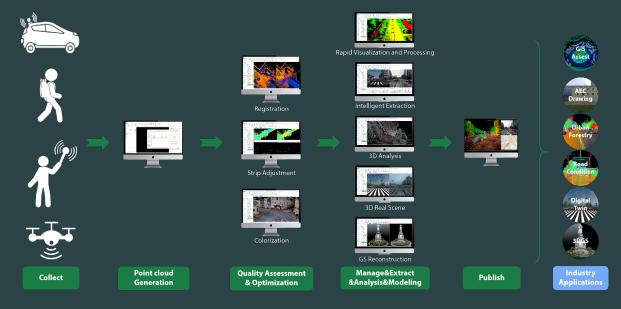
Independently Developed Underlying Engine

Efficient and Friendly 3D Interactive Editing
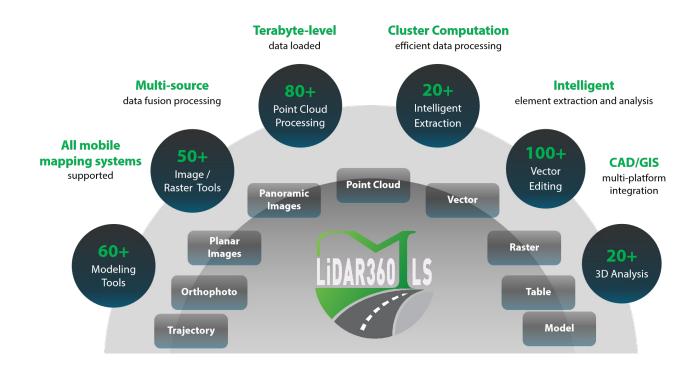
Leading Artificial Intelligence Algorithm

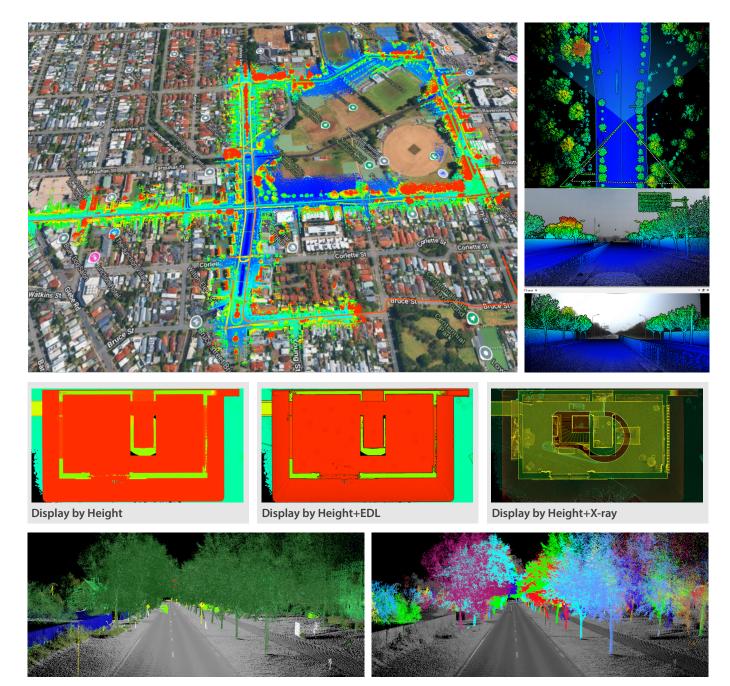Integrated Management of Collection, Editing, Database Storage, etc.

Rapid Visualization and Processing

Registration

Intelligent Extraction

Strip Adjustment

3D Analysis

Colorization

3D Real Scene

GS Reconstruction

GIS Assest

AEC Drawing

Urban Forestry

Road Condition

Digital Twin

3DGS

Collect

Point cloud Generation

Quality Assessment & Optimization

Manage&Extract &Analysis&Modeling

Publish

Industry Applications

Contents

Framework

Terabyte-level
data loaded

Cluster Computation
efficient data processing

Multi-source
data fusion processing

80+
Point Cloud
Processing

20+
Intelligent
Extraction

Intelligent
element extraction and analysis

All mobile mapping systems
supported

50+
Image /
Raster Tools

100+
Vector
Editing

CAD/GIS
multi-platform
integration

60+
Modeling
Tools

20+
3D Analysis

Point Cloud

Panoramic Images

Vector

Planar Images

Raster

Orthophoto

Table

Trajectory

Model

LiDAR360 LS

Data Loading and Rendering

- Supports point cloud and image data from various mobile mapping systems.
- All features support international units such as meters, feet, yards, etc.
- Supports overlay display of multiple planar cameras, panoramic camera and point cloud data, measurement and boresight calibration, assist data acquisition and editing.
- Supports combined display of multiple attributes, with the ability to add additional attributes to meet more application requirements.
- Provides rich point cloud snap tools that support automatic snapping of feature points such as planes, ridges, and corners.
- Seamlessly overlays point clouds, rasters, 3DGS, and various 3D models onto online maps.

Display by Height

Display by Height+EDL

Display by Height+X-ray
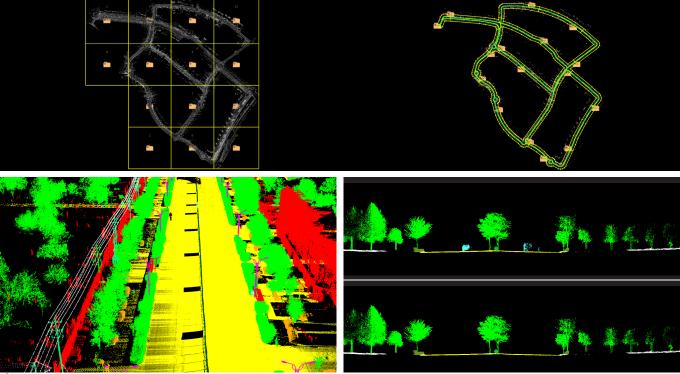
Display by Classification+Intensity

Display by TreeID+Intensity

All-in-One Data Processing Tools

- Supports multi-extent volume measurement and two-phase volume change analysis using Grid and TIN methods.
- Point cloud processing includes extraction, registration, export, classification, projection and coordinate transformation, selection and clipping, measurement, etc.
- Supports point cloud slicing based on scale, strips, and multiple modes, with slice editing capabilities.
- Vector processing includes extraction, format conversion, field calculator, overlay analysis, proximity analysis, quality checking projection and coordinate transformation, etc.
- Raster processing includes measurement, surface analysis, raster calculator, format conversion, projection transformation, etc.

