RELEASE NOTES

Trimble eCognition Suite

for Windows operating system

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Trimble

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Legal Notes

Acknowledgments

Portions of this product are based in part on third-party software components.

Last updated: November 9th, 2017

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Overview

1.1 About eCognition Suite

Trimble® eCognition® Suite is an advanced analysis software available for geospatial applications. It is designed to improve, accelerate and automate the interpretation of a variety of geospatial data and enables users to design feature extraction or change detection solutions to transform geospatial data into geo-information.

eCognition imports a variety of geospatial data, fusing them together into a rich stack of geo-data for the analysis. The analysis logic is structured into series of steps to create a computer-based representation of an expert's geospatial interpretation process a so called Rule Set. eCognition then combines the analysis logic with scalable computing power to identify changes over time or features on the earth's surface across very large sets of data.

eCognition Suite version 9.2 is a major release and includes a range of new features and bug fixes. We recommend upgrading to this new version to benefit from the new features and improvements. For an overview of the highlights please refer to chapter eCognition Suite 9.3 Highlights, page 5. A complete list of new features and bug fixes can be found in chapter New Features - Bug Fixes and Limitations, page 9.

1.2 Key Features

Building Analysis Solutions

The eCognition technology examines image pixels not in isolation, but in context. It builds up a picture iteratively, recognizing groups of pixels as objects. Just like the human mind, it uses color, shape, texture, shape and size of objects, as well as their context and relationships, to draw the same conclusions that an experienced analyst would draw.

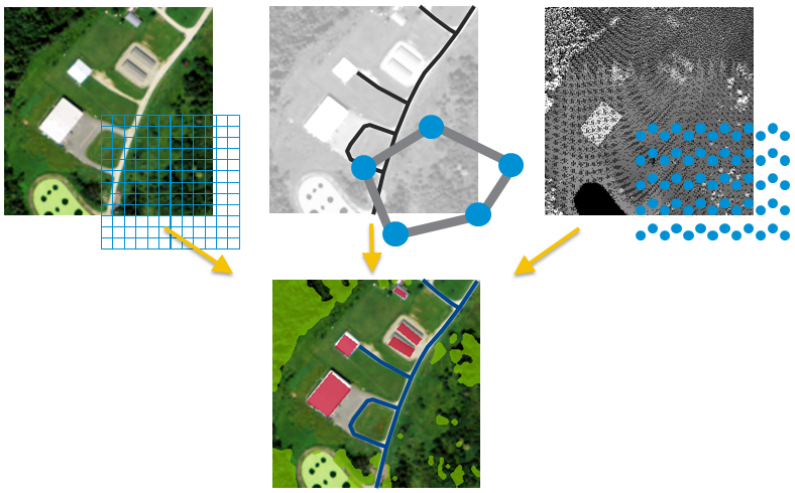
To build an analysis solution, it is possible to flexibly combine the image interpretation steps like object creation (segmentation), object classification (knowledge based, fuzzy logic, machine learning), object detection (template matching) and object modification (fusing, smoothing, orthogonalization, simplification) into a Rule Set or even a new application (Rule Set with UI) to solve the analysis problem.

The result is a unique approach to translate mind models (why a human interpreter can see the objects, changes, or features in the geospatial data) into computer understandable code (Rule Set) or an individual/customized application.

Leveraging Data Synergies

eCognition can fuse a variety of geospatial data, such as spectral image data, 3D structure data from point clouds and spatial/thematic data from GIS vectors.

The proximity of eCognition to GIS, its ability to link and fuse the available data in an analysis - combined with the straightforward export of results to GIS layers - help eCognition users to achieve outstanding results.