| Name	Color	CellSize (m)	Basic Height	Size (L*W*H)	Project Area (m2)	Empty Volume (m3)	Cut(m3)	Fill(m3)	Total(m3)	Density (kg/m3)	Weight (kg)
Region_0		0.1	Minimum	39.37*43.65*12.91	1404.79	0	8437.94	0	8437.94	1	8437.94
Region_1		0.1	Minimum	43.11*142.08*15.64	5508.44	0	44126.6	0	44126.6	1	44126.6
Region_2		0.1	Minimum	35.97*37.79*12.97	1073.3	0	5202.63	0	5202.63	1	5202.63
Region_3		0.1	Minimum	15.37*10.64*2.4	120.586	0	86.258	-0.01	86.248	1	86.248
Region_4		0.1	Minimum	41.62*68.66*9.64	2460.9	0	11126.7	-0.036	11126.6	1	11126.6
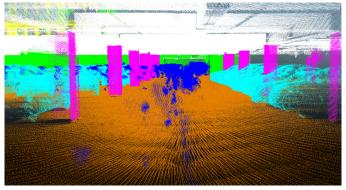
Intelligent Point Cloud and Imagery Processing

- Provides a complete AI pipeline for point cloud and image data from annotation, training, to inference.
- Supports local training of custom AI models and mapping of image detection results into 3D.
- Supports customized point cloud deep learning classification, allowing users to train models suitable for their own data, and also supports few-shot learning models.
- Supports image labeling assisted by the SAM model.
- Supports AI-based plates and faces blurring.
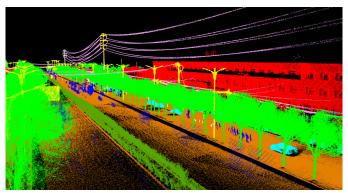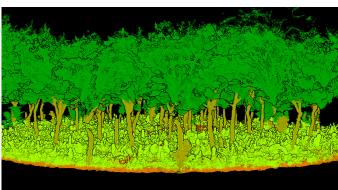

AI-based Plates and Faces Blurring

Image Object Detection
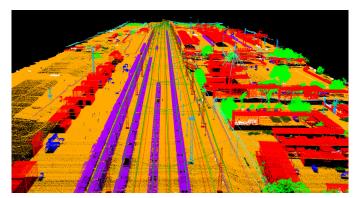
Scene 1: Underground Parking Garage

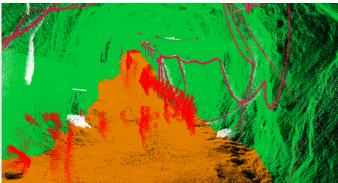**Scene 2: Shopping Mall**

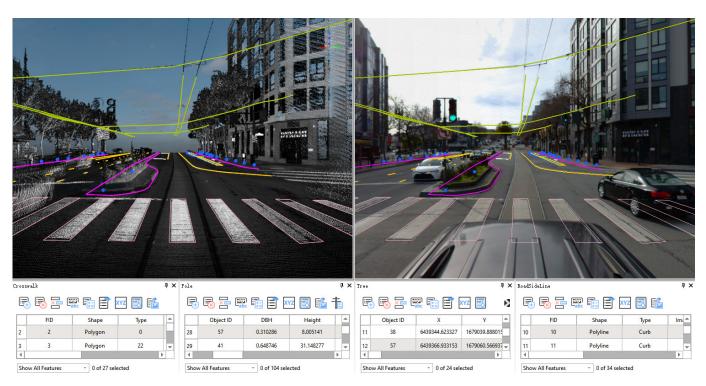**Scene 3: Urban Road**

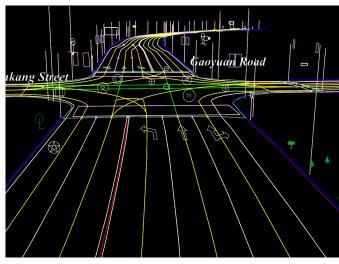**Scene 4: Forestry**
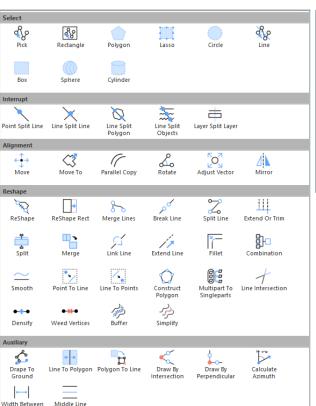

Scene 5: Railway

Scene 6: Mining Tunnel

Vector & Attribute Editing

- Supports vector mapping with multi-source data fusion.
- Supports 2D horizontal/vertical section mapping.
- Supports 100+ vector operations: drawing, editing, type conversion, extraction analysis, overlay analysis, proximity analysis, and projection transformation.
- Supports Point, Line, Polygon, MultiPoint, and MultiLine geometries.
- Provides multiple snapping and editing modes for vector nodes.
- Supports vector layer and attribute management, and supports attribute table template configuration.
- Supports a field calculator and object photo database storage. The field calculator includes over 300 built-in functions and provides Python scripting tools.
- Provides a built-in national standard road asset symbol library and a general symbol library.
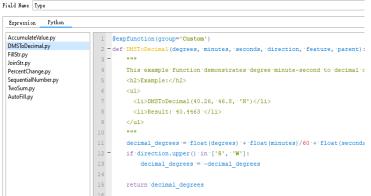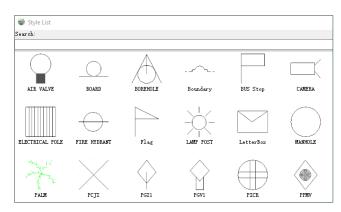- Supports adding annotations to point clouds, features, and multi-level data such as vertices and edges.

	FID	Shape	Type
2	2	Polygon	0
3	3	Polygon	22

Crosswalk — Show All Features — 0 of 27 selected

	Object ID	DBH	Height
28	57	0.310286	8.005141
29	41	0.648746	31.148277

Pole — Show All Features — 0 of 104 selected

	Object ID	X	Y
11	38	6439344.623327	1679039.888015
12	57	6439366.933153	1679060.566937

Tree — Show All Features — 0 of 24 selected

	FID	Shape	Type	Im
10	10	Polyline	Curb	
11	11	Polyline	Curb	

RoadSideLine — Show All Features — 0 of 34 selected

Select

Pick | Rectangle | Polygon | Lasso | Circle | Line

Box | Sphere | Cylinder

Interrupt

Point Split Line | Line Split Line | Line Split Polygon | Line Split Objects | Layer Split Layer

Alignment

Move | Move To | Parallel Copy | Rotate | Adjust Vector | Mirror

Reshape

ReShape | ReShape Rect | Merge Lines | Break Line | Split Line | Extend Or Trim

Split | Merge | Link Line | Extend Line | Fillet | Combination

Smooth | Point To Line | Line To Points | Construct Polygon | Multipart To Singleparts | Line Intersection

Densify | Weed Vertices | Buffer | Simplify

Auxiliary

Drape To Ground | Line To Polygon | Polygon To Line | Draw By Intersection | Draw By Perpendicular | Calculate Azimuth

Width Between Lines | Middle Line

Stopline - Field Calculator

Field Name Type

Expression | Python

Fields: FID, Type, ImageName, Image, Width, MCode, SCode

Function: Search...

Arrays, Color, Conditionals, Conversions, Date and Time, Favorites, Files and Paths, Fuzzy Matching, General, GeometryGroup, Maps, Math, Operators, Record and Attributes, String

Close Help

function $area

Returns the area of the current feature. The area calculated by this function respects both the current project's ellipsoid setting and area unit settings. For example, if an ellipsoid has been set for the project then the calculated area will be ellipsoidal, and if no ellipsoid is set then the calculated area will be planimetric.

Syntax

$area

Examples

- $area → 42

Select Value

+ − / * ^ || ( ) \n

RoadMarking - Field Calculator

Field Name Type

Expression | Python

AccumulateValue.py
DMSToDecimal.py
FillStr.py
JoinStr.py
PercentChange.py
SequentialNumber.py
TwoSum.py
AutoFill.py

```python
1   @expfunction(group='Custom')
2 - def DMSToDecimal(degrees, minutes, seconds, direction, feature, parent):
3       """
4       This example function demonstrates degree minute-second to decimal 
5       <h2>Example:</h2>
6       <ul>
7         <li>DMSToDecimal(40.26, 46.8, 'N')</li>
8         <li>Result: 40.4463</li>
9       </ul>
10      """
11      decimal_degrees = float(degrees) + float(minutes)/60 + float(seconds
12      if direction.upper() in ['S', 'W']:
13          decimal_degrees = -decimal_degrees
14
15      return decimal_degrees
16
```
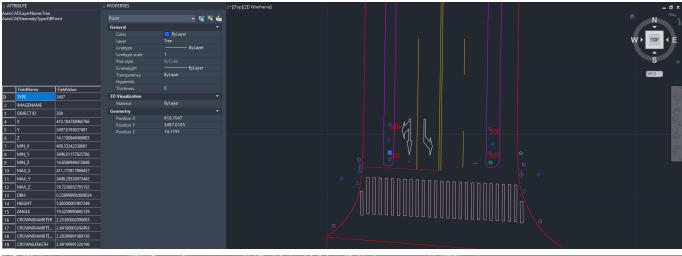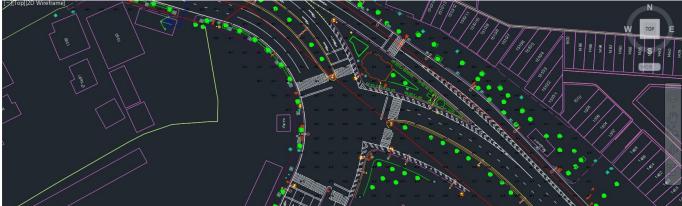
AutoCAD Plugin

- Zero-configuration, one-click installation, compatible with multiple CAD and Civil3D software versions.
- Seamless integration with AutoCAD for geometry, attributes, annotations, and styles.
- Supports import/export of GPKG, SHP, DXF, JSON, GeoJSON, tables, and rasters.
- Enables attribute queries along with symbol style management, definition, and editing.
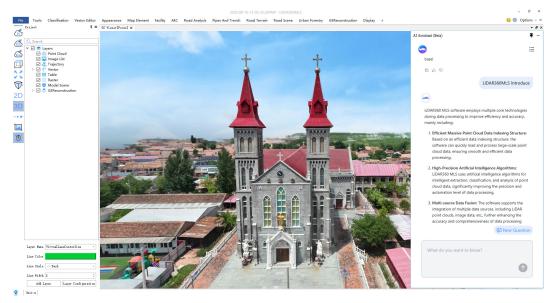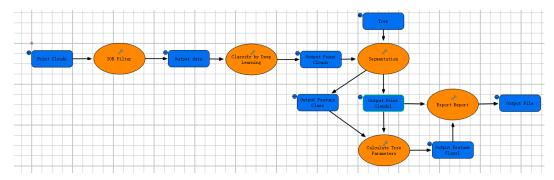- Provides multi-mode batch symbolization capabilities.

AI Assistant

- Built-in Q&A and user guide. Ask questions and get answers instantly— easier to learn, smarter to use.

Modelbuilder and Batch Processing

- Supports custom batch processing workflows for point clouds, vectors, and raster tools.
- Provides a fully customizable canvas, allowing models to be exported and shared.
- Includes built-in, one-click batch processing workflows for various tasks such as road marking extraction, pavement distress analysis, individual tree segmentation in forestry and parameter calculation.
- Supports cluster computing.

Cluster Computing
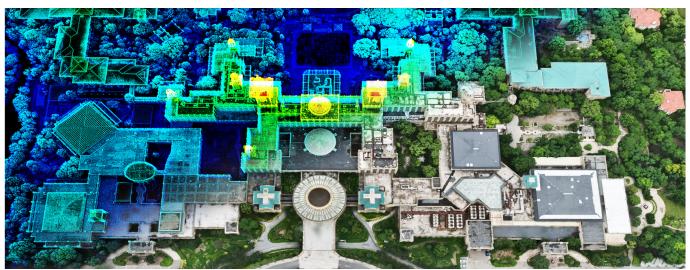
- Cluster computing engine comprehensively enhances georeferencing, point cloud processing and model reconstruction efficiency.