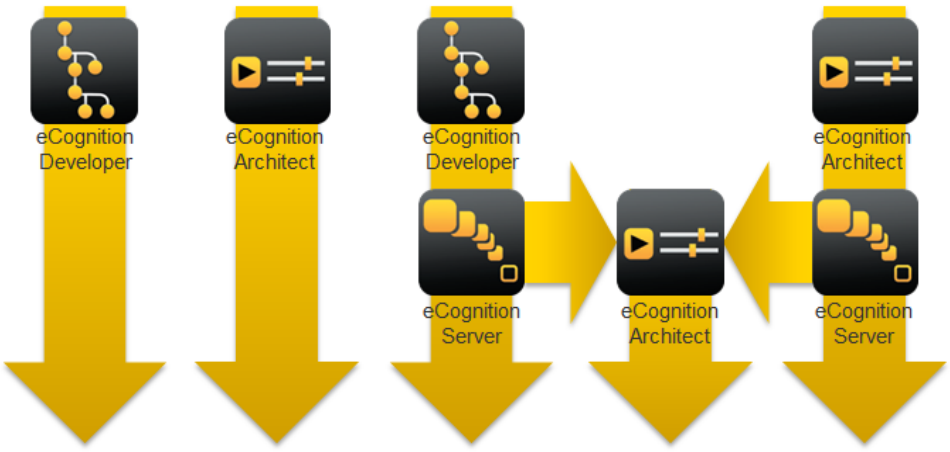
Efficient Workflows

The eCognition Suite offers three different components which can be used stand-alone or in combination to solve even the most challenging fully automated and semi-automated production tasks:

- eCognition Developer is the development environment for object-based image analysis. It is used in geospatial industry to develop Rule Sets or applications for eCognition Architect for the automatic analysis of geospatial data.
- eCognition Architect enables non-technical professionals such as vegetation mapping experts, urban planners or foresters to leverage eCognition technology. Users can easily

configure, calibrate and execute analysis applications (Rule Set in combination with a UI) created in eCognition Developer.

- eCognition Server software provides a powerful processing environment for batch and parallel execution of analysis jobs, based on Rule Sets or applications.

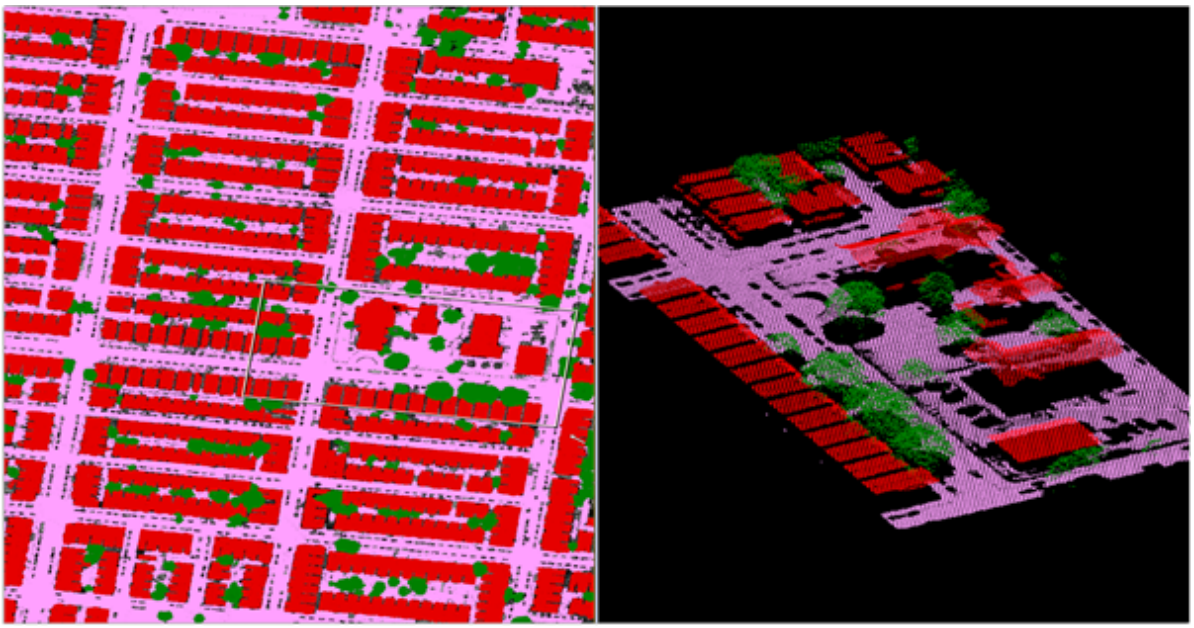


1.3 eCognition Suite 9.3 Highlights

1.3.1 Advanced Object Based Point Cloud Analytics

The new 3D point cloud capabilities enable users to integrate aerial and terrestrial point cloud data to perform complex 3D data classification, extract information and analyze change over time. Therefore, eCognition 9.3 provides new features so users can benefit from the full integration of point cloud data, regardless whether the source is LiDAR or dense matching. New capabilities improve point cloud analytics and include algorithms for automated point cloud classification and transferring thematic information between point clouds.