Comparison Table of Cluster Computing Efficiency Improvements for Selected Functions

Device Configuration	Function	Data Size	Number of Cluster Engines	Efficiency Improvement
System: Windows 11 **CPU:** Intel(R)Core(TM)i7-10700K **RAM:** 64GB **GPU:** NVIDIA GeForce RTX 3060 **GPU Memory:** 12GB	LiGrip GSReconstruction	Data Collection: 60 minutes Coverage Area: 200m*200m	2	90%
			4	210%
	COLMAP SReconstruction	Image Count: 20,000 Coverage Area: 3.8 km*1.8 km	2	100%
			4	200%
	Point Cloud Generation	5 Projects	2	200%
			5	400%
	Deep Learning Classification+Conversion of Point Clouds	137GB	2	201%
			3	298%

*Note: The efficiency gains from cluster computing may vary depending on device configuration, switch performance, network bandwidth, and data volume. The table above is for reference only.
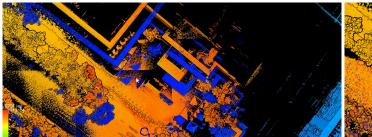
BP Module
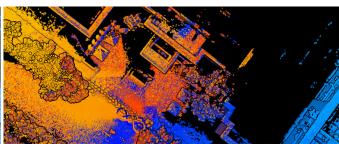
- Supports one-click batch project creation and processing of LiGrip and LiBackpack data.
- Supports point cloud generation in coordinate systems using meters, feet, or yards.
- Supports PPK processing and the export of PPK trajectory quality reports.
- Supports base station data in RINEX, NovAtel, and RTCM3 formats.
- Supports coordinate transformation options including seven-parameter transformations, geoid models, linear offset, projection to specified elevation, etc.
- Supports custom ellipsoids, projection coordinate system, vertical coordinate system, etc.
- Supports one-click MESH model export.
- Supports one-click AI-based classification.
- Supports GCP import and selection, enabling georeferencing and improved point cloud accuracy.
- Supports LiGrip output of high-density point cloud data for enhanced realism.
- Supports registration and editing tools for single/multiple projects.
- Supports SLAM closed-loop editing tools.
- Supports SLAM calibration parameter updates.
- Supports quality inspection and accuracy improvement.
- Supports moving object removal.

LiGrip Data Colorization Effect

Before Closed-Loop Editing
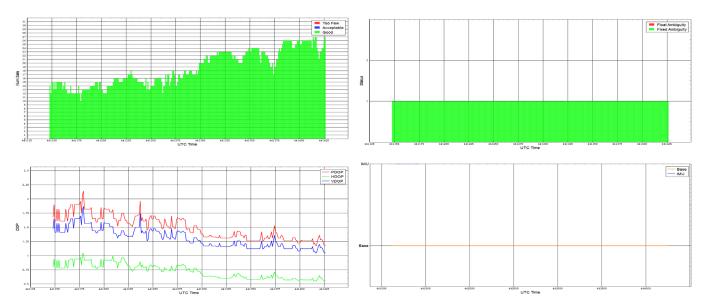
After Closed-Loop Editing

Before Moving Objects Removal
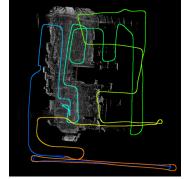
After Moving Objects Removal

PPK Quality Report

Geo Module

- Supports intelligent data quality inspection and copying, automatically generating raw data quality reports (including camera, laser, and IMU statistics).
- Supports a new data processing workflow to continuously improve algorithms and data quality.
- Supports one-click point cloud generation for LiMobile data.
- Supports point cloud generation in coordinate systems using meters, feet, or yards.
- Supports LiMobile data SLAM processing, effectively optimizing trajectorys in GPS-denied but feature-rich environments such as underground parking lots.
- Supports multi-source data registration for complex scenarios.
- Supports quality inspection and accuracy improvement.
- Supports point cloud boresight calibration as well as extrinsic calibration of panoramic or planar cameras. Calibration can be performed without returning the mapping system to the factory.
- Supports point cloud and trajectory accuracy analysis, automatically identifying and repairing abnormal conditions such as trajectory jumps.
- Supports an optimized coloring algorithm with improved sky color rendering and smoother color transitions.
- Supports relative alignment of MLS point cloud data, global optimization of multiple projects with control points, and the output of detailed accuracy reports to provide high-precision data support for subsequent applications.
- Supports moving object removal.

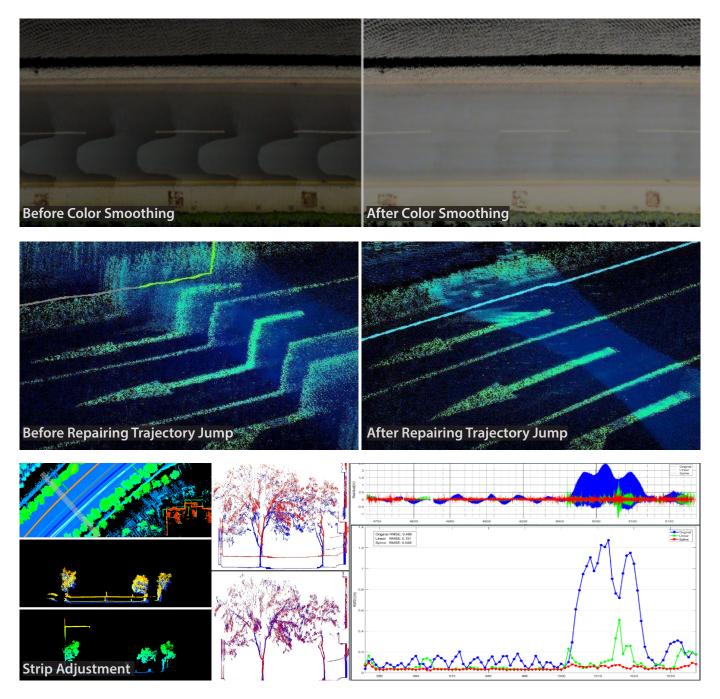**Integrated Navigation Trajectory**

Integrated Navigation + SLAM Trajectory

1. Project Summary:

Project Name	Collect Time (s)
demo_2025-01-24-03-46-25	120.089
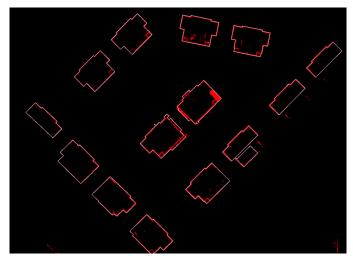
2. Camera Statistics:
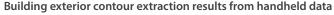
Camera	Number of Images	Number of Triggers	Deviation
Planar_F1	217	218	1
Planar_F2	217	218	1
Planar_B1	0	0	Unreadable
Planar_B2	0	0	Unreadable
Panorama	318	318	0

Before Color Smoothing

After Color Smoothing

Before Repairing Trajectory Jump

After Repairing Trajectory Jump
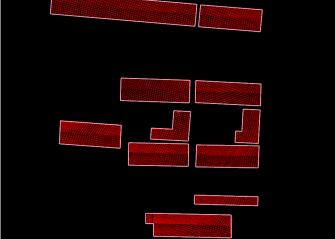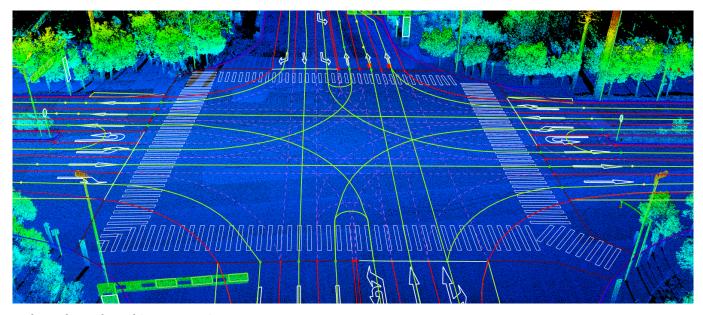

Strip Adjustment

Asset Extraction

- Built-in fully automatic extraction models for road markings and facilities, capable of extracting dozens of feature types with one click.
- Customizable road marking and facility extraction models based on synthetic samples, supporting localized training and inference.
- Customizable road marking symbol library, enabling one-click drag-and-drop for 100% accurate drawing results.
- Supports the drawing of special symbols such as characters and letters, enriching the deliverable database.
- Interactive automatic multi-element detection to improve mapping efficiency.
- Rich library of road element templates, supporting one-click drag-and-drop.
- Supports customization of linear facility templates to achieve batch extraction of linear elements.
- Supports batch extraction of existing railroads and centerlines.
- Supports individual segmentation and parameter extraction of road facilities such as poles and vehicles.
- Supports one-click extraction of building exterior contours.
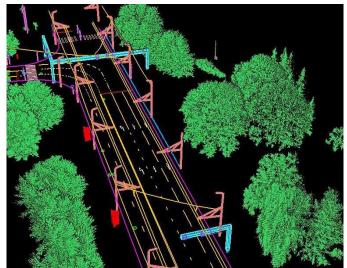

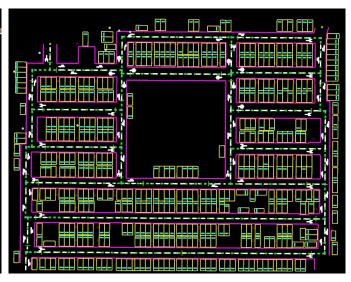**Building exterior contour extraction results from handheld data**

Building exterior contour extraction results from airborne data

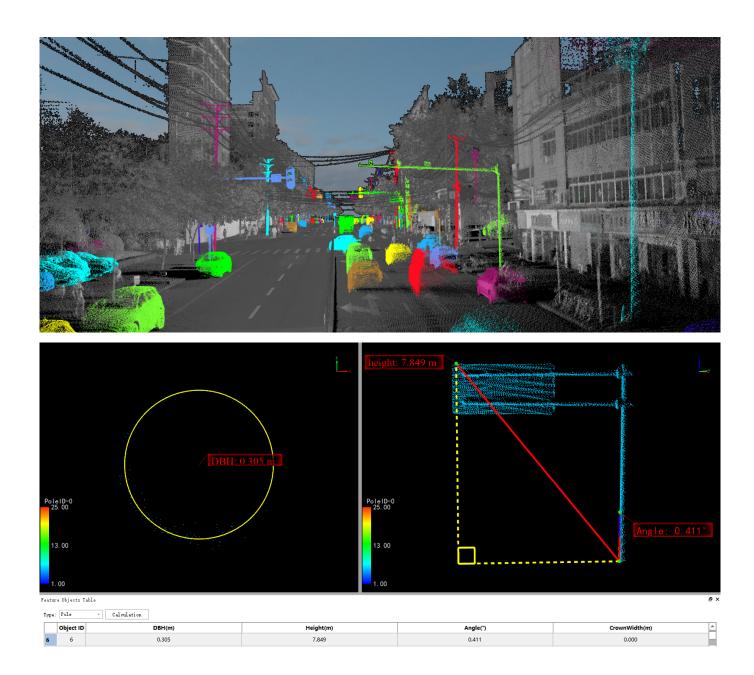**AI-based Road Marking Extraction**

AI-based Road Facility Extraction

Urban Road Scene

Overpass Scene

Highway Scene

Underground Parking Garage Scene

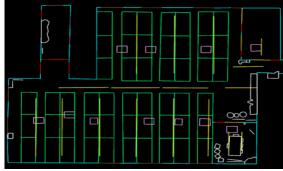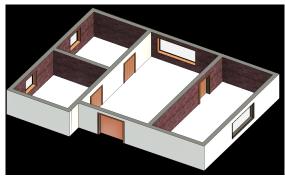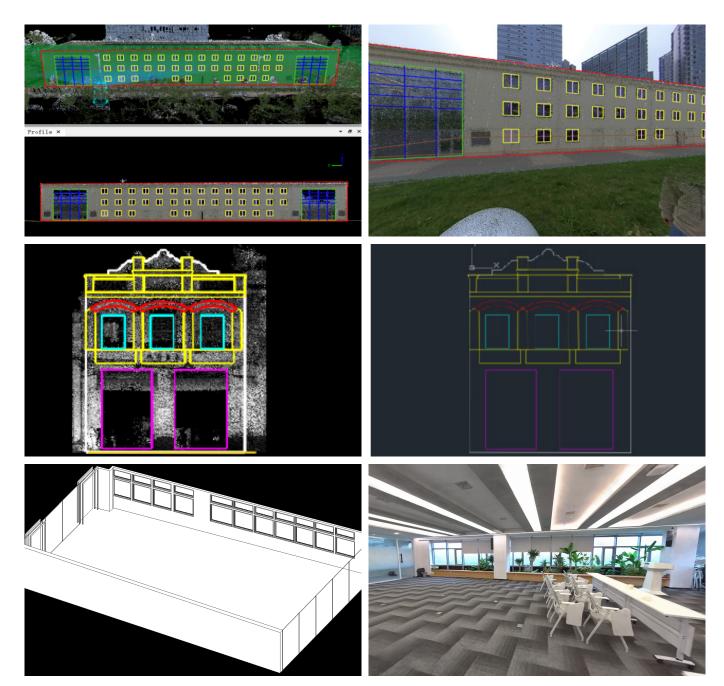|	Object ID	DBH(m)	Height(m)	Angle(°)	CrownWidth(m)
6	6	0.305	7.849	0.411	0.000