For example, the automatic point cloud classification algorithm supports basic land cover classification directly from the XYZ information through the classification of ground, vegetation, buildings and more.

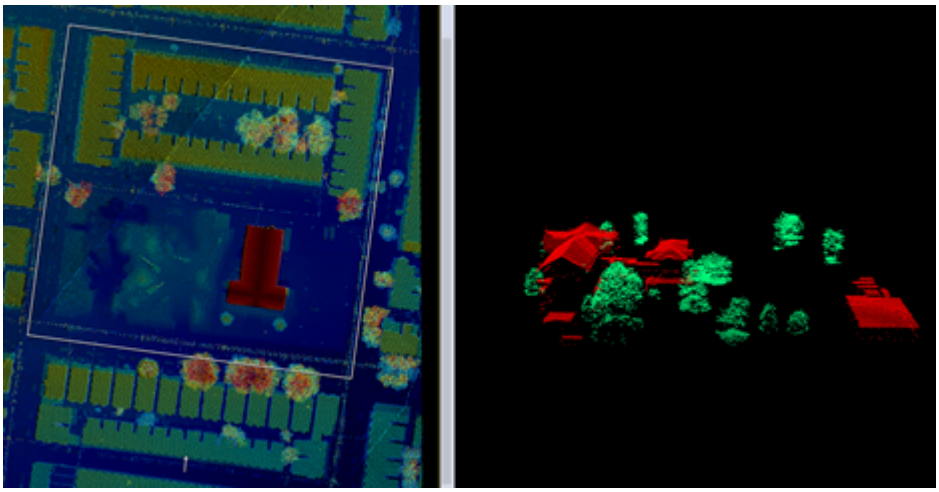


1.3.2 Enhanced Point Cloud Viewing

With the improvements made to point cloud integration comes a new point cloud viewer in 9.3. Apply new point cloud viewing features to get the full information potential of your input data and to effectively combine raster, vector and point cloud data within your project.

The new viewer supports a variety of point cloud fields such as elevation, classification, intensity, RGB (if available) and more. Furthermore, the user can control various 2D and 3D view modes to get a better understanding of the data.

Predefined perspectives can be used to walk through the point cloud and individual points can be selected and associated attributes examined in multiple view simultaneously.



1.3.3 Extended Image Analysis using Deep Learning

By leveraging deep learning technology from the Google TensorFlow™ library, eCognition empowers customers with highly sophisticated pattern recognition and correlation tools that automate the classification of objects of interest for faster and more accurate results. eCognition 9.3 now provides new algorithms to directly leverage this state of the art machine learning technology. The new tools include a trainable convolutional neural network model and algorithms for the automatic generation of sample patches, train and apply model as well as the ability to save and load models into eCognition.

1.3.4 Accelerated Image Object Creation

In addition, we have added a variety of the latest Superpixel segmentation approaches for faster image objects creation. These include SLIC, SLICO and MSLIC.

SLIC superpixel segmentation region size 10 - 20 – 40

SLICO superpixel segmentation region size 10 - 20

MSLIC superpixel segmentation region size 10 - 75

1.3.5 Improved Usability

We have optimized the readability of software dialogs, windows and the Rule Set Tree to provide a uniform experience for high-DPI (4k) display systems.

In addition, eCognition 9.3 benefits from a newly introduced memory-compression for temporary layers which improves performance and saves disk space particularly when working with large images.

eCognition 9.3 now supports EXIF information, a standard format for the storage of metadata in digital imagery, for both the JPG and TIFF formats.

2

New Features - Bug Fixes and Limitations

2.1 New Features

New Features in eCognition 9.3.0:

Story	Feature	Description
Algorithms	New algorithm: superpixel segmentation	Algorithm allows fast segmentation based on the superpixel implementation of OpenCV
Algorithms	Improved algorithm: set rule set options	Users can choose to enable or disable GPU processing in the OpenCV based algorithms
Algorithms	Improved algorithm: create/modify project	Parameter 'Image layer ID' can be assigned based on a variable
Algorithms	Improved algorithm: set custom view settings	Image equalization mode can be defined by user
Algorithms	Improved algorithm: set ruleset options	New parameter allows setup of multi-core usage within the ruleset
Algorithms	Improved algorithm: convert image objects to vector objects	Attributes of type integer can now be created
Algorithms	Improved algorithm: template matching	Users can process an image with a template at several user-defined orientations
Algorithms	Improved algorithm: template matching	Users can select a single orientation to be used for the template
Algorithms	Improved	Users can choose between "latest" and "current"

	algorithms: new option for compatibility mode parameter	version to define how algorithm will behave in future versions of eCognition
Convolutional neural networks	New algorithm: generate labeled sample patches	Convenient generation of sample patches to be used in training of convolutional neural networks
Convolutional neural networks	New feature: number of sample patches	Denotes the number of samples patches of a given class within a specified sample folder
Convolutional neural networks	New algorithm: create convolutional neural network	Creates a convolutional neural network architecture with random initial weights. The model receives the image as input, and generates classes on output, with a user-defined number of hidden layers in between
Convolutional neural networks	New feature: convolutional neural network model info	Provides detailed information on the network architecture in string format
Convolutional neural networks	New algorithm: train convolutional neural network	Trains the network based on labeled sample patches and adjusts the model weights using back-propagation
Convolutional neural networks	New algorithm: apply convolutional neural network	Applies the convolutional neural network to an image, producing heat map layers for selected classes
Convolutional neural networks	New algorithms: load/save convolutional neural network	Loads or saves network architecture and weight settings
Drivers	New predefined imports for point clouds	New predefined import templates to load point cloud data according to 3D data specification
Drivers	New import/export support	EXIF metadata of jpg images can be imported and exported
Drivers	New import/export support	64-bit float images can be imported
Performance	Improved performance for	Many memory-intensive algorithms benefit from the introduction of memory-compression for

	large images.	temporary layers
Performance	New option in eCognition.cfg: "use multiple files for memory swapping on Linux"	Enable memory compression if the Linux default restriction of 1024 open file handles has been removed
Point cloud analysis	New algorithm: automatic point cloud classification	Classifies a point cloud based on LAS classes
Point cloud analysis	Improved point cloud algorithms: multi-layer selection	Point cloud algorithms allow for selection of multiple input point clouds
Point cloud analysis	Improved algorithm rasterize point cloud	New parameter allows users to define a kernel size
Point cloud analysis	New feature group: point-cloud related features	These features provide information on individual points
Point cloud analysis	New point cloud features available in image object information	Display point cloud features of a point selected in the viewer
Point cloud analysis	New parameter: point cloud filter	Powerful filters using complex conditions can be created inside many point cloud algorithms
Usability	Improved UI: dpi sensitive UI	Optimized readability of software dialogs, windows and the Rule Set Tree to support high-resolution 4K monitors
Usability	Improved toolbar: new button to save ruleset	Users can save the rule set with a single click
Usability	Improve error message: legacy rasterization	User is informed if out-dated rasterization is used in a ruleset and can opt for new methods
Usability	Improved algorithm: start thematic edit mode	Manual drawing of lines can now be completed conveniently with a double-click
Usability	Improved workflow	User cannot uninstall while running the software

	guidance	
Usability	Improved error message: layer arithmetics algorithm	Clear error message for the layer arithmetics algorithm if string cannot be parsed
Viewer	Improved viewer: display individual points in image viewer (top down view).	Points can now be visualized together with raster and vector layers in the standard eCognition viewer
Viewer	New dialog: point cloud mixing	Dialog allows customization of point cloud display. Different display modes are available, including a new height-based color rendering
Viewer	Improved window "view settings": new option background color	Users can select the background color displayed in the absence of image or point cloud data
Viewer	New toolbar buttons: 3D subset selection	A simple two-click rectangular selection is provided on the standard view settings toolbar. A 3-click selection allows for flexible rectangular selection and is available on the 3D toolbar
Viewer	Improved 3D viewer	Performant display and intuitive navigation of point cloud subsets
Viewer	Improved 3D viewer: visualization of center of rotation	Center of rotation is displayed when user rotates point cloud using left mouse button
Viewer	Improved viewer: show correspondence to 3D viewer.	Standard viewer displays outline (of 3D subset) and arrow (to indicate the vantage point)
Viewer	Improved toolbar: additional buttons for 3D toolbar	Users can choose between orthogonal and perspective view, and select predefined vantage points
Viewer	Improved viewer: points can be selected	Users can select and highlight individual points with a simple mouse click

2.2 Bug Fixes

The update includes the usual bug fixes and improved performance and system stability.