Architectural Drawing

- One-Click Vectorization – automatically generates floor plans, intelligently extracts elevation structures, and rapidly builds BIM models with minimal manual intervention.
- Smart Drawing Tools – supports merging, splitting, node editing, construction lines, grouped arrays, and more, covering 2D, elevation, and 3D modeling workflows.
- Accurate Measurement & Calculation – provides real-time length and area measurements, supports 3D model verification, ensuring precise and reliable results.
- Direct Compatibility with LiGrip, LiBackpack, and LiMobile – directly utilizes point cloud and imagery data without format conversion.
- Multi-Mode Data Acquisition – supports baseline drawing, multi-structure elevation unfolding (polygon, curve, cylinder), and BIM-linked point cloud modeling for versatile surveying needs.
- Panoramic Imagery Assisted Mapping – integrates panoramic imagery with point cloud data to enhance the completeness and accuracy of feature mapping.
- Point Cloud-Driven Modeling – supports automatic contour extraction, 3D/section drawing, and synchronized vector-BIM model editing for rapid, high-precision model generation.
- Batch Processing – enables one-click extraction of elevation windows and intelligent unfolding of building structures, significantly improving efficiency.
- Multi-Format Output – exports results in DXF, orthophoto, and other formats, ensuring compatibility with CAD, GIS, BIM, and other platforms.
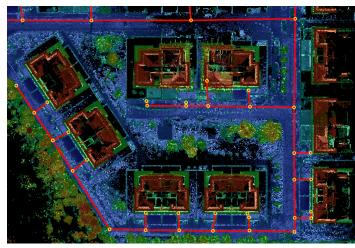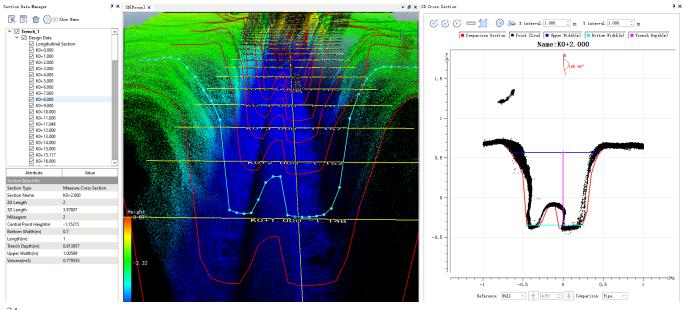
Trench & Pipeline

- Intelligent Extraction: automatically extracts pipeline routes and 3D trench profiles based on LiDAR point cloud data.
- Key Point Annotation: allows manual addition of pipeline feature points (e.g., elbows and tees) to improve pipeline network information completeness.
- Accurate Parameter Calculation: calculates key engineering parameters such as trench width, depth, volume, and over/under excavation with one click.
- 3D Visualization: displays pipelines and trench spatial distributions directly from point cloud data, supporting multi-angle viewing and analysis.

Road Condition

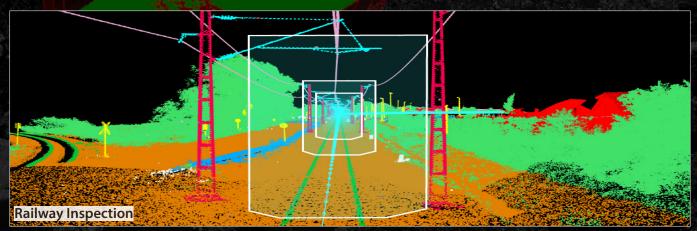**AI-Powered Intelligent Road Inspection and Evaluation.**
- AI-based road damage detection: accurately detects cracks, potholes, and other defects, automatically calculates the PCI, and supports multi-source data fusion and editing.
- Road analysis: clearance analysis, viewshed analysis, height-limit analysis, and vehicle passability analysis to meet the needs of roads, railways, tunnels, and other scenarios.
- Multi-phase data comparison: automatically generates standardized comparison reports to support maintenance decision-making and project acceptance.
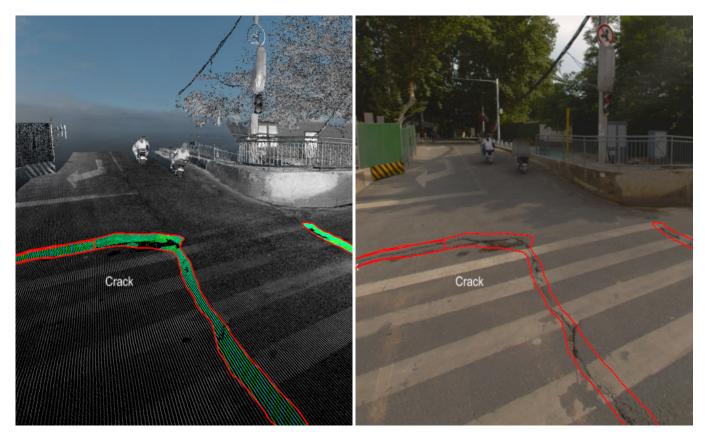
3D Spatial Analysis and Intelligent Computation
- Professional cross-section analysis: supports roads, railways, tunnels, and other scenarios, providing key parameter calculations such as slope and over/under-excavation.
- Construction and maintenance assistance: estimates volumes and assesses structures based on cross-section data to optimize operational plans.
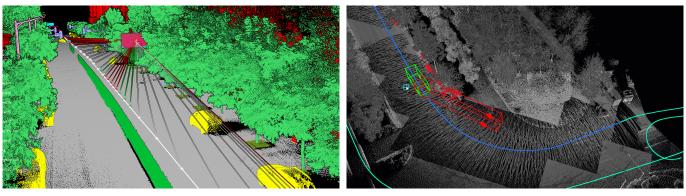
High-Precision Terrain Product
- Flexible terrain generation: supports terrain generation based on point cloud or cross-section data, meeting diverse accuracy requirements.
- Full range of terrain products: enables one-click generation of standard surveying outputs such as contour lines, DEM, and DSM, seamlessly integrated with GIS and engineering applications.
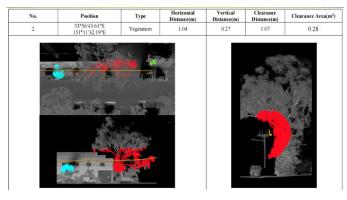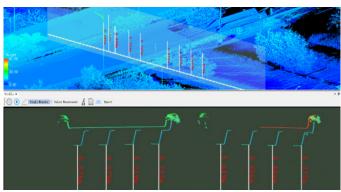
Railway Inspection

AI-based Pavement Damage Detection

Viewshed Analysis based on Target Point
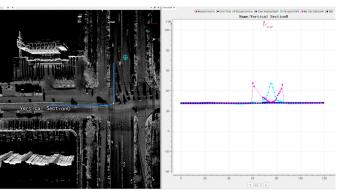
Vehicle Collision Simulation Analysis

No.	Position	Type	Horizontal Distance(m)	Vertical Distance(m)	Clearance Distance(m)	Clearance Area(m²)
2	33°56'43.61"S 151°11'32.19"E	Vegetation	1.04	0.27	1.07	0.28

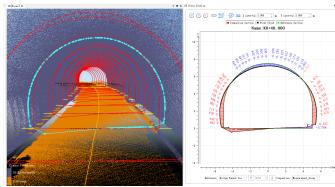**Urban Power Distribution Line Analysis**
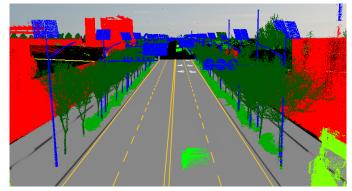
Bridge Height Limit Analysis
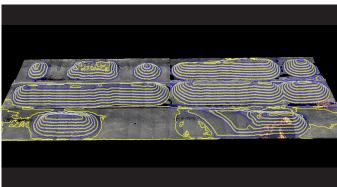
Road Section Analysis

Tunnel Section Analysis

Road Terrain
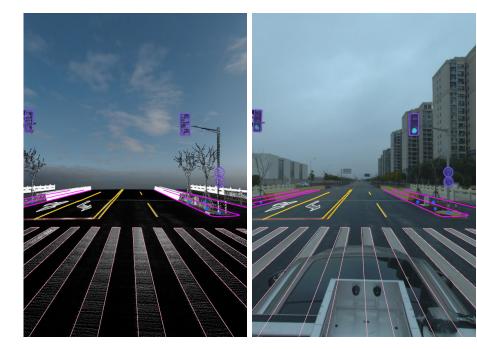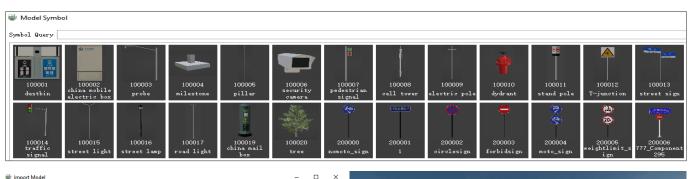
Contour Line
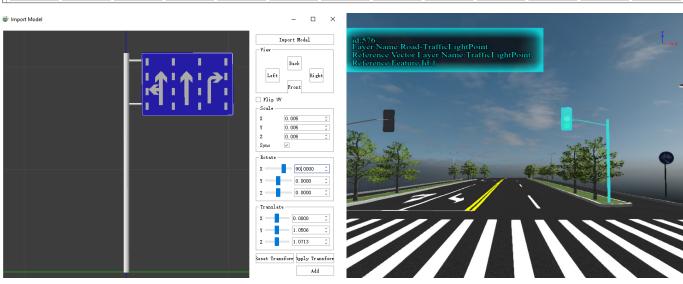
Road Scene
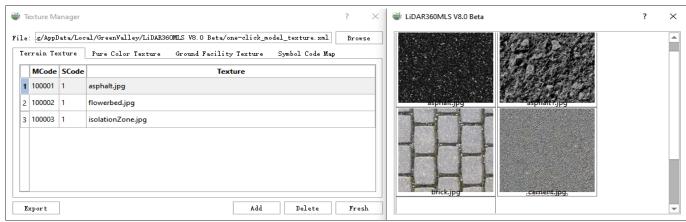
- Supports one-click generation of component-level 3D real scenes.

- Supports configurable texture rules to adapt to different project requirements.

- Supports automated quality inspection.

- Supports model library expansion and customized configuration of model textures, with over ten model editing tools.

- Supports model export in OBJ and OSGB formats.

Model Symbol

Symbol Query

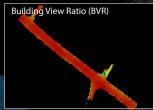| 100001 dustbin | 100002 china mobile electric box | 100003 probe | 100004 milestone | 100005 pillar | 100006 security camera | 100007 pedestrian signal | 100008 cell tower | 100009 electric pole | 100010 dydrant | 100011 stand pole | 100012 T-junction | 100013 street sign |
| 100014 traffic signal | 100015 street light | 100016 street lamp | 100017 road light | 100019 china mail box | 100020 tree | 200000 nomoto_sign | 200001 1 | 200002 circlesign | 200003 forbidsign | 200004 moto_sign | 200005 weightlimit_s ign | 200006 777_Component 295 |

Import Model

Import Model

View
Left Back Right Front

☐ Flip UV

Scale
X 0.005
Y 0.005
Z 0.005
Sync ☑

Rotate
X 90.0000
Y 0.0000
Z 0.0000

Translate
X 0.0000
Y 1.0506
Z 1.0713

Reset Transform   Apply Transform
Add

id:576
Layer Name:Road-TrafficLightPoint
Reference Vector Layer Name:TrafficLightPoint
Reference Feature Id:1

Texture Manager

File: g/AppData/Local/GreenValley/LiDAR360MLS V8.0 Beta/one-click_model_texture.xml   Browse

Terrain Texture | Pure Color Texture | Ground Facility Texture | Symbol Code Map

	MCode	SCode	Texture
1	100001	1	asphalt.jpg
2	100002	1	flowerbed.jpg
3	100003	1	isolationZone.jpg

Export   Add   Delete   Fresh

LiDAR360MLS V8.0 Beta

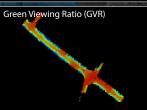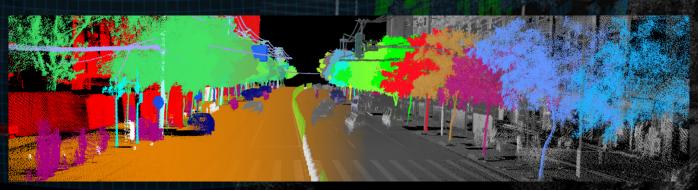asphalt.jpg   asphalt1.jpg
brick.jpg   cement.jpg

Forestry

- Supports AI-based point cloud classification.

- Supports seed point extraction in single-point, batch, and global modes.

- Supports individual tree segmentation and parameter extraction.

- Provides an individual tree editor with parameter measurement tools.

- Supports measurement of parameters including DBH, Height, Crown Width, Crown Length, Crown Diameter, Crown Diameter SN, Crown Diameter EW, CBH, Angle, Area, etc.

- Supports individual tree management with parameters and photos.

- Generates ecological landscape thematic maps.

- Supports simulation analysis of Green Viewing Ratio (GVR), Green Volume, Sky View Factor (SVF), etc.

- Expands the batch processing mode for ecological landscape analysis, meeting the needs of large-scale scene analysis.

Building View Ratio (BVR)

Green Volume (GV)

Green Viewing Ratio (GVR)

Sky View Factor (SVF)

	Image	Object ID	X	Y	Z	DBH	Height	Angle	CrownDiameter	CrownDiameterS	CrownDiameterE	CrownLength	CrownWidth	Area	Volume	El...
1	Blob	626			12.329	0.189	7.540	4.656	7.021	7.463	6.806	8.474	6.516	38.718	143.178	
2	Blob	631			12.702	0.285	11.969	2.941	8.041	9.969	8.135	10.082	8.080	50.779	252.884	

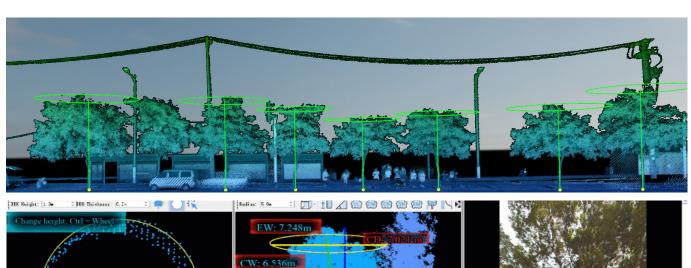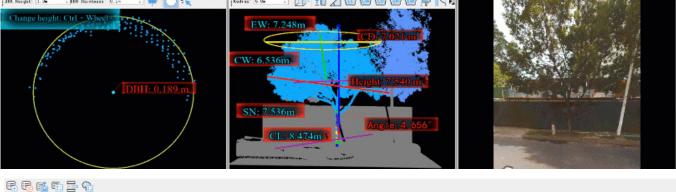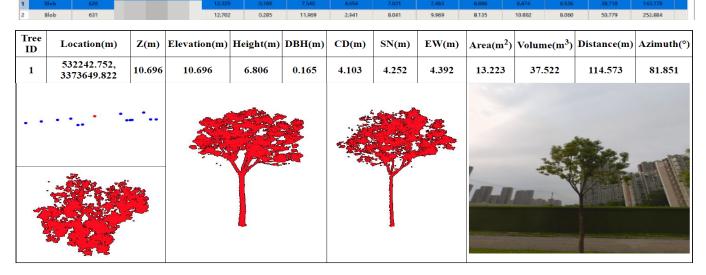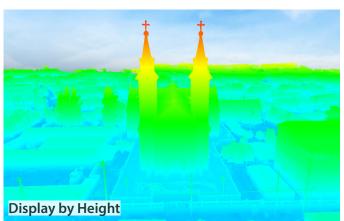| Tree ID	Location(m)	Z(m)	Elevation(m)	Height(m)	DBH(m)	CD(m)	SN(m)	EW(m)	Area(m^2)	Volume(m^3)	Distance(m)	Azimuth(°)
1	532242.752, 3373649.822	10.696	10.696	6.806	0.165	4.103	4.252	4.392	13.223	37.522	114.573	81.851

GSReconstruction

- Supports Gaussian splatting reconstruction from LiGrip data.

- Supports Gaussian splatting reconstruction from UAV data.

- Supports Gaussian splatting reconstruction from general COLMAP data.

- Supports cluster-mode reconstruction, exponentially improving efficiency for large-scale scenes.

- Supports seamless rendering of large-scale Gaussian data with hundreds of millions of points.

- Supports generating photo-realistic 3D models with exquisite detail that faithfully replicate the real world.

- Supports Gaussian models containing absolute coordinate information, enabling precise 3D measurements.

- Supports linked display, measurement, and 3D mapping across Gaussian data, point clouds, and panoramic imagery.

- Provides the industry's first Gaussian model editing software, featuring selection and clipping, class editing, individual object editing, noise point editing, flattening, and more.

- Supports importing and editing reconstruction results from third-party software such as DJI Terra.

- Supports arbitrary and edge-based cross-sections with full editing, measurement, and mapping functions.

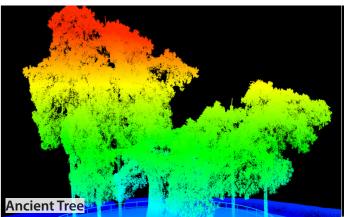- Supports importing and exporting in LiSplat and PLY formats.

Display by RGB

Display by Classification

Display by Height

Display by Label

Before Splat Editor

After Splat Editor

Gaussian-linked point cloud

Panorama-linked Gaussian

3D Measurement

Height: 2.563 m

Sculpture Scene

Ancient Tree

Substation Scene

Architectural Facade Scene