Bug Fixes in 9.3.0:

Reference	Description
ECOG-4642	Algorithm export thematic raster files: irrelevant classes exported for export type 'classification'
ECOG-3961	Order of parameters in custum algorith is incorrectly reflected in autonaming
ECOG-3836	DIAMkWksp does not work on Linux
ECOG-4164	Algorithm template matching: when image and template have same size, match is not evaluated
ECOG-4030	License borrowing option missing for Architect installation
ECOG-4384	Error returning license on Win10
ECOG-4646	DIAMkWksp crashing after workspace creation on Windows 10
ECOG-4371	Template editor crashes on unsinged int 32 bit images
ECOG-4227	Half-pixel shift using JP2 images
ECOG-4203	Multi-threshold segmentation can lead to corrupt image object hiearchy if objects are very large
ECOG-4132	Algorithm calculate random number: identical values returned if used twice within same time period
ECOG-4028	Project Input data path not displayed correctly after redefining file path
ECOG-4179	Algorithm vector buffering: incorrect objects for line file input
ECOG-4669	Algorithm vector buffering: cannot use vector attribute for offset distance
ECOG-4316	Polygon .shp file is read as line .shp file
ECOG-4303	Algorithm export vector layer: pixel shift for point layer export in center-of-gravity mode
ECOG-4238	Rasterization of vector lines sometimes incorrect
ECOG-4217	Algorithm convert image objects to vector objects: vectors are simplified
ECOG-4195	Algorithm contrast split segmentation: does not work with object features
ECOG-4194	Algorithm contrast split segmentation: min contrast condition is not applied

ECOG-4183	Map name variable cannot be designated by a local string variable
ECOG-4130	Algorithm multi-resolution segmentation: small variations in scale parameter can dramatically change results
ECOG-3922	Algorithm create/modify project: ID column not recognized for thematic layer import
ECOG-3907	Algorithm export vector layer: after resaving ruleset algorithm may export slightly different shapes
ECOG-3902	Predefined/customized import: FileGDB import improved
ECOG-3831	Action Library: radio button sometimes cannot be unchecked
ECOG-3822	Algorithm fill pixel values: performance improvements / bug fixes
ECOG-3767	Algorithm chessboard segmentation: incorrect segmentation when applying self-intersecting polygons

2.3 Known Issues and Limitations

Prior to installing license server 9.3 users should return all licenses and uninstall previous versions of the license server. All 9.3 products require license server version 9.3 to work. Please contact support for further questions.

Since eCognition 9.0 it is not possible to create and use 3D raster stacks based on point cloud data, because the Z resolution of LAS files is not supported by the LAS driver anymore.

The License Server does not support the web interface on Linux distribution CentOS 6 (license server startup script needs to be modified to use -noWeb option for lmadmin).

An intended limitation is that the *trial version* of eCognition Developer does not allow saving of projects.

3

Acknowledgments

Portions of this product are based in part on the third-party software components. Trimble is required to include the following text, with software and distributions.

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3.1.1 gcore/Verson.rc

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3.1.2 frmts/gtiff/gt_wkt_srs.cpp

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The Unix configuration script "configure" was produced with GNU Autoconf.

It is copyright by the Free Software Foundation but is freely distributable.

The same holds for its supporting scripts (config.guess, config.sub, ltconfig, ltmain.sh). Another support script, install-sh, is copyright by M.I.T. but is also freely distributable.

It appears that the arithmetic coding option of the JPEG spec is covered by patents owned by IBM, AT&T, and Mitsubishi. Hence arithmetic coding cannot legally be used without obtaining one or more licenses. For this reason, support for arithmetic coding has been removed from the free JPEG software. (Since arithmetic coding provides only a marginal gain over the unpatented

Huffman mode, it is unlikely that very many implementations will support it.)

So far as we are aware, there are no patent restrictions on the remaining code.

The IJG distribution formerly included code to read and write GIF files.

To avoid entanglement with the Unisys LZW patent, GIF reading support has been removed altogether, and the GIF writer has been simplified to produce "uncompressed GIFs". This technique does not use the LZW algorithm; the resulting GIF files are larger than usual, but are readable by all standard GIF decoders.

